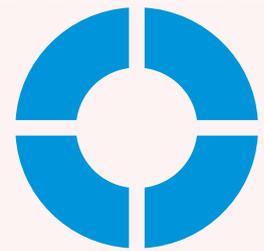


CONCRETE PROTECTION

CONCRETE PROTECTIVE LINERS



agru

Worldwide Competence
in Plastics

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Wastewater treatment plant in Amsterdam - realisation with concrete protective liners.

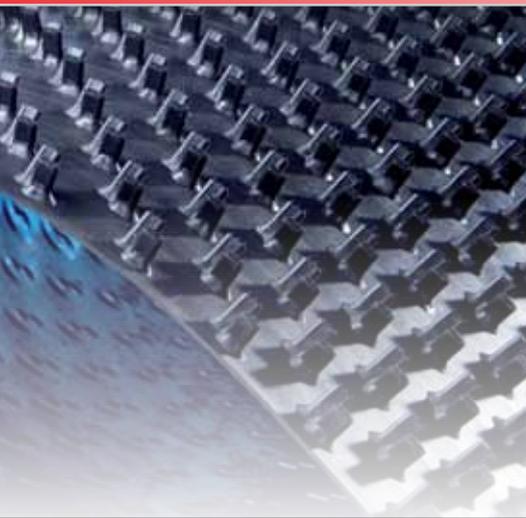
Worldwide competence in plastics

AGRU Kunststofftechnik GmbH is a family-owned, highly productive enterprise headquartered in Austria with worldwide activities in production and sales of high-quality thermoplastic products. One of our core competences are concrete protective liner made of PE, PP, PVDF and ECTFE.

Our product group CONCRETE PROTECTION offers a complete and top-quality range of concrete protective liners. The main focus is the protection of concrete structures from aggressive and abrasive media.

Concrete protective liners are used wherever there are increased requirements towards the concrete structure. The concrete protective liners are popular where fluids or gases have to be transported and stored.

CONCRETE PROTECTION



Sure Grip® system

The Sure Grip® concrete protective liner system, developed and patented by AGRU, is a high-quality solution for the innovative long-term protection of concrete structures. It fulfils the highest requirements for a chemical-proof construction.

Sure Grip® concrete protective liners made of HDPE, HDPE-el, PP, PVDF and ECTFE are produced with state-of-the-art manufacturing facilities. For more than 25 years this system has been successfully applied worldwide.

A system with benefits

Concrete protective liners prevent concrete degradation and thus expand the lifetime of the construction. Moreover exfiltration and infiltration are avoided, which is a direct protection of the environment. Furthermore the unique anchoring system enables also constructions in areas of backpressure.

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Concrete protective liner advantages

Concrete protective liners combine the advantages of thermoplastics (flexible, ductile, no corrosion) with those of concrete (high strength, high stiffness). Thus the concrete is protected effectively and the durability is increased.

- Applicable for countless concrete structures
- Absolute mechanical anchoring to the concrete structure
- Bridging of cracks in the concrete
- High impact resistance
- Excellent shear resistance
- Suitable for aggressive media (no corrosion)
- Applicable within a wide temperature range
- Long life expectancy
- Low maintenance effort and easily cleanable
- Easy and safe installation
- Available in UV resistant materials

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CONCRETE PROTECTIVE LINERS



Innovative & unique design

The unique V-shaped anchor studs, which are directly formed onto the liner during the extrusion process, allow a safe mechanical anchoring of the concrete protective liner to the concrete.

This design guarantees optimum anchoring to the concrete or injector, even though plastic and concrete do have different thermal expansion coefficients.

Depending on the project requirements, different stud forms and liner thicknesses are available.

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Prefabrication of concrete pipes with Sure Grip® liner.

Lining of precast concrete structures

The Sure Grip® system as well as the Ultra Grip® system enable a wide range of applications for the lining of prefabricated concrete structures.

The systems, especially developed by AGRU for concrete pipes, distinguish themselves by efficiency in processing and the following installation.

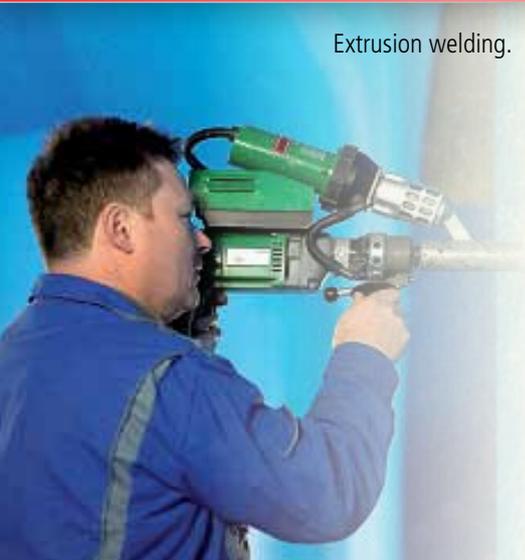
Applications:

- Prefabricated concrete elements
- Concrete pipes and manholes
- Tank construction
- Oil separators

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CONCRETE PROTECTION



Extrusion welding.

For ever sealed

Concrete protective liners are joined by welding, which make the connections permanent and reliable.

Different welding technologies, depending on the project requirements, are available for a safe and leak-tight joint:

- Heating element butt welding
- Extrusion welding
- Hot wedge welding

Well prepared...

Installation and welding trainings at AGRU's or on-site are offered services.



Heating element butt welding.

Lining of cast in situ structures

The concrete protective liners are adjusted to the shape of the construction on-site. They are mounted to the formwork fast and safely by means of end profiles and tear off profiles. After the hardening of the concrete the concrete protective liner system is made leak-tight with extrusion welding.

This installation method has the benefit of erecting the concrete protective liners and the formwork at the same time. Therefore no additional time is required.

Applications:

- Underground constructions
- Foundations and bridges
- Areas, where chemical media are used, transported or stored
- Any kind of basins



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LINING OF NEW CONSTRUCTIONS



Concrete protection must-haves

Concrete connection sockets (type 1 & 2)

Concrete connection sockets are used for permanent and leak-tight chamber connections and pipe penetrations in concrete constructions. They are mounted aligned to the formwork and cast into concrete. Prefabricated grooves ensure a secure anchoring. The concrete connection sockets are permanently and tightly connected with PE pipes by electrofusion welding.

Concrete connection sockets.



Type 1

Type 2

AGRUPLAST purging rod

The purging rod cleans the plasticating chamber of the extrusion gun. Due to the special material composition, the AGRUPLAST purging rod removes coloured remains, incrustated polymers and even rust particles. A repeated use additionally maintains the extrusion gun. To summarise it: The AGRUPLAST speeds up material and colour changes.



AGRUPLAST purging rod.



Stepwise relining at Duslo (Šafa, Slovakia).

Relining of concrete structures

Relining tanks

Additionally to the lining of new structures, concrete protective liners can also be used for relining. This is a very cost effective way of renovating concrete tanks as the existing concrete structure remains and the concrete protective liners are applied ex post.

Trenchless relining of underground pipes

AGRU offers system solutions for trenchless relining which enable the rehabilitation of any cross sections and different dimensions, independent from the degree of corrosion:

- Segment relining
- Hose relining

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Segment relining

Short prefabricated inliner sections are inserted into the channel. Then they are fixed to the formwork. The gap between the liner and the old pipe is finally backfilled with highly flowable injection mortar. After the hardening the formwork is removed and the single segments are welded together.

Starting with dimension 800 mm this relining method is very advantageous when it comes down to large dimensions as it is almost unlimited.

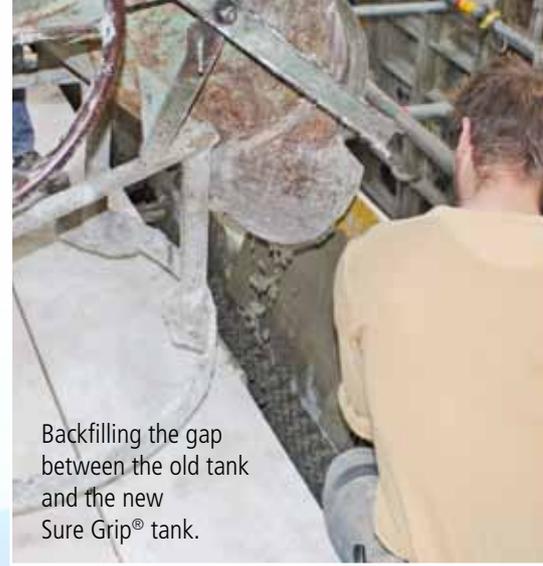


Tank relining

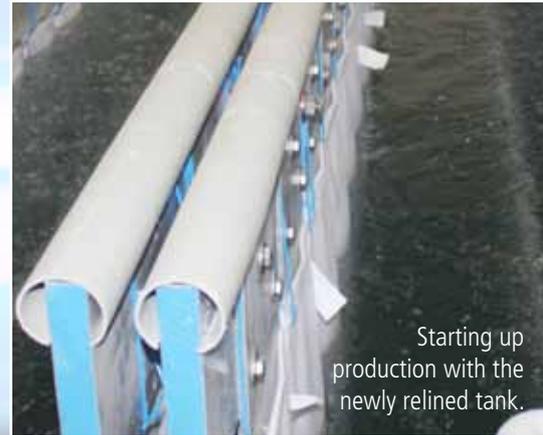
Most sections of a tank can be prefabricated as well as pre-assembled. This significantly speeds up the installation on-site. As a consequence the shutdown time of production is reduced, which saves costs and increased the economic efficiency.



Prefabricated corners for a tank relining.



Backfilling the gap between the old tank and the new Sure Grip® tank.



Starting up production with the newly relined tank.

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RELINING

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Hose relining

The liners, customised for each and every project, are drawn from manhole to manhole. The liner is sealed with balloons and water pressure is added depending on the grouting length. Afterwards special mortar is injected into the gap between the liner and the old pipe.

This system has been developed in cooperation with TROLINING® and has been used successfully for many years.

With hose relining section lengths up to 200 m are possible and rehabilitated diameters range from 300 mm up to 2000 mm.



Foto®:
Trolining GmbH.

Supply range (13 mm stud height)

Material	Thickness	
	from [mm]	to [mm]
PP grey	3.0	8.0
PP black	3.0	5.0
PE black	2.0	12.0
PE yellow	2.0	5.0
PE agate grey	2.0	5.0
PE-el black	3.0	5.0
PVDF natural	3.0	4.0
ECTFE natural	2.5	2.5

Supply range (19 mm stud height)

Material	Thickness	
	from [mm]	to [mm]
PE black	2.0	3.0

Sure Grip®

The well-established standard

The concrete protective liner standard type, with a stud height of 13 mm, is used for new constructions, tank rehabilitations as well as prefabricated elements such as concrete pipes and manholes.

For advanced requirements

The advanced type offers a higher pull-out resistance due to a stud height of 19 mm. It is used as concrete protection for new structures and repairs with high requirements, e.g. high ground-water pressure.

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CONCRETE PROTECTION

Supply range (13 mm stud height)

Material	Thickness	
	from [mm]	to [mm]
PE black	2.0	4.0
PE black/white	2.0	4.0
PE yellow	2.0	4.0

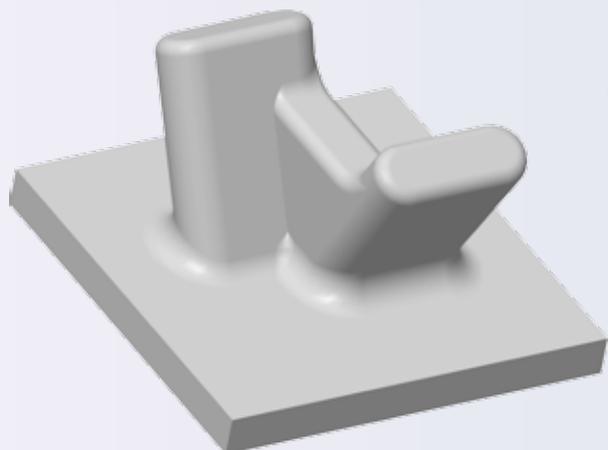
Ultra Grip®

For high backpressures

The innovative stud design of the Ultra Grip® has a conical shape. As a result it offers a superior resistance to being pulled out of the concrete.

Especially for installations of structures in groundwater, the Ultra Grip® sealing is recommended.

Furthermore it is of advantage that the Ultra Grip® concrete protective liner is available in 5 m width. Consequently it is the best solution for large constructions. The higher width reduces the number of welds up to 60 % which makes the installation faster and more cost-effective.



Self-cleaning system

Due to the latest scientific research on self-cleaning surfaces with bionic behaviour, this surface pattern was developed. The bionic surface leads to a reduced sedimentation in the bottom area of sewers and is especially beneficial at discontinuous flow.

Even at low flow rates a positive self-cleaning effect can be observed. Turbulences are created by the specially shaped ribs, resulting in solids being transferred to the liner's central bottom section and being carried away.

A reduction of maintenance costs for communes and a reduction of a biogenous production of hydrosulphureous acid, the main reason for the corrosion of concrete underground sewers, can be reached.

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UNLIMITED VARIETY

Supply range

Material	Thickness	
	from [mm]	to [mm]
PE yellow	2.0	3.0

Sure Grip® with bionic surface.



Sure Grip® special types

Sure Grip® with signal layer

Light-coloured signal layer for visual detection of damages; improved installation due to the sun reflecting white layer.

Sure Grip® with slip and slide protection

Slip and slide protection for lining floors.

Sure Grip® with polyester fabric

The fabric enables an adhesive bond to other materials such as PVC and steel.

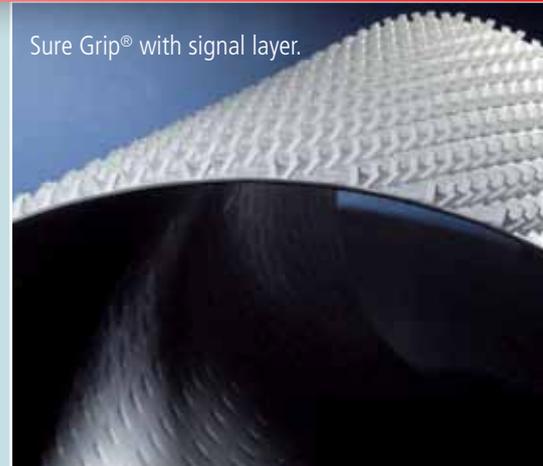
Sure Grip® in customised styles

Customised colours and sheet formats are available on request.

Accessories

Installation profiles, corners and welding rods facilitate the installation of the Sure Grip® concrete protection liners.

Sure Grip® with signal layer.



Sure Grip® with slip and slide protection.



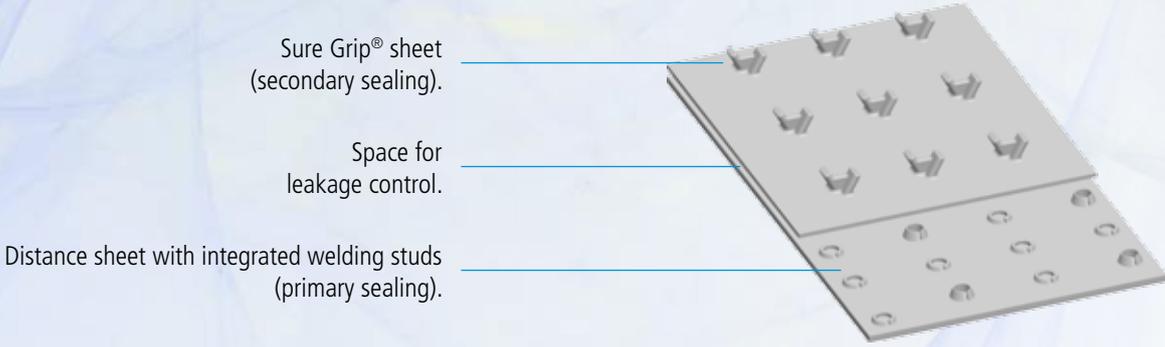
Supply range

Material	Thickness	
	from [mm]	to [mm]
PE black		
Sure Grip® sheet	3.0	4.0
Distance sheet	5.0	5.0

Double sealing system

The combination of Sure Grip® concrete protective liners and distance sheets do absolutely meet the requirements of storing environmentally hazardous media.

These two individual sealing systems are joined by an innovative technology (ultrasonic welding). The space between the sheets enables a permanent monitoring of the system.



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CONCRETE PROTECTION



Sure Grip® double sealing system.

Advantages

- Highest safety (combination of two independent systems)
- Space for monitoring (leakage control)
- High mechanical resistance
- Suitable for outdoor applications (UV stabilised)

Applications

- Storage tanks for groundwater dangerous media
- Reservoirs and drains in the chemical industry
- Disposal systems in the semiconductor industry
- Collecting and sewage basins

HYDRO⁺ concrete protective liner

Numerous positive experiences have made PE popular in the water industry (supply lines for potable water). In addition Sure Grip[®] concrete protective liners are well-established as protection of concrete structures. These reasons led to the development of the HYDRO⁺, a lining system for potable water tanks.

The HYDRO⁺ concrete protective liners are mainly used for new constructions. Both installation methods, cast in situ and precast elements, are possible. It is a perfect solution for higher temperature changes or in case of groundwater, where backpressure builds.

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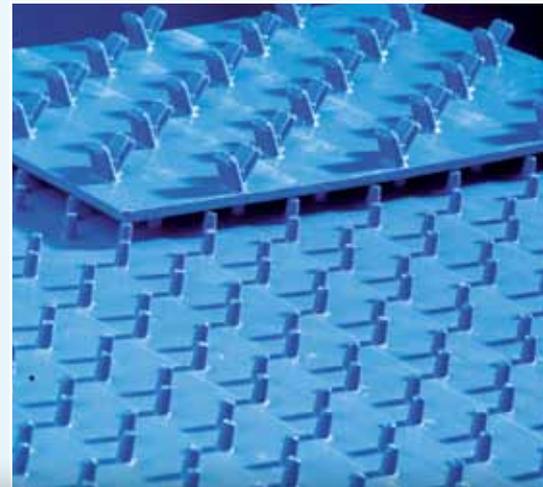
FOR POTABLE WATER STORAGE



Supply range

Material	Thickness	
	from [mm]	to [mm]
PE blue		
HYDRO ⁺	5.0	5.0
Distance liner	5.0	5.0

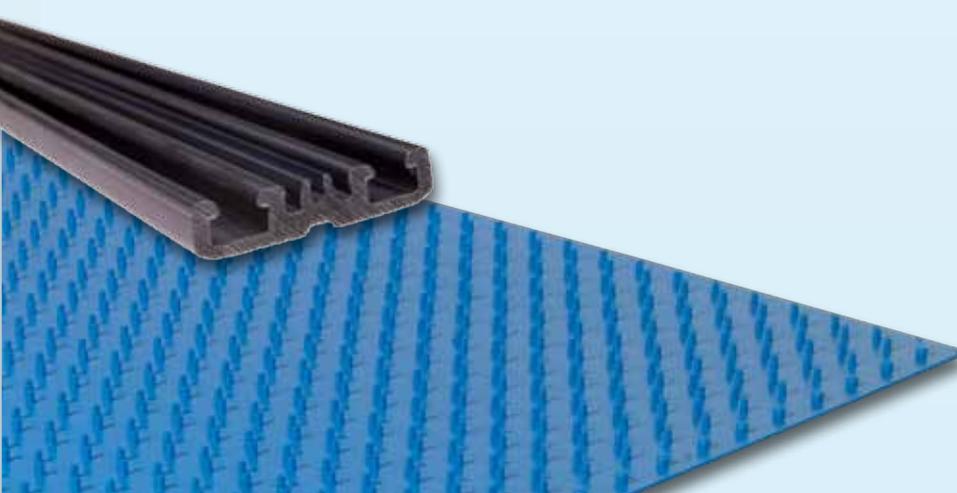
HYDRO⁺ and HYDRO⁺ distance liner.



HYDRO^{CLICK}

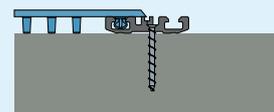
The HYDRO^{CLICK} system was especially developed for the rehabilitation of potable water tanks. The HYDRO^{CLICK} design enables a fast and safe installation for both, new constructions and renovations.

It is especially advantageous for the rehabilitation of existing tanks. Neither a removal of the old lining nor surface preparations are necessary. Therefore the HYDRO^{CLICK} system is cost saving and timesaving.



Supply range

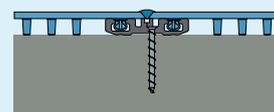
Material	Thickness	
	from [mm]	to [mm]
PE blue		
HYDRO ^{CLICK}	4.0	4.0
Extruded sheets	5.0	20.0



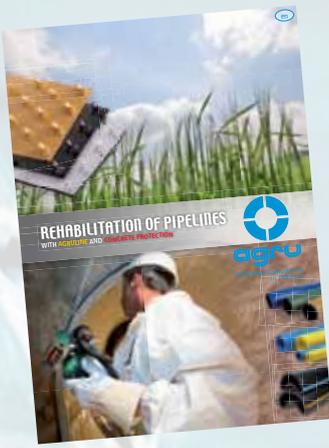
Step 1
CLICK!



Step 2
CLICK!

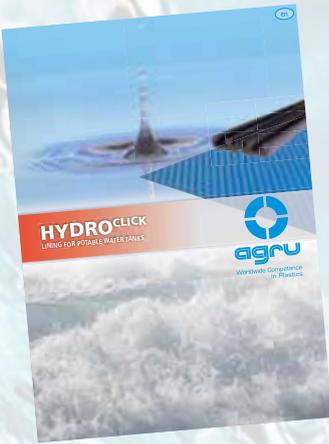


Step 3
Extrusion welding



Rehabilitation of pipelines

- Rehabilitation of old pipes with **AGRULINE** piping system
- Rehabilitation of old pipes with **CONCRETE PROTECTION** lining



HYDROCLICK

Lining for potable water tanks

- Fast installation
- Corrosion resistant
- Leak-tight system



● CONCRETE PROTECTION

CONCRETE PROTECTIVE LINERS

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