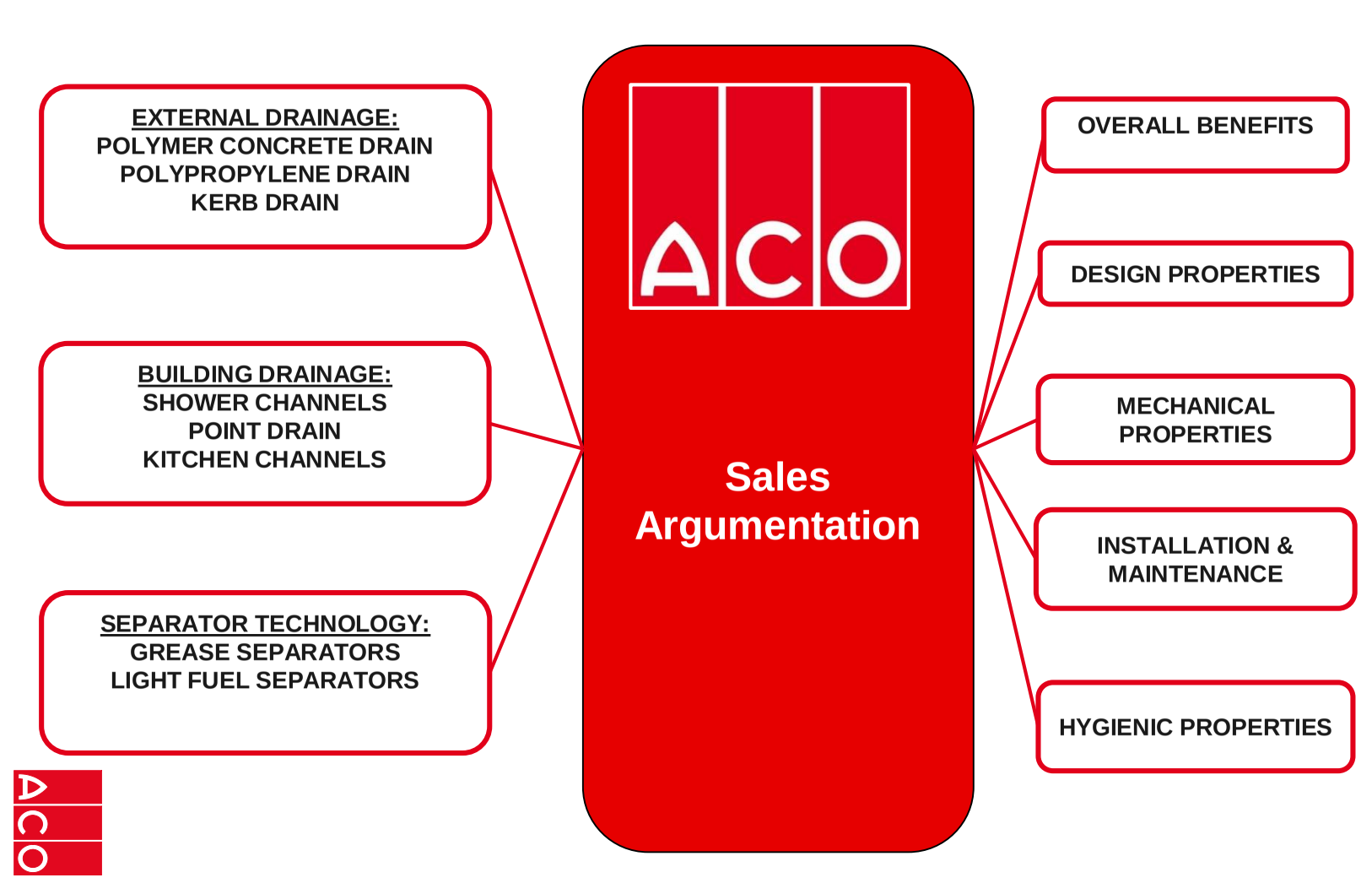
SALES ARGUMENTATION


EXTERNAL DRAINAGE:
POLYMER CONCRETE DRAIN
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KERB DRAIN
BUILDING DRAINAGE:
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POLYMER CONCRETE DRAIN

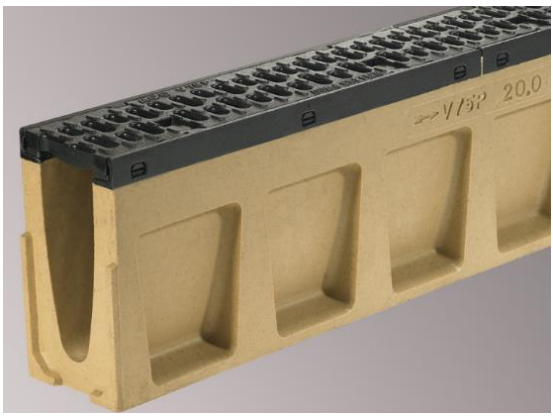
OVERALL BENEFITS

ACO polymer concrete drain is a high strength channel drainage system designed to provide an economical solution for the **efficient removal of surface water**. The system is suitable for use in a wide range of applications including commercial and residential developments, landscaping and parking areas for all vehicle types. ACO's comprehensive range of products will not only help to meet your **hydraulic capacity requirements** but are also **easy to install and maintain**, have superior **mechanical properties** and the **design** is aesthetically pleasing.

DESIGN PROPERTIES

- The **'V'** profile drain creates the excellent flow efficiency, high flow rate.
- Internal **self-sloping d**rain channels.
- Efficient **hydraulic design** because of the excellent surface smoothness.
- Water tightness at the joints can be achieved using **sealant**.
- Produced according to **EN1433** ensuring uniform high quality and minimum tolerance deviation.
- **Variety of grating types** (Bar, slot, mesh) available.
- Grating with **boltless locking system** will eliminate the movement of grating in the channel.
- **Variety of grating materials** (C.I, G.S, S.S, composite, P.P) available.
- Can be delivered with **Brick Slot** in galvanized and stainless steel.
- Can be delivered with **light point** (LED) gratings.

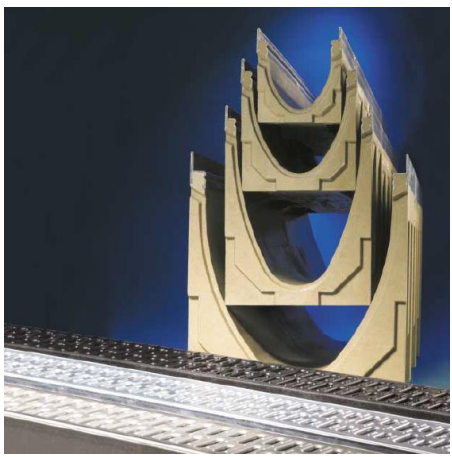
DESIGN PROPERTIES



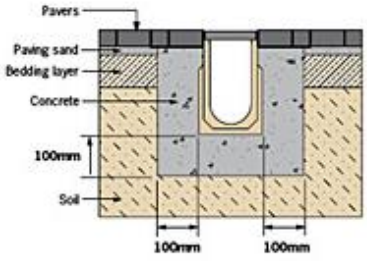
- **Complete system available** comprising of channel body with edge rail, grating and accessories.
- **Smaller drain size** compared to the conventional drain systems.
- Outlet can be possibly taken from the bottom and also from the side.
- Very **minimal height** (55mm) available for the different applications.
- Channel body **with/without built-in slope** can be possible for the short length drain.
- **Variety of sizes** (Width and depth) available for different applications.
- **'L', 'T'** and **cross connections** are possible.

MECHANICAL PROPERTIES

- Excellent **compressive strength** compared to the conventional drain systems. 50% higher than concrete.
- Excellent **bending tensile strength** compared to the conventional drain systems. 150% higher than concrete.
- **Variety of grating load classes** available from pedestrian movement (A15) until air vehicular movement (F900).
- No need of concrete reinforcement and shuttering.
- **No water absorption**.
- **Surface roughness** of polymer concrete is approximately 90% lower than concrete leading to higher water velocity and flow rate.



EASY INSTALLATION AND MAINTENANCE



Easy Maintenance due to:

- **Self-cleansing** effect due to high flow velocity.
- No chance of water stagnation, very minimal siltation and **zero absorption of water d**ue to surface smoothness.
- Avoids the growth of algae and fungi.

Time saving Installation due to:

- **Easy to install** due to the less weight of channel bodies, and the tongue and groove joints.
- **Indication of flow direction** mentioned in the channel body to ensure the right installation of drain.
- Availability of **complete system**: 1m and 0.5m channel length, end caps, sump units, gratings.
- **Less excavation** compared to onsite casting due to the compact design of the polymer concrete channel.
- **Average installation length** of polymer concrete channels is 60-80 metres per day using skilled labor.

POLYPROPYLENE DRAIN

OVERALL BENEFITS

ACO polypropylene drain is a **high strength, high quality** channel drainage system suitable for a range of **domestic drainage applications** to provide an economical solution for the **efficient removal of surface water**. Manufactured using recycled polypropylene the system has a range of innovative features which makes installing drainage channels easier than ever. The system is **ideal for domestic and light vehicle applications** and is easy & **quick to install.**

DESIGN PROPERTIES

- **Smaller drain size** compared to the conventional drain systems.
- **Produced according to EN1433 ensuring uniform high quality and minimum tolerance deviations**
- **Complete system available** comprising of channel body with edge rail, grating and accessories.
- **Variety of sizes** (Width and depth) available for different applications.
- **Variety of edge rail** (galvanized-steel and plastic) for the channel systems available.
- **'L', 'T'** and **cross connections** are possible for angular drain installation.
- Channel body **without built-in slope** for the short length drain.
- Possibility of cutting the drain channel at site for **flexible drain installation**.
- Wide **choices of grating** are available in various materials and designs.
- Can be delivered with **Brick Slot** in polypropylene, galvanized and stainless steel.
- Can be delivered with **light point** (LED) gratings.
- Grating with **boltless locking system** will eliminate the movement of grating in the channel.
- **Outlet** can be possibly taken from the bottom and also from the side.

MECHANICAL PROPERTIES

- **High strength** and **quality** material is used.
- **Light weight** drain channels.
- **Environmental friendly** drain channel (100% recyclable).
- Durable **galvanized-steel edge** rail protects channel from traffic damage.
- Variety of **grating load classes available** from pedestrian movement (A15) until parking areas (D400).

EASY INSTALLATION AND MAINTENANCE

Easy Maintenance due to:

- **Self-cleansing** effect due to high flow velocity.
- No chance of water stagnation, very minimal siltation and **zero absorption of water** due to surface smoothness.
- Avoids the growth of algae and fungi.

Time saving Installation due to

- **Easy to install** due to the less weight of channel bodies, and the tongue and groove joints.
- Indication of flow direction mentioned in the channel body to ensure the right installation of drain.
- Availability of **complete system**: 1m channel length, end caps, sump units, gratings.
- Easy to cut channels for **flexible installation.**
- **Less excavation** compared to onsite casting due to the compact design of the channel.

KERB DRAIN

OVERALL BENEFITS

ACO KerbDrain is a **combined kerb and drainage system** specifically designed and developed to form an integral part of any modern, sustainable surface water management solution. The one-piece system is suitable for a wide range of applications including **major and minor highways, car parks, and commercial and urban landscaping**. **The easy installation** and maintenance combined with the excellent design and outstanding mechanical properties ensures a versatile and aesthetically pleasing drainage solution.

DESIGN PROPERTIES

- Combination of **Kerb stone and drain** together in a single unit.
- Availability of **1m and 0.5m** channel length and **a wide range of sizes** available.
- One side sloping of the road is required towards the kerb compared to the point gullies for multi sloping.
- Manufactured **from sustainable and environmentally friendly material**.
- **Four drain sizes** available to meet specific hydraulic requirements.
- Produced according to **EN 1340** ensuring uniform product quality and minimum tolerance deviations.
- Can be delivered for **circular** (roundabouts) and **angular installations** (90 and 45 degrees).
- Special **drop kerbs** for bus stops and building entrances and **blind kerbs** for speed breaks are available.

MECHANICAL PROPERTIES

- Excellent **compressive strength** compared to the conventional drain systems. 50% higher than concrete.
- Excellent **bending tensile strength** compared to the conventional drain systems. 150% higher than concrete.
- **Impact resistance 50% higher** than traditional kerb units.
- **No chipping off or cracks** due to vehicular dashing.
- Suitable for **D400 load class as per EN 1433**.
- **Surface roughness** of polymer concrete is appr. 90% lower than concrete leading to higher water velocity and flow rate.

EASY INSTALLATION AND MAINTENANCE

- Simple **water-tight** installations due to the watertight material and the sealant groove.
- **Easy handlng due to design.**
- Access points and gully units will allow the system to be simply and efficiently cleaned by standard jetting equipment during the maintenance.
- **Time saving** installation due to the combination of kerb stone and drain together.
- ACO Kerb Drain is up to **60% lighter** than a standard kerb stone.
- Installation length of **200 metres per day** has been achieved by skilled labours.

SHOWER CHANNELS

OVERALL BENEFITS

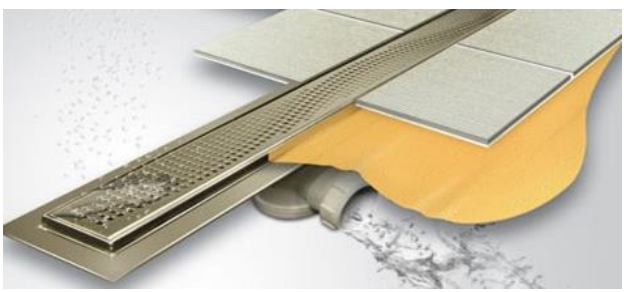
ACO shower channels represent an **innovative** and sophisticated method of **wet room drainage** in all types of buildings, from domestic properties and hotels through to leisure facilities and hospitals. Using the latest developments in drainage technology ensuring **easy installation and maintenance** makes it is easy to convert, refurbish or construct new showering and bathing areas.

DESIGN PROPERTIES

- A **wide range** of gratings available.
- Stainless steel material of **304** grade and optionally 316 grade.
- **Excellent flow rate** due to the lateral built-in slope. Flow rate 0.5 l/s to 1.5 l/s depending on installation.
- **Low height installation**; Horizontal outlet with 65mm of installation height and vertical outlet with 18mm of installation height.
- **Channel with light** (LED) module options with different colours available.
- Choices of **multiple lengths** available from 585 mm to 1185 mm.
- **Flanged** option is available for improved water proofing.

EASY INSTALLATION AND MAINTENANCE

- **Linear solution**, hence the floor can be sloped in a single direction.
- **Easy tile installation.**
- **Easy maintenance due to accessible foul air trap.**
- **Installation height can be reduced** depending on the outlet of the channel.
- To avoid foul smell, **Foul Air Trap** (FAT) are provided to replace the P-trap.
- The outlet pipe can be **easily connected** to the waste pipe by the push-fit joint method.



POINT DRAIN

OVERALL BENEFITS

The ACO point drain represent the cumulation of many years' practical experience and **design know-how** in fabrication technologies. Our state of the art European plants produce products of **consistent outstanding quality** but with economic benefits that can only be realised through the most **advanced manufacturing methods**.

DESIGN PROPERTIES

- **Gully Body**, **Riser Sections** and the **Gratings** from single source.
- Available in **Stainless Steel** and **High End Plastic** materials.
- Stainless steel **304** grade is available. Optionally can be delivered with 316 grade.
- A **wide range** of gratings available.
- Available in **horizontal and vertical outlet** options with different outlet sizes.
- **Excellent flow rate of 0.9 l/s to 2 l/s depending on installation.**
- Optionally available with the **lockable grating**.
- **Channel with light** (LED) module options with different colour available.
- Pont drain is produced according to **EN 1253** ensuring uniform high product quality and minimum tolerance deviation.
- **Flanged/membrane** option is available for improved water proofing.

EASY INSTALLATION AND MAINTENANCE

- To avoid the foul smell, **Foul Air Trap** (FAT) is provided to replace the P-trap.
- Access and maintenance to the FAT is very **easy and simple**.
- **Flexible installation height** as per the site condition.
- Optionally the **side inlet connections** are available.

KITCHEN DRAIN

OVERALL BENEFITS

The ACO kitchen drains incorporates hygienic principles to ensure the **optimum hygienic performance** and **drainage capacity**. The hygienic box channel range is ideal for applications where high standards of hygiene are required as they are **capable of handling large volumes of fluid**. The **easy installation and maintenance**, the design and hygienic properties of the system ensure the perfect drainage solution for **commercial kitchens** and the **food and beverage industry**.

DESIGN PROPERTIES

- Produced according to **EN1672 / EN14159** ensuring uniform product quality and minimum tolerance deviations.
- Hygienic design according to **EHEDG** Document No. 8, 13, 44 guidelines.
- Tested and certified according to **EN1253**
- Stainless steel material of **304 grade** and optionally **316 grade** available
- **Built-in edge infill**.
- **Built-in slope** available ensuring e**xcellent flow rate of** 1.4 l/s to 6.2 l/s depending on installation.
- **Resistant** to temperature extremes and thermal shock ensuring longevity.
- Choice of channel edges available for **different flooring options**.
- **Foul Air Trap** (FAT) can be provided to replace the P-trap.
- The channel can be **customized** as per client request.
- **Environmental friendly drain channel** (100% recyclable).
- A wide **range of standard sizes** available to choose the right product as per site condition.
- Very **simple and easy joining method** with water tight and leak proof joints.
- A **wide range of grating options** available including the slip resistance.
- A **wide range of grating load classes** available from light vehicular traffic (L15) until forklift movement (N250).
- **Silt basket** can be provided for the collection of large solid particles to avoid the blockage in the pipe.

HYGIENIC PROPERTIES

- **Hygienic drain solutions**.
- No metal to metal contact to **reduce** the **chance of corrosion**.
- **Smooth** and **round corners** to reduce the risk of stagnation and food contamination.
- **Full drain ability**.
- Very minimal chance of silt formation.
- **Non-porous**, **easy to clean** and **disinfect**.
- **EHEDG** (Environmental Hygiene Engineering Design Group) compliant. Hygiene concepts created together with key players in the food processing segment like Nestle/Unilever etc.
- Applying standards reserved for food contact surfaces **EN1672**, **EN ISO 14159** and hygienic principles recommended by EHEDG to our product design.
- Advanced manufacturing technologies to ensure **durability** and special surface treatment to guarantee **corrosion resistance**.

EASY INSTALLATION AND MAINTENANCE

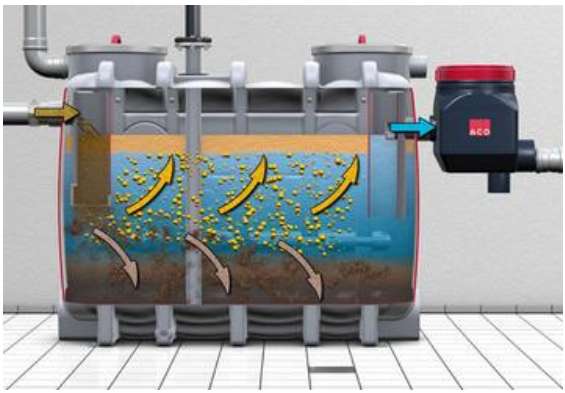
- **Non-porous**, **easy to clean** and **disinfect**.
- **Longevity** – It can be used for minimum of 25 years.
- The outlet pipe can be easily connected to the waste pipe by the **push-fit joint method**.
- The **leveling feet** will help to adjust the height of the drain channel to match with the floor level.
- Available in **horizontal and vertical outlet options** with different outlet sizes.
- A **wide range of flange** (location flange, adhesive bonding flange and mechanical clamping flange) with gully options available.
- Optionally **side inlet connections** can be provided to connect the equipment outlets.

GREASE SEPERATORS

OVERALL BENEFITS

A significant problem for kitchen and food preparation areas is the **collection of fat, oil and grease** within the drainage system. These substances not only have a major effect on the performance of any internal or local external drainage system, but can also have a major impact at regional level: **water pollution, obstruction of drainage infrastructure and reduced efficiency at sewage treatment plants** are all possible occurrences. ACO offers a wide range of **grease trap systems to assist with prevention**. The systems **provide hygienic, effective methods** of dealing with these substances with a selection of accessories to suit all applications.

DESIGN PROPERTIES



- **Hygienic solution** – Manual scavenging can be avoided.
- **Air tight** unit, no problem to odour.
- **100% recyclable PE-HD** material is used for the manufacturing.
- A **wide range of sizes** (NS) available based on the flow rate.
- **Options** available in the **installation types** (Above & below ground and partial disposal).
- A **wide range of extension stages** (Basic until stage-3) available based on the method of cleaning and disposal.
- Optionally stainless steel separators can be manufactured based on the client request.
- Manufactured accordance to the applicable standards of **EN 1825** and **DIN 4040-100**.
- Hydraulically tested and have a general official approval from **DIBt, Berlin**.
- Inspection by the **Landesgewerbeanstalt Bayern, Germany** to check the separator production for adherence to the currently applicable test standards.
- The separator is certified by **LGA**, **GET** and **KIWA**.

EASY INSTALLATION AND MAINTENANCE

- **Easy to handle.** Compact size and light weight.
- **Easy** maintenance with minimum human intervention compared to conventional systems.
- **Longevity** - The structural stability of 25 years.
- **Reliable** operation when maintained according to ACO recommendations.
- **Below ground separators**, the load class can be provided up to fire vehicular movement (D400).
- **For below ground installation, light weight top section** will provide the flexibility of installation height to match with the FGL.
- Optionally **high pressure pump** and **disposal pump** can be provided.
- The operation of the pump can be **manual or automatic** based on the type of selection.

LIGHT OIL SEPERATORS

OVERALL BENEFITS

The ACO light-oil separators set a new **benchmarks for separator technology**. **Inflammable** or **explosive** atmospheres can **build up in the wastewater piping systems** of **petrol stations**, **car washes** and **vehicle workshops.** These hazardous atmospheres must be isolated by separator systems. Furthermore, the **efficient use of oil separators** secure minimum ground water contamination.

DESIGN PROPERTIES

- Produced according **to EN858** ensuring uniform product quality and minimum tolerance deviation.
- Effective solution for **protecting the ground water** from contamination.
- A **wide range of sizes** (NS) available based on the flow rate.
- Option of using only the internal functional parts from ACO **and cast-in-situ tank construction**.
- Guaranteed outlet parameter complying to **MoEF** (Class I – 5 ppm / Class II – 100 ppm).
- For below ground separators, the top cover load class can be provided up to **fire vehicular movement** (D400).according to EN 124
- Alarm system available for sensing the level of **oil**, **sludge** and **overflow level**.
- **Air tight unit**, no problem to odour.

EASY INSTALLATION AND MAINTENANCE

- The **oil level** can be **monitored** through BMS.
- **Compact vertical design** for ease of handling, installation and the maintenance.
- **Maintenance friendly design** for simple operation and excellent accessibility.
- **Light weight top section** will provide the flexibility of installation height to match with the FGL.
- **Robust polyethylene construction** for long service life and improved durability over GRP unit as well as concrete or brick work oil separator unit.

FACT SHEET

MATERIAL FACTS - STAINLESS STEEL

Stainless steel is the name given to a wide range of steels which have the characteristics of greatly enhanced corrosion resistance over conventional mild and low alloy steels. The enhanced corrosion resistance of stainless steel essentially comes from the addition of at least 11% of chromium, however most stainless steels commonly used contain around 18% of chromium. Other significant alloying elements include nickel and for superior corrosion resistant properties, molybdenum.

Stainless steel has the following unique advantages:

High corrosion resistance
Non-porous, easy to clean and disinfect
Aesthetically pleasing
Resistant to temperature extremes and thermal shock
Coefficient of linear expansion similar to concrete
100% recyclable material

ACO drainage is manufactured from austenitic stainless steel, grades 1.4301 or 1.4404 according to EN 10088 (304 or 316L according to AISI) and is ideal for applications including food processing, leisure, dairy, brewing, pharmaceutical, chemical and petrochemical industries.

Surface treatment of stainless steel

The process cutting, forming and welding stainless steel will introduce impurities into the surface of the material and unless the appropriate action is taken, the material will begin to corrode and ultimately fail in service. Therefore after fabrication, it is vital that stainless steel is treated with the correct surface treatment to ensure it is fully corrosion resistant. By applying pickle passivation as the primary surface treatment, the corrosion resistance of stainless steel can be fully restored to its original state, ensuring long and reliable life performance together with the required aesthetic appearance.

MATERIAL FACTS - STAINLESS STEEL

All ACO drainage is pickle passivated by immersing products in a series of acid baths. This is a fundamental requirement for removing iron embedded particulates introduced in the fabrication process and also for restoring the chromium depleted regions generated by the welding process. ACO has one of the largest and most advanced pickle passivation installation in Europe which ensures the optimum corrosion resistance of our products.

After pickle passivation, some products are then immersed in an electrolytic fluid in which the products become the anode of a direct current electrical circuit. This process of characterized by a selective attack of the surface of the components whereby upstanding roughness is preferentially dissolved and will yield a progressively smoother, brighter surface. All hygienic box channel grates are electro-polished as a standard.

ACO channels have brushed upper edge for aesthetical reasons.

MATERIAL FACTS - POLYMER CONCRETE

Polymer concrete is produced by mixing a variety of selected aggregates with a polyester resin binder to give a strong but lightweight material which can be cast into complex shapes.

ACO polymer concrete offers approximately 4 times the compressive strength of cement-based concrete, enabling ACO to produce lighter channels than equivalent concrete products. The compressive strength of the material is 90 - 100 N/mm2, compared with 60-70N/mm2. The flexural strength of the material is 22 - 25 N/mm2, much higher than concrete at 2-5 N/mm2

ACO polymer concrete channels are highly resistant to chemical attack and, with the appropriate grating, can be used in most environments where acids and dilute alkalis are likely to be encountered. The material is not affected by hydrocarbons or road de-icing salts.

Polymer concrete has the following unique advantages:

- **Polymer concrete channels have much higher strengths and lower weights for the same density when compared to cement concrete.**
- **The low weight of the components simplifies handling, installation, and thereby reduces costs.**
- **Polymer concrete is watertight and has a very low water absorption.**
- **The smooth surface allows water and dirt particles to run off quickly.**
- **Polymer concrete is resistant to aggressive conditions without extra coating.**
- **Can be used flexibly and permanently even under extreme conditions.**

MATERIAL FACTS - POLYMER CONCRETE

The mechanical properties of polymer concrete compared to cement concrete are listed below :

	Polymer Concrete	Cement Concrete
Bending tensile strength	25 N/mm^2	10 N/mm^2
Compressive strength	95 N/mm^2	68 N/mm^2
Water absorption	0.01 mm	4 mm
Surface roughness	22 µm	175 µm

In addition to our internal quality controls in accordance with DIN EN 1433, our products are also tested by the following certification authorities in Germany : KIWA Germany, MPA Eckernförde, and MPA Lübeck.

Cooperation with EHEDG

With its advanced drainage solutions for commercial kitchens and the food industry ACO cares about hygiene and food safety. That's why ACO is a long term member of the **European Hygienic Engineering and Design Group, EHEDG**.

EHEDG is a consortium of equipment manufacturers, food industries, research institutes as well as public health authorities and was founded in 1989 with the aim to promote hygiene during the processing and packing of food products. The principal goal of EHEDG is the promotion of safe food by improving hygienic engineering and design in all aspects of food manufacture. EHEDG actively supports European legislation, which requires that handling, preparation processing and packaging of food is done hygienically using hygienic machinery and in hygienic premises.

The Hygiene First drain design of ACO follows the guidelines of EHEDG and shows our commitment to ultimate hygienic performance. ACO Hygiene First drain design fulfils stringent hygienic requirements to prevent harmful bacteria contamination. We apply all relevant hygienic design principles that are reserved for food contact surfaces of **EN 1672**, **EN ISO 14159** and **EHEDG documents No. 8, 13 and 44** to the design of our drainage systems.