ACO Tiefbau

Professional design:
Surface water management and water protection
As a reliable partner of the specialist civil engineering builders’ merchant, ACO offers solutions for professional rainwater or surface water management and water protection. These play a large role in the planning and design of urban, infrastructure and industrial drainage. Whether for public clients, consultant engineers, landscape architects, contractors and operators within the ACO Group, ACO Tiefbau provides innovative product solutions for civil engineering, road construction and landscape gardening. With comprehensive design tools and services, ACO Tiefbau also assists with the design, construction and sustainable operation of modern drainage systems.

Design professionally: Surface water management and water protection

With this brochure we provide you with practical information for selected areas of use and against the background of the relevant standards for use of ACO drainage systems.
**How does surface water management and water protection begin?**

**collect:** Collect and hold

The surface water or liquids to be treated pass from the surface into the drainage system, quickly and as completely as possible. This part of the ACO system chain ensures protection, safety and convenience for the people, buildings and traffic routes in the direct surroundings.

- Drainage channels
- Road and yard drains
- Gully tops
- Manhole covers

**clean:** Pretreat and treat

The surface water or collected liquids are treated by integrated physical, chemical or biological methods so that – as a minimum requirement – they can be fed into the public sewers. This part of the ACO system chain establishes the prerequisite for recycling and sustainable use.

- Separators
- Sedimentation and filtration systems

**release:** Pump, discharge and reuse

Pumps, lifting plants and pipe systems transfer the collected, treated and controlled water to downstream systems and circuits. This part of the ACO system chain brings the collected and treated water to downstream systems in a controlled way for further use or returns it to the natural water cycle.

- Control valve shafts
- Infiltration and attenuation systems
- Retention basins made of concrete

**How to achieve the right water quality?**

**hold:** Keep out and retain

Stones, barriers and valves ensure that surface water or the liquids to be treated stay within the drainage system and can be conveyed there in a controlled way. This part of the ACO system chain increases protection and safety for extreme requirements, e.g. in case of heavy rainfalls, flooding or in handling critical liquids.

- Flow control systems
- Pump shafts

**How to reduce surface runoff to a natural level?**

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- Control valve shafts
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**How to control the discharge rate to the required level?**

**hold:** Keep out and retain

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- Flow control systems
- Pump shafts
What must be considered when designing public car park drainage?

Public car parks, for example, in front of large shopping centres, are particularly highly frequented traffic areas. The channels laid for surface drainage are driven over by vehicles with regular frequency. They must therefore be extremely durable.

Rainwater that falls on trafficked areas becomes highly contaminated with abraded material, brake dust and traces of petrol and oil. To avoid irreversible damage early, the channel system must not only hold the water but must also carry it to the connected surface water treatment, and thus the natural water cycle, without avoidable losses.

Practical tip

**Application-oriented products of the ACO system chain**

- Standard
  - RAS-Ew Chapter 3.4
  - EN1433
  - ZTV Ew-StB 14, Chapter 5
  - ZTV Ew-StB 14, Chapter 9
  - Advisory leaflet for infiltration systems (“Merkblatt für Sickeranlagen”)
  - DWA-M 153

**Drainage of Car parks**

Customer car parks, Park and Ride, Employee car parks
Rainfalls that run off of trafficked areas contain significantly more contamination than most people are aware of. Highly trafficked roads are contaminated with harmful materials from tyres (abraded material), brake dust and exhaust gases and traces of petrol and oil. In addition to these, there is the use of de-icing agents in winter. When it rains, all these contaminants are automatically washed into structures and groundwater where they can cause substantial damage. For example, the chloride in de-icing salt can cause corrosion and weakening of the foundation.

The ACO DRAIN® Multiline Seal in drainage channels ACO Multiline is the channel filled with a seal as a standard feature. With the Seal in technology, ACO makes the key areas of linear drainage system tight and ensures future requirements regarding tightness and water quality. The tightness of the ACO DRAIN® Multiline is certified by the Institute for Underground Infrastructure (IKT - Institut für Unterirdische Infrastruktur).

What to do with surface water? Treatment for the water cycle

Rainfalls on trafficked areas contain significantly more contamination than most people are aware of. Highly trafficked roads are contaminated with harmful materials from tyres (abraded material), brake dust and exhaust gases and traces of petrol and oil. In addition to these, there is the use of de-icing agents in winter. When it rains, all these contaminants are automatically washed into structures and groundwater where they can cause substantial damage. For example, the chloride in de-icing salt can cause corrosion and weakening of the foundation.

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Application-orientated products of the ACO system chain

ACO Sedimed-C ACO Sedismart-C Detailed info in the individual brochure or in the T 2, Chapter 5 www.aco-tiefbau.de/produkte
ACO DRAIN® Multiline Seal Detailed info in the individual brochure or in the T 2, Chapter 5 www.aco-tiefbau.de/produkte
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In addition to the ACO polymer concrete, the captive 2-component seal is an essential part of the Seal in technology. The channel body is also produced in a special 2-component process. The result is a tight channel as well as surface water collecting in the channel is diverted to the stormwater retention areas. The structure and groundwater are permanently protected through targeted surface water management.

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Drainage of Public roads

Public roads are indispensable for the transport of all types of goods, but also for passenger traffic. All too often, we forget that widening and maintenance are part of a functioning traffic network. Installation of a new drainage system is also required as part of complete renewal. For this, ACO offers a large number of systems for use in the different traffic areas.

What must be considered in the case of trafficked areas with high loading?

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Practical tip

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Standard
- RAS-Ew Chapter 3.4
- EN 1433
- EN 124
- ZTV-Ew-StB 14, Chapter 5
- ZTV-Ew-StB 14, Chapter 9
- Advisory leaflet for infiltration systems (“Merkblatt für Sickeranlagen”)
- DWA-M 153
ACO offers a large number of possible solutions for discharging surface water.

ACO road gullies

With ACO Combipoint PP, lightweight road gullies made of plastic are used, which are rotatable, telescopic, can be shortened and their inclination adjusted. Due to the innovative modular design, the gully bodies can be produced to precisely fulfill load-bearing requirements. The lightweight, high-strength polypropylene weighs only 2.5 to 2.8 kg. The systems are complemented by gully tops in Multitop design for classes C 250 and D 400.

ACO manhole covers

A dramatic increase in goods traffic is expected in the next few years. Roads remain the number one route of transport. ACO has adapted the Multitop Plus manhole cover to the increasing market requirements. We have re-designed the tried and tested weight, handling, wear and mortar joint solutions and focussed on the new-product advantages: Silent, Air permeable, Slip resistant.

ACO kerb drainage

ACO DRAIN® KerbDrain is a polymer concrete kerbstone made of one piece and at the same time it is a drainage channel. The system has convincing features due to its outstanding hydraulic flow capacity over the entire kerb length and thus offers ideal drainage design for areas such as roadways, roundabouts and car parks. As the KerbDrain is coloured to be the same as standardised concrete kerbs, its use helps to achieve a uniform, aesthetic appearance. Through the low weight, the integration of the drainage channel in the kerb and simple cleaning, cost advantages result from the installation through to use.

How to manage the surface water? Discharge into the public sewer

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Drainage of Motorways

The widening of motorways not only requires widening the road cross-section, but also adapting the surface drainage to the new requirements. A special channel is required where porous asphalt (PA) is used as the top layer (surface course) for noise control reasons; which can take in the surface water that infiltrates through the road surfacing.

Practical tip
How can traffic safety and noise control be combined?

The widening of motorways not only requires widening the road cross-section, but also adapting the surface drainage to the new requirements. A special channel is required where porous asphalt (PA) is used as the top layer (surface course) for noise control reasons; which can take in the surface water that infiltrates through the road surfacing.

Standard
FGSV leaflet on asphalt surface courses made of porous asphalt ("Merkblatt für Asphaltdecksschichten aus offopenporigem Asphalt – M OPA")
Climate change means increasingly longer dry periods. Litter, leaves and petal accumulation at the motorway boundaries. If heavy rainfall occurs, dirt and contaminants carried along by the water are washed towards the road gully. The risk of blocking is minimised in the ACO motorway gully tops through their wide slots and large intake area – in this way, ACO DRAIN® drainage channels and gully tops prevent aquaplaning.

Thanks to the wide, hydraulically optimised slot geometry, dirt is flushed into the gully by the force of the water.

ACO motorway gully tops in Multitop Aqua Plus design are characterised by their hydraulically optimised slot geometry and large intake area, which reduce the risk of blockages and aquaplaning.

Further advantages are maintenance-free, the traffic-safe locking made of highly wear-resistant plastic and the rattle-free noise-dampening PEWEPREN insert in the frame.

What can be done with surface water? Discharge in robust channels and gullies

Motorways

ACO DRAIN® drainage channels
A special channel is required where porous asphalt (PA) is laid; the surface water from the road surface can flow into the side of the channel. The advantage of porous asphalt is its sound absorption that makes it an active noise control measure. ACO DRAIN® Multitop Aqua Plus design (Multitop Aqua Plus opening) was especially developed for the drainage of porous asphalt and has a convincingly compact design with low weight and high laying rates. Due to the tried and tested V-shaped cross-section and associated optimised hydraulic performance, the surface water can be drained quickly and reliably and thus prevent aquaplaning.

Discharge in robust channels and gullies
What can be done with surface water?

Motorways

ACO DRAIN® Monoblock RD 200 V drainage channels with lateral openings (PA openings) were especially developed for the drainage of porous asphalt and have a convincingly compact design with low weight and high laying rates. Due to the tried and tested V-shaped cross-section and associated optimised hydraulic performance, the surface water can be drained quickly and reliably and thus prevent aquaplaning.

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Discharge in robust channels and gullies
What can be done with surface water?
Drainage of Tunnels

What properties must a channel have to conform to the RABT and ZTV-ING? What intake capacity will be required in the drainage system in the event of an accident? What happens to liquids in the drainage channel? How is safe, accessible access to the escape route implemented? All ACO product systems for tunnel drainage provide answers to these and other questions. ACO is one of the world market leaders in drainage technology and rises to the challenges in tunnel construction. Special products have been developed for the drainage of tunnels and the connected infrastructure. The wide range of climatic conditions in tunnels and the particular local environment require ecological and economic solutions. ACO tunnel drainage systems not only include standardised products such as the Monoblock T drainage channel, but also project-specific solutions.

Practical tip

What must be considered in case of accidents in tunnels?

- European Directive 2004/54/EC
- German guidelines: RABT and ZTV-ING
An important criterion for use of polymer concrete materials in tunnels is the “non-flammable” classification. Building elements in tunnels are subject to the highest safety requirements in accordance with the European Tunnel Directive 2004/54/EC and the German RABT and ZTV-ING guidelines and regulations. ACO’s special polymer concrete mix fulfills these requirements. In case of an accident, especially with flammable liquids, escaping hazardous goods are carried from the road surface and into the subsurface along the shortest route by the tunnel drainage and are thus separated from the oxygen supply. The tunnel products are selected on a specific project basis, according to the requirements and circumstances and thus offer the greatest leeway for design and planning. The special ACO polymer concrete mix is the first polymer concrete to conform to fire class A2-s1, d0 “non-flammable” to EN 13501-1. The explosion classes to EN 206-1 and DIN 1045-2 required for tunnels are more than fulfilled by ACO polymer concrete. Applications-oriented products of the ACO system chain

Where do flammable liquids go? Accident-safe tunnel channels

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ACO manhole covers

The special situation in tunnels and the aggressive climate there set high requirements for manhole covers. They must be easy to maintain and not susceptible to corrosion, surface water tight and leakable. ACO Multitop Plus manhole covers have a maintenance-free, quick and easy to operate locking made of plastic, which holds the cover in the frame and keeps it traffic-safe. Thanks to the quick and easy operation, the lightweight cover made of cast iron is ideal for maintenance work on the drainage pipe inspection shafts.

ACO DRAIN® Monoblock T tunnel channel made of polymer concrete fulfills the task of tunnel drainage reliably, increases safety and offers extraordinary properties for adjacent designs.

ACO DRAIN® tunnel channels

The high requirements for tunnel channels are due to the limited construction space in tunnels, the many installations and amended regulations and standards. The ACO DRAIN® Monoblock T tunnel channel made of polymer concrete fulfills the task of tunnel drainage reliably, increases safety and offers extraordinary properties for adjacent designs.

ACO DRAIN® Wesendose

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Bridges are key elements in a road traffic system. If water collects on them, aquaplaning or black ice can quickly occur. These hazards can be avoided by using ACO’s special bridge gullies, because the surface water is removed quickly and effectively, and bridges are permanently safe for traffic and operation.

ACO Multitop bridge gullies are designed to meet the special requirements during the construction and remediation of bridges and pavements. They enable significant improvement in the function, safety and economic efficiency of drainage. Special solutions are offered for all relevant areas of use.

**Standard**
- EN 124

**Important!**
Bridge gullies installed on older bridges frequently do not meet the relevant regulations and standards.

New class D 400 gully top sections in accordance with EN 124 must be used for the remediation of installed bridge gullies.

**Practical tip**
What must be considered when designing drainage for prestressed concrete, reinforced concrete and ballasted deck bridges?
Drainage of Bridges

What can be done with surface water?
Collect, treat and discharge

Surface water on bridges is collected by bridge gullies. ACO offers different bridge gullies for the diverse requirements of this type of drainage. They are matched to the special features of the respective bridge design, regardless of whether it is a prestressed, reinforced concrete or ballast bridge. Solutions are available for new bridge structures and for remediation.

After the surface water has been collected, it runs through the subsequent steps of the ACO system chain. Water contaminated with mineral or lubrication oils must be treated first before it can be discharged into the sewers or receiving water. ACO large separators, which treat the water in an environmentally friendly way, are frequently used for this. Depending on the circumstances, it may also be necessary to install an ACO surface water retention basin, which temporarily stores surplus water.

ACO developed the Multitop Universal gully tops in the required D 400 load class especially for remediation purposes, and they simplify project completion significantly. The bridge remediation gully tops are mounted above installed bottom sections of gullies with different geometric shapes.

ACO Multitop Universal gully tops with cover plates that can be mounted on both sides

ACO Multitop bridge gullies
Detailed info in the publication brochure or in the Civil Engineering Catalogue T 1, Chapter 10
www.aco-bildband.de/de
Drainage of Industrial yards

Industrial yards in front of warehouses are areas with high traffic loads and large catchment areas. It is therefore necessary to remove large quantities of water within a short time, especially in case of heavy rainfall. Different solutions exist for controlled surface water management. Both the products and their positioning vary depending on the specific application. Local conditions, such as ground and design levels, degree of pollution of the collected surface water and approval legislation requirements should be taken into consideration. ACO’s application engineers can advise you on the technical possibilities.

Practical tip
What must be considered when designing drainage for large roofs and sites with heavy duty traffic?

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Drainage of Industrial yards

ACO DRAIN® Monoblock
Deline at the individual brochure or the Civil Engineering Catalogue T 1, Chapter 5
www.aco-tiefbau.de/produkte

ACO DRAIN® drainage channels
ACO DRAIN® Monoblock is a drainage system with monolithic design. The channel and cover are produced from polymer concrete in one casting. The result is an extremely stable and functional structure. There is also no need for bonded joints. The unique monocast design guarantees maximum safety and stability, even under the extreme loads of large area drainage.

ACO Sedimentation systems
ACO Sediment-C is used to remove surface water from sediments and to thus protect the downstream block storage from the impact of sand. The internal body, around and through which the surface water to be treated must flow, causes the water to form a sludge trap by flowing in a rotational pattern. The stagnation time is increased, the sedimentation of solid is optimised.

ACO Sedismart-C
Detailed info in the T 2, Chapter 5
www.aco-tiefbau.de/produkte

ACO flow restriction systems
The discharged quantities from the ACO Stormbrixx block storage are adjusted and controlled via the ACO flow restriction manhole, a manhole structure made of reinforced concrete with integrated flow restriction valve for individual reduction of the discharge pipe cross-section. In this way, collected surface water is discharged into the sewer in a controlled way, without overloading it.

ACO flow restriction manhole
Detailed info in the T 2, Chapter 8
www.aco-tiefbau.de/produkte

ACO Stormbrixx block storage
The ACO Stormbrixx infiltration system is not only suitable for block infiltration but also as the block storage/retenion of surface water. The surface water is stored temporarily in the infiltration system and then released in a controlled way, overloading of the sewer network is avoided in case of heavy rainfall.

ACO Stormbrixx block storage
Detailed info in the individual brochure or in the T 2, Chapter 6 and 7
www.aco-tiefbau.de/produkte

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ACO Sedismart-C
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www.aco-tiefbau.de/produkte

What can be done with surface water?
Collect, treat and discharge

Rainfall that falls on large areas with high loading density or heavy-duty areas, is collected via ACO DRAIN® Monoblock drainage channels and is forwarded to a sedimentation shaft, in which sediments are removed from the surface water. The ACO Stormbrixx infiltration system then stores the previously collected rainwater and discharges it into the receiving water or sewer with a time delay. The controlled discharge of rainwater or surface water into the sewers or receiving water is becoming increasingly important, especially in areas of heavy rainfall. This is because the peak runoff of the surface water of a storm is spread over a longer period and the peak flow is therefore reduced. The ACO Stormbrixx infiltration system acts as block storage underneath entrances, public spaces and in areas on private properties.

ACO DRAIN® Monoblock
Deline at the individual brochure or the Civil Engineering Catalogue T 1, Chapter 5
www.aco-tiefbau.de/produkte

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Drainage of Logistics areas

Logistics and storage areas have high traffic loading and large catchment areas. Especially during heavy rainfalls, large quantities of water must be removed in the shortest possible time. Retention channels such as ACO Qmax enable simultaneous water intake and retention. Before discharging the surface water into the receiving water (outfall), it is treated and raised to the normal drainage level by a pumping station. ACO heavy-duty channels are used for the drainage of special areas such as ramps or loading and unloading bridges.

What must be considered in case of heavy rain on large areas?

Practical tip

Application-oriented products of the ACO system chain

Standards
- EN 1433
- DWA-M 153
On large areas with hard (watertight) surfacing, rainfalls can quickly lead to very high runoff quantities of several hundred litres per second. The surface water can then be collected via retention channels and gradually discharged into downstream separators via flow restriction systems.

Light liquid separators are used where liquids harmful to water occur. They treat the wastewater, so that no pollutants can get into the sewer system or bodies of water. The function is based on the physical principle of gravity. ACO Oleosmart Pro made of polymer concrete removes oil, sediments and fine particles from the wastewater with the help of gravity.

ACO flow restriction systems
The discharge quantities from the drainage and retention channels are passed via the ACO flow restriction manhole with integrated flow restriction valve and, through individual reduction of the discharge pipe cross-section, are discharged into the separator in a controlled way without overloading it.

ACO DRAIN® drainage channels
ACO FlowDrain is a real alternative for traffic areas, which withstands heavy loads and achieves good flow performance even at high flow velocities in the area of ranges. With its low retention side, universal stability, functionality, design freedom and innovation novelty demanding the product line has plenty of convincing features.

ACO ACO® retention channels
ACO FlowDrain was especially developed for linear surface drainage and retention for large hard surfaced areas with traffic loads up to class F 900. Its advantage is in its weight and particularly robust design. This enables the Option to withstand high loads and large quantities of water.

ACO DRAIN® retention channels
ACO Qmax was especially developed for linear surface drainage and retention for large hard surfaced areas with traffic loads up to class F 900. Its advantage is in its weight and particularly robust design. This enables the Qmax to withstand high loads and large quantities of water.

ACO PowerDrain is a real all-rounder for traffic areas, which withstands heavy loads and achieves good flow performance even at high flow velocities in the area of ranges. With its low retention side, universal stability, functionality, design freedom and innovation novelty demanding the product line has plenty of convincing features.

ACO drainage of logistics areas
ACO DRAIN® drainage channels
ACO PowerDrain is a real alternative for traffic areas, which withstands heavy loads and achieves good flow performance even at high flow velocities in the area of ranges. With its low retention side, universal stability, functionality, design freedom and innovation novelty demanding the product line has plenty of convincing features.

ACO flow restriction manhole
Detailed info in the T 2, Chapter 8
www.aco-tiefbau.de/produkte

ACO Oleosmart Pro
Detailed info in the individual brochure or in the T 2, Chapter 1
www.aco-tiefbau.de/produkte

ACO DRAIN® drainage channels
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Near-surface drainage

In comparison calculations, with the help of drainage channels, near-surface located drainage solutions are a more economic variant compared to conventional drainage with pipes. The near-surface routing also benefits the downstream treatment plant. The discharge level is significantly higher. In this way, through designs replicating those found in nature, open design treatment plants can have a positive influence on the ecological and design ideas for open space design.

Practical tip

How can economy and ecology be usefully combined?

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The combination of technical and natural elements sets new standards in landscape architecture and at the same time ensures unhindered and fast discharge of the accumulated surface water.

Infiltration as a design element

What can be done with surface water?
Collect and infiltrate

Near-surface drainage

Infiltration is a viable option in urban areas with confined spaces, as well as in rural-structed areas. Where there are larger quantities of surface water, wastewater drainage frequently constitutes a problem for economic and ecological reasons. In most cases, large-dimension drainage systems have to be overcome to the nearest treatment plant and large-dimension combined sewers, stormwater sewers or storage facilities are required to ensure secured and reliable wastewater discharge. If the rainwater or surface water can be infiltrated in situ, only the wastewater has to be drained to the treatment plant. This enables significant cost savings for pipe and sewer construction. It is advantageous to route the water as close as possible to the surface from the area to be drained into the infiltration system or separation unit in the basins. ACO DRAIN® offers a whole range of drainage products, which collect and drain surface water quickly. For large and extensive catchment areas (for example, housing areas), in this way the installation of deep pipes can be reduced, which means substantial cost savings. Different design variants are available for the infiltration of contaminated surface water in urban areas. The respective type of infiltration depends on the size and location of the property.

ACO DRAIN® drainage channels

Near-surface drainage channels, such as the ACO Multiline Seal is shown here, collect the surface water produced reliably and carry it quickly and with maximum height loss to downstream infiltration. This space is implemented in a green space for surface infiltration or as an infiltration area of paths. The infiltration area can only ensure dry roads and paths but also provide design accents.

ACO swale inlet

The inlet of a swale or of any other non-pressure distribution swale water inlet in the area of slopes.

ACO sedimentation systems

ACO Sedised-C is used to remove sediments from surface water and thus protect the downstream block storage from becoming blocked with sand. The internal body, around and through which the surface water to be treated must flow, causes the water above the sludge trap to flow in a rotational pattern. The time required for the sedimentation is optimised.

ACO Stormbrixx

Groundwater recharge is a central topic in surface water or rainwater management. With the development of ACO Stormbrixx, ACO offers a concept that constitutes an ecologically sustainable and effective solution, not only for the drainage of new build projects in building and civil engineering, but also for subsequent hard surfacing of public and private areas with subsequent infiltration. With the infiltration the surface water is first treated in the ACO Stormbrixx. From there it is gradually discharged into the in situ soil.

Application-oriented products of the ACO system chain
Nowadays, not only extreme weather events pose particular requirements for the design and construction of road drainage but also legislation and the requirements of the approving authorities set ever-higher standards for the discharge of surface water into receiving bodies of water. For example, surface water classified as "normally contaminated" must be treated in a surface water sedimentation tank or similar equipment before it is discharged into a receiving body of water. Where this is technically not possible, alternative solutions must be found. As done by ACO!

What must be considered in case of heavy rain on dirty, polluted roads?

Standard
- Trennerlass (NRW) (North-Rhine Westphalia Law on the collection and discharge of rainwater via stormwater sewers)

Practical tip
- Application-orientated products of the ACO system chain
Surface water from heavily trafficked road areas should be treated before it is discharged into a body of water. Locating the required stormwater retention or sedimentation tank or basin to under the road is often not a real alternative in view of the small space available and high implementation costs. ACO has found a solution with which the contaminants in the surface water are retained in the road gully.

What can be done with surface water?

Treat and infiltrate

This system is based on the ACO Combipoint PE road gully, to which a filter insert is added to retain contaminants. Wastewater collection and discharge with the help of the watertight system can avoid infiltrating and exfiltrating wastewater and thus exclude contamination of the groundwater.

Rainwater treatment

ACO separation road gully

The separation road gully (SSA) is a method for removing suspended matter in the network. The body of the Combipoint PE road gully with filter insert is connected with a special double socket and the SSA insert. This insertion makes possible the separation of the solids in the road run-off. Due to the integrated flow insert, this system can avoid settling. The efficiency of sedimentation and the total solids are improved by 60 % compared to conventional road gullies with wet sludge trap, and the contaminants adhering to the solids are removed from the water.

ACO manhole covers

ACO Multitop Plus manhole covers are also available as a Bituplan rolled-in system. They are not positioned directly on the manhole head, but instead are rolled or vibrated-in flush with the road surface. This ensures precise installation flush with the surface. There is no longer a noticeable depression in the road, which leads to pot holes effects and noise emissions when driven over. The Bituplan frame is supported in the surfacing of the top flange and is isolated from the manhole. Traffic loads are therefore only transferred to the structure to a small extent.

ACO tree protection

Trees are indispensable for healthy living spaces with balanced urban climate. ACO tree grating and tree protective cages ensure that trees have free space to live, especially in towns and cities. The grate protects the trunk from damage and safeguards the root area from compaction. This ensures adequate oxygen supply and ventilation of the root area. Through design variants and the installation of ground spotlights, new opportunities are available for designing urban architecture.

ACO application-oriented products of the ACO system chain
ACO materials

In the design of components and structural elements, the choice of suitable materials determine the aesthetic and functional qualities of the product. The materials used by ACO are characterised by their strength, ageing resistance and their resistance to aggressive media, frost, heat and sunlight. Thanks to their long life and recyclability, they are equally sustainable and environmentally compatible and are used in an application-orientated way.

Polymer concrete

With 30 production locations worldwide, we consistently implement our ideas of product quality, economic efficiency and on-time delivery to our customers. Each of our factories has special materials expertise, from which the entire ACO Group benefits. Keeping our production technology and ecological performance up-to-date and in line with the latest standards is part of our key criteria for acting responsibly as a company and to be a worldwide leader.

ACO polymer concrete – one idea ahead

The special material composition and state-of-the-art production technology give polymer concrete its outstanding properties. ACO polymer concrete products have high strength values and a low weight. ACO polymer concrete is waterproof, allowing water to dry quickly, frost damage is eliminated. The smooth surface of ACO polymer concrete allows water and dirt particles to run off quickly and is easy to clean. Polymer concrete is also resistant to aggressive media without requiring additional coatings and can be used versatilely and durably even under extreme conditions.

Quality and the environment

Quality management

The ACO company is certified to EN ISO 9001. The raw materials of the polymer concrete are subject to strict specification and continuous quality monitoring. In addition to factory production control in accordance with EN 1433, the products are also controlled externally through regularly testing and monitoring by Kiwa (the Dutch “Keuringsinstituut voor WaterleidingArtikelen” (Judging Institute for Water Supply Articles)). Type tests in accordance with the European Construction Products Regulation 305/2011

Environmental management

As part of the ACO sustainability strategy, it is our declared objective to continuously improve the environmental balance. Our environmental management systems certified to EN ISO 14001 in our Büdelsdorf and Reith locations and energy management to EN ISO 50001 in our Büdelsdorf location make a significant contribution to this.

Landfill suitability and recyclability

Due to its extreme durability, polymer concrete helps to avoid waste. It can be added to the recycling process and is classified under waste code 170107 (mixtures of concrete, clay bricks, tiles and ceramics) in accordance with the “European Waste Register Regulations” for mineral waste.
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**Cast iron**

ACO cast iron – quality for all standards

The types of cast iron melting ACO Guss & Risse are selected and adapted to the increasing requirements through our intensive research and development processes. Both cast iron with lamellar graphite (grey cast iron GJL) and cast iron with nodular graphite (spheroidal cast iron GJS) have proven their worth as materials for use in cast iron sewers due to their high corrosion resistance. ACO Guss offers the optimum solution for the respective application, independent of the material.

**Plastic**

ACO plastic – innovative and flexible

Components made of plastic offer the greatest possible design freedom with regard to form and function. We use this potential to avoid expensive material combinations and time-consuming joining processes and to develop intelligent solutions “cast in one piece” to take their place. The plastics used by ACO are characterised not only by their high tensile strength but also by their outstanding resistance to environmental influences. Simple machining options and low weight are the reason for the outstanding user-friendliness of our plastic solutions.

**Steel/stainless**

ACO steel/stainless – sophisticated components

The processing of both steel and stainless steel is a core expertise of ACO in the different production facilities of the ACO Group worldwide. Large investment sums ensure that our production facilities are always state-of-the-art. The high quality of our skilled workers ensure high-quality products. Our own in-house plants for surface protection and finishing are used, among other things, in the production of ACO Drainlock gratings.

**Concrete**

ACO concrete – durable and reliable

Concrete is a material that plays a decisive role in tank construction for separation and drainage technology. ACO tanks for drainage technology are made from a highly waterproof concrete. A very high resistance and stability. The tanks can be used as separators, pumping stations, accident (spillage) systems or special chambers and can also be equipped with a plastic coating or lining. ACO tanks made of concrete are a durable solution for the drainage and treatment of water.
train:
Information and further training
In the ACO Academy we share the know-how of the worldwide operating ACO Group with architects, design engineers, installers and merchants, for whom quality is important. We invite you to benefit from this.

design:
Planning, design and optimisation
The specification and design of drainage solutions allows many variations. Yet which concept produces the economically best and technically most reliable solution? We help you to find the right answer.
support:
Construction advice and support
To ensure that no unpleasant surprises occur between the design and implementation of a drainage solution, we advise and assist you for a specific project on your construction site.
care:
Inspection and maintenance
ACO products are designed and produced with longevity. With our after-sales offers we ensure that ACO continues to fulfills your high quality standards even after many years.

www.aco-tiefbau.de
ACO Tiefbau on the internet
You will find our products with all the information important to you on the ACO Tiefbau website. You can use it during the design, not only to access technical descriptions but also the corresponding image information and tender specifications and installation instructions and information.

www.aco-academy.de
ACO Academy for practical training
Events at ACO Academy are something special: They impart sound practical knowledge of all aspects of construction and at the same time, are a place for practitioners from the entire industry to meet and exchange ideas and experiences. The ACO academy is a forum for excellent building. Future topics of the construction industry and concentrated know-how for all aspects of construction are taught with practical reference. Find out about the contents of the seminars on offer.

www.service.aco
ACO is your strong service partner
The service professionals of the ACO Group are there for you – around the clock, by working together with selected service partners throughout Germany.

ACO at a glance
• 4,400 employees in over 40 countries (Europe, North and South America, Asia, Australia, Africa)
• 30 production locations in 15 countries
• Sales in 2016: Euro 711 million

ACO Tiefbau
worldwide sales development in mln euros

ACO Group

The ACO Group is one of the world market leaders in drainage technology. Climate change poses us with the challenge of responding to the new environmental influences with innovative solutions. With its integrated approach, ACO stands for professional drainage, economic treatment and controlled discharge or reuse of water.

Among other things, the products include drainage channels and gullies, oil and grease separators, backflow systems and pumps and pressurised watertight basement windows and lightwells.

The family-run company based in Rendsburg/Büdelsdorf was founded in 1946 on the grounds of the Carlshütte iron foundry, the first industrial company of Schleswig-Holstein. The innovational strength of the ACO Group is the result of intensive development and research and expertise in the processing and use of polymer concrete, plastic, cast iron, stainless steel and reinforce concrete.

ACO. The future of drainage.
Each ACO Tiefbau product supports the ACO system chain

- Drainage channels
- Road gullies and yard gullies
- Gully tops
- Manhole covers
- Separators
- Accident systems
- Sedimentation and filtration systems
- Infiltration and attenuation systems
- Retention basins
- Flow control systems
- Pumping stations
- Tree protection
- Amphibian protection