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# CONCRETE PROTECTION

AGRUSAFE PROTECTIVE LINERS



**agru**

Worldwide Competence  
in Plastics







Wastewater treatment plant in Amsterdam -  
realisation with AGRUSAFE liner products

## Worldwide competence in plastics

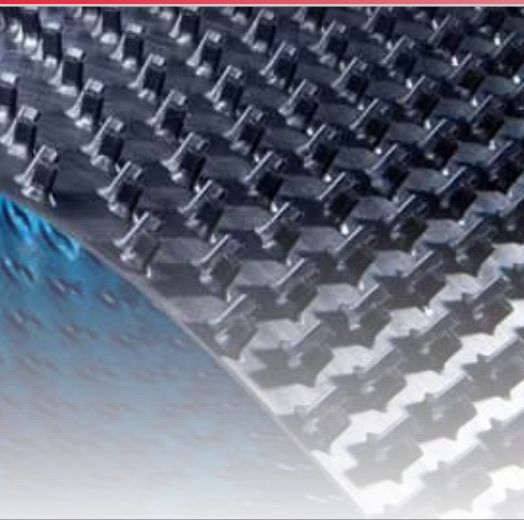
AGRU Kunststofftechnik GmbH is a successful, Austrian family business with worldwide activities in production and distribution of high-grade thermoplastic products.

With more than 50 years of experience, consequent pursuit of quality and a wide product range, AGRU has become a global player in the thermoplastic sector.

The name AGRU is inseparably tied to flexibility and customer orientation and is always exerted to provide optimal solutions for the customer.

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## AGRUSAFE



### Sure Grip® system

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

AGRU Sure Grip® concrete protective liner systems made of HDPE, HDPE-el, PP, PVDF and ECTFE are produced with state-of-the-art manufacturing facilities. The system is successfully applied worldwide for more than 20 years.

Photo: Wastewater tunnel in Singapore



## Advantages of thermoplastics

- Applicable for a wide range of structures
- Absolute mechanical anchoring of the plastic liner in the concrete
- Bridging of cracks in the concrete
- High impact resistance and excellent shear resistance
- Suitable for the storage and transport of aggressive media
- Chemical resistance and long life expectancy combined with low maintenance effort
- Applicable within a wide temperature range (up to 100 °C), PVDF and ECTFE up to 120 °C
- Available in UV-resistant materials
- Easy and safe installation

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## BETONSCHUTZPLATTEN



### Innovative & unique design

Based on the unique and patented design of the V-shaped anchor studs and their staggered order an exceptional mechanical anchoring to the concrete is reached.

This design guarantees absolute integrity of the installed system even though there are different thermal expansions appearing.

Studs with different slopes and heights offer an additional advantage for various applications.



Sure Grip® type 560

Sure Grip® type 560 concrete protective liner with a stud height of 13 mm are used for new construction as well as for constructions, tank rehabilitations, trans-loading areas, prefabricated elements and for concrete pipes and manholes.

**Thicknesses:**  
2.0 mm - 12.0 mm

**Materials:**  
HDPE, HDPE-el, PP grey and black, PVDF, ECTFE



Sure Grip® type 571

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

**Thicknesses:**  
2.0 mm - 12.0 mm

**Material:**  
HDPE

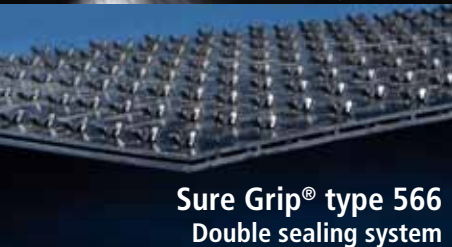


Ultra Grip® type 568

The liner, with revolutionary stud geometry is available in 5 m width and provides superior pull-out forces with only 13 mm stud height.

**Thicknesses:**  
2.0 mm - 4.0 mm

**Material:**  
HDPE



Sure Grip® type 566  
Double sealing system

The Sure Grip® double sealing system consists of 2 completely separate sealing elements (Sure Grip® concrete protective liner and distance sheet) which are welded together by ultrasonic welding.

**Thicknesses:**  
3/5 mm up to 4/5 mm

**Material:**  
HDPE

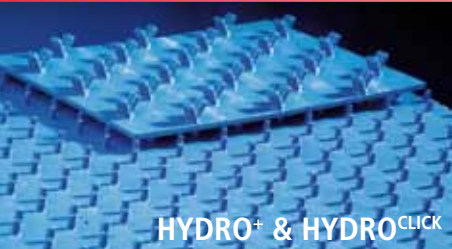
1. allows transition to other materials such as steel
2. PVC and steel

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# AGRUSAFE SUPPLY



HYDRO+ & HYDROCLICK

The HYDRO+ systems are designated for the lining of closed potable water tanks whether new construction or retrofit. The HYDRO+ for an in situ installation within the formwork erection, and the pouring of concrete and the new system development. HYDROCLICK for the installation after the concrete works are finished and for rehabilitations are designed and adopted for the

demands in potable water applications.

**Material:**  
PE 80 blue (RAL 5012)



Self Cleaning System

This concrete liner's bionic surface (on the media contact side) provides a self-cleaning effect in channel systems, even at low flow rates.

**Thicknesses:**  
2.0 mm up to 3.0 mm

**Material:**  
HDPE



with signal layer

## SPECIAL TYPES

### Sure Grip® with signal layer

very advantageous for visual detection of damages; improved installation because of a sun reflecting white layer.

### Sure Grip® with polyester fabric

allows transitions to other products such as PVC and steel.



with slip and slide protection

### Sure Grip® with slip and slide protection

slip and slide protection for accessible floor lining.

Installation profiles, welding rods and concrete connection sockets at pipe penetrations/connections facilitate the installation of the Sure Grip® concrete protection liners.



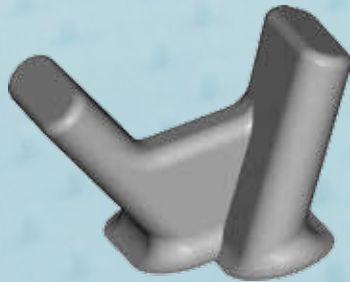
## AGRUSAFE Ultra Grip®

### Sure Grip® with improved stud geometry

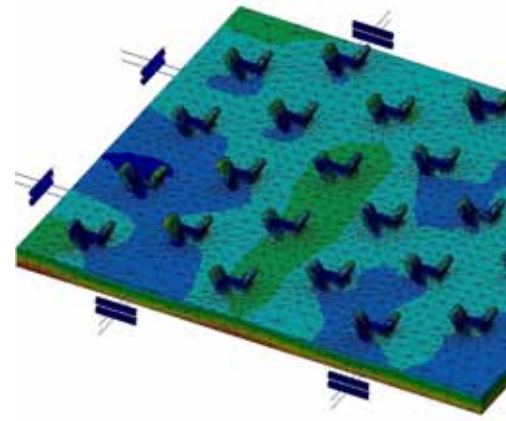
The innovative stud design of the AGRUSAFE Ultra Grip® offers superior pull-out resistance from the concrete.

Especially for installations of structures in groundwater, the Ultra Grip® sealing element is a protection from delaminations and the pulling out of anchoring elements from the concrete.

The AGRU Ultra Grip® concrete protective liner is available in 5 m width. This is reducing the welding requirements in the field up to 60 % compared to other liner systems.



Extensive formwork



## SCS BIONIC SURFACE

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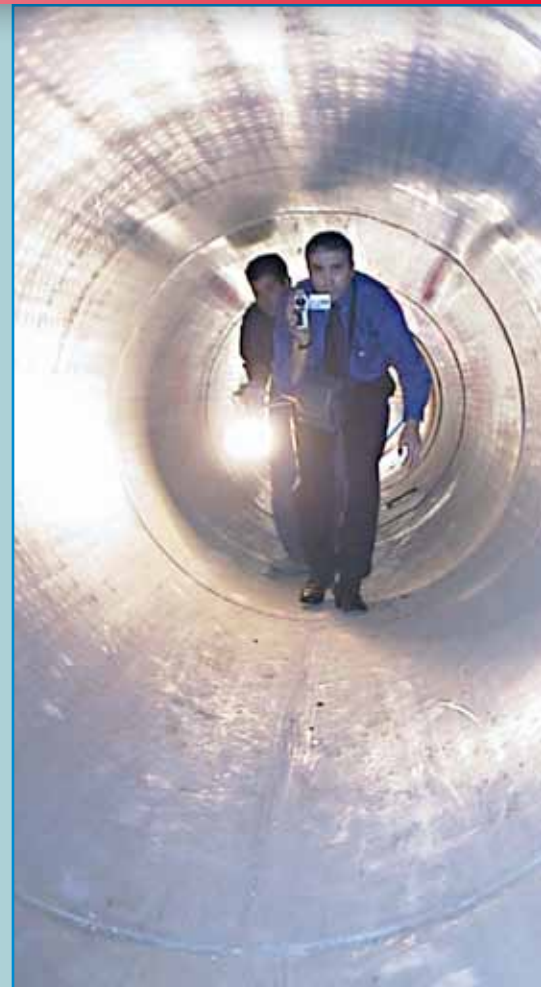
### Self Cleaning System

Due to the latest scientific research for self cleaning surfaces with bionic behaviour, a surface pattern could be developed, which results in a decrease of sedimentation in the bottom area of sewers at discontinuous flow.

Especially at low flow rates a positive self cleaning effect can be reached by the turbulences created by the specially shaped ribs, resulting that solids are transferred to the liner's central bottom section and removal.

A reduction of maintenance costs for the communes and a reduction of biogenous production of hydro-sulphurous acid, which is the main reason for the corrosion of concrete underground sewer lines, can be reached.

In addition the surface structure of the bottom section is a slip and slide protection and increases the safety for inspections during monitoring works. In dependence on the diameter, production lengths for no-dig installations up to 200 m can be manufactured.







1



2



3

## Sure Grip® - Double sealing

The combination of AGRUSAFE Sure Grip® concrete protective liners and distance sheets are especially suitable to fulfil the requirements of the storage of water and environmentally hazardous media.

These two individual sealing systems are connected by an innovative technology. The space enables a permanent control of the system.

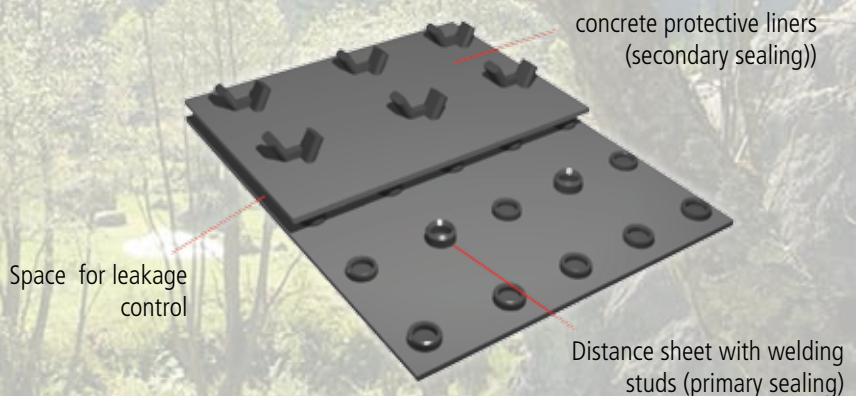
### Advantages

- Monitoring the space between the two liners
- Constant distance of the monitored space
- High mechanical resistance
- Combination of two independent sealing systems
- Combination of different sheet thicknesses is possible

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# AGRUSAFE DOUBLE SEALING

1. Double sealing system installed on form work (before pouring the concrete)
2. Preparation of welding joints
3. Pumping station with AGRU Sure Grip® double sealing and connection to a double layer sealing system



## Applications

- Lining of concrete storage tanks
- Storage of groundwater dangerous media in collecting basins
- Lining of reservoirs and drains in the chemical industry
- Sewage disposal systems in the semiconductor industry
- Lining of sewage basins



## HYDRO<sup>+</sup> concrete protective liners

Based on the positive experience with PE piping systems for potable water supply and the Sure Grip<sup>®</sup> concrete protective liners for the protection of concrete structures, the AGRUSAFE HYDRO<sup>+</sup> system was developed for the lining of potable water tanks.

The HYDRO<sup>+</sup> concrete protective liners in new constructions, where the sheets are installed on the formwork or used for precast elements, create a mechanical bond with the concrete by the anchor studs and is a perfect solution for higher temperature changes or in case of groundwater where backpressure builds.

## HYDRO<sup>CLICK</sup> system

The new HYDRO<sup>CLICK</sup> system has been developed in cooperation with the Swiss company ETERTUB AG. The HYDRO<sup>CLICK</sup> design enables a fast and safe installation for both, new constructions and renovations.

Especially for the rehabilitation of existing and coated tanks a removal or surface preparation of the concrete are not necessary and therefore cost and timesaving.

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# HYDRO<sup>+</sup> & HYDRO<sup>CLICK</sup>



## HYDRO<sup>CLICK</sup>

- Clean installation
- Short installation time
- Prefabrication of components is possible
- Completely sealed joints
- Low maintenance
- Simplified inspection due to light-coloured surface
- System components can be added via small entry openings (manholes)

## Advantages

- Frost-proof
- Corrosion resistant
- Resistant to chlorination (up to 5 mg/l)
- Long life expectancy (>50 years)
- Complete leak control
- High surface quality, no deposits
- Easy to maintain and suitable for high-pressure cleaning
- Resistant to micro-organic corrosion

## CLICK!

The CLICK profile is aligned to the CLICK studs of the sheet. The profile has a co-extruded electroconductive layer which provides the auxiliary electrode for discontinuity (holiday) testing.

Therefore an easy and fast control of the joint area after welding is granted.







1



2



3

## Lining of concrete structures by cast-in-place concrete

- Attachment of the Sure Grip® liners onto the formwork
- Application of reinforcement
- Erection of outside formwork
- Casting and curing of the concrete
- Removal of formwork
- Sealing of joints by extrusion welding
- Leakage test of the welds

1. Welding of Sure Grip® liners
2. Lining of an industrial storage tank
3. Corrosion protection of bridge pillars
4. Lining of swimming pools
5. Prefabricated tanks lined with Sure Grip® HDPE

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## NEW CONSTRUCTION WITH AGRUSAFE



4

## Application areas

- Corrosion protection of concrete buildings, foundations and ceilings
- Lining of sewage basins, prefabricated tanks, concrete pipes and manholes, drains and elevated tanks for potable water
- Sealing of tunnels and channels
- Collecting basis and areas for water dangerous media
- Retention ponds for oil, industrial and sludge disposal
- Sealing of handling areas for petrochemical products



5



## Sure Grip® lining

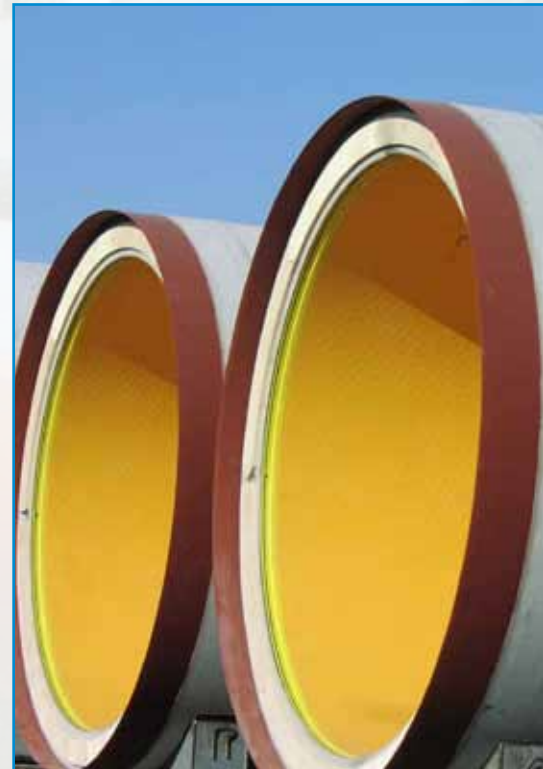
The Sure Grip® concrete protective liner system offers a wide range of applications for the lining of prefabricated concrete structures, concrete pipes and manholes.

The system - especially developed by AGRU for concrete pipes - distinguishes itself by efficiency in production and installation.

### Advantages of the Sure Grip® lining systems:

- Quality and efficient installation on-site
- Outstanding chemical resistance
- Excellent resistance to permeation and abrasion
- Protection against concrete cracks
- Tight joint connection by welding

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Prefabricated concrete pipes with HDPE AGRUSAFE inliner

## PREFABRICATED CONCRETE STRUCTURES



The Sure Grip® concrete protective liner is applicable for covering sockets, pipes and manholes.

Different welding technologies - depending on the project requirements - are available for a safe and tight connection.



Prefabricated elements for channel construction with AGRUSAFE Sure Grip®

Kite-shaped profile pipes with AGRUSAFE Sure Grip® liners



Cross-section of prefabricated manhole lined with AGRUSAFE Sure Grip® concrete protective liners





## RELINING WITH AGRUSAFE

### Relining of structures

The development of different technologies enables the relining of concrete structures, independent from corrosion progress.

#### Application for repair:

- Direct fixation of the Sure Grip® concrete protective liners using profiles to join different sections of the liner
- Installation of concrete protective liners on the inside
- Formwork with following welding and backfilling of the gap with applicable grout

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## Sure Grip® relining

### A system for trenchless relining of buried piping systems

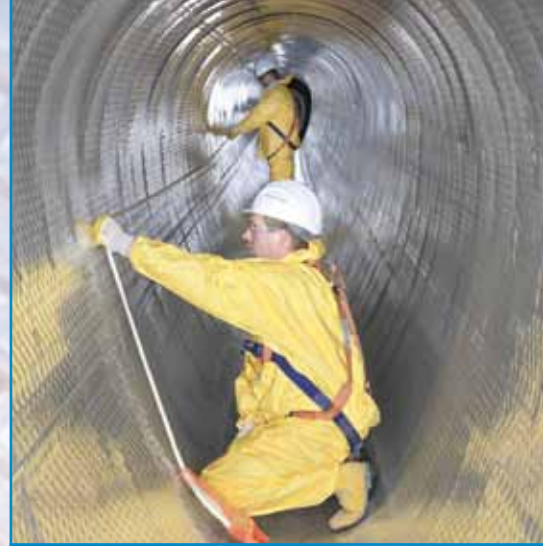
AGRU offers system solutions for channel relining which enable the lining of different cross sections and dimensions.

#### Segment relining technique

Different segment relining methods depending on the channel cross sections and civil works can be applied.

Prefabricated segment liners are fixed onto wooden or monolithic formworks in the channel (complete or partial repair) and filled with grout.

The connection of the installed inliner is done by manual extrusion welding or available welding machines.



## CHANNEL RELINING



#### Tube relining technique

AGRUSAFE Sure Grip® concrete protective liners, in lengths up to 160 m, are prefabricated as inliners on rolls and pulled into the channel (to be repaired) through the existing manholes.

Inliners are closed by a balloon and adapted with pressure to the pipe's profile to be repaired.

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

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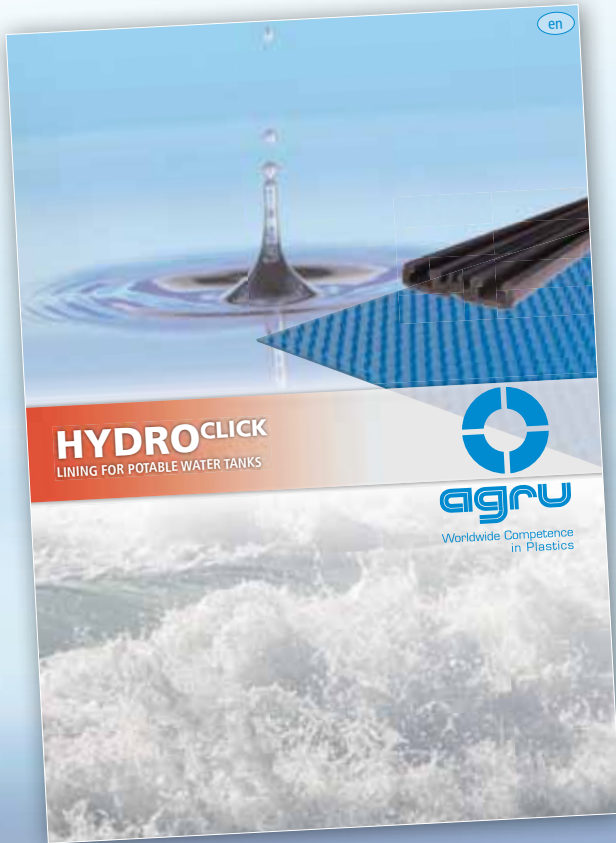
Photos®: Trolining GmbH



## HYDROCLICK

### Lining for potable water tanks

- Frost-proof
- Corrosion resistant
- Resistant to chlorination (up to 5 mg/l)
- Complete leak control
- High surface quality, no deposits
- Easy to maintain and suitable for high-pressure cleaning
- Resistant to micro-organic corrosion



## ● CONCRETE PROTECTION

AGRUSAFE CONCRETE PROTECTIVE LINERS

Satzfehler, Druckfehler und Änderungen vorbehalten.  
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