



Guarantor for safety, stability and high degree of functionality

**ACO DRAIN® Monoblock – the monolithic
drainage system made of polymer concrete**



ACO. The future of drainage.



The ACO system chain provides the drainage solutions for tomorrow's environmental conditions.

Increasingly extreme weather must be counteracted by more complex and sophisticated drainage concepts. ACO achieves this with intelligent system solutions which have a dual purpose: protecting people from water, and water from people. Every ACO product within the ACO system chain therefore safely controls the water as it passes along the chain to ensure that it can be ecologically and economically reused in a viable way.

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collect:
Collect and carry



clean:
Pretreat and treat



hold:
Hold and retain



release:
Pump, discharge and reuse



ACO system chain
in action



ACO DRAIN® Monoblock – A block that nothing can shock

The monoblock is a drainage system with a monolithic design: The channel and cover are produced from polymer concrete in one casting. The result is an extremely stable unit without loose parts, there is also no need for bonded joints. The polymer concrete material can withstand extremely high loads and stresses, is durable and has a low specific weight. That makes the monoblock systems particularly easy to work with.

ACO DRAIN® Monoblock – The monolithic channel system made of polymer concrete



ACO DRAIN® Monoblock – A block that nothing can shock

The latest production methods with the tried and tested polymer concrete material enable a drainage channel to be produced in one piece without loose parts and without bonded joint.

High degree of functionality due to the monocast design

The unique monocast design guarantees maximum safety and stability in all areas of traffic area drainage, including transverse and longitudinal drainage on dual carriageways and motorways, up to load class F 900 to EN 1433: An ideal alternative to the conventional solution. The large inlet cross-section and V-shaped cross-section ensure fast discharge of the water. The uncomplicated modular principle with few system elements solves all kinds of different application cases, easily and clearly.

ACO polymer is the ideal der material for the monoblock design

The special material composition and state-of-the-art production technology gives polymer concrete a properties profile that make it the ideal material for monoblock designs.

Prefabricated unit weights

Due to the significantly higher strength values compared to concrete properties but approximately the same density, polymer concrete products are significantly lighter than comparable concrete products. The low weight simplifies handling the products on the construction site, increases the laying rate and thus reduces costs.

Impermeability

Compared to uncoated concrete products, liquids cannot penetrate the surface of the materials, as the water penetration depth of polymer concrete is 0 mm. Freeze-thaw and extreme de-icing salt exposure cannot destroy the polymer concrete. According to EN 1433, polymer concrete automatically has the highest weathering level and is thus the ideal material for use in modern transport infrastructure construction.

Chemical resistance

Due to the use of the latest polymer compounds, products made of polymer concrete are resistant to aggressive media without requiring additional coatings or liners made of PE-HD, as is the case with comparable concrete products.



ACO DRAIN® Monoblock RD 200 V (watertight) for porous asphalt (see page 6)

ACO DRAIN® Monoblock PD 200 V

The system's advantages at a glance



The advantages in the system

- **Monolithic design!**
Monoblock satisfies all load classes of EN 1433.
- **Easy and clear!**
All application cases can be solved with only a few system elements.
- **Sealing to EN 1433!**
An integrated sealing option exists to satisfy the European standard requirements.
- **DF type for use in porous asphalt**

The installation advantages

- **Cost-effective installation!**
Thanks to the highly stable polymer concrete material, the quantity of concrete required for lateral haunching when laying the monoblock channels can be reduced significantly.
- **Stable unit!**
Thanks to its monolithic design without bonded joint, the monoblock remains stable even under extreme loads. Compared to bonded systems, the top and bottom sections cannot separate. Installation does not require stiffeners and the surfacings can be worked up to the channels without slippage.
- **Low weight!**
Based on the very high material strengths, the design weights of the monoblock systems are significantly lower than with comparable concrete products. Low product weights reduce costs for transport and installation. Also, there is no need for additional equipment to lay the channel bodies.

The maintenance advantages

- **Absolutely rust-free!**
All components are made of polymer concrete, the aesthetic appearance is not disturbed after installation by corroded covers.
- **Durable look and function!**
The gratings and frames used in the necessary sump boxes and inspection elements are made of EN-GJS, CDP coated, and are equipped with a traffic-safe screwless stop.
- **Simply clean!**
The contemporary methods for cleaning the channels include high-pressure (jetting) but low-pressure flushing is also used.



ACO DRAIN® Monoblock (watertight)

A special channel is required where porous asphalt (PA) is used as the surface course; the surface water from the road surfacing can flow into the side of the channel. Porous asphalt is not only advantageous because of its sound absorption, due to its porous structure it is also able to discharge surface water on the waterproof tack or bond coat between the binder and surface course. One or two layers of porous asphalt (PA/2PA) are laid as the surface course, if special requirements are set to reduce traffic noise. The PA/2PA is thus used as active noise control. ACO DRAIN® monoblock drainage channels are used to drain the carriageways. The channels developed specially to drain porous asphalt have a convincingly compact design, low weight and high laying rate. They can be installed with-

out large numbers of personnel or machinery. Two other factors argue in favour of use of ACO monoblock systems: 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. Another advantage: Without additional coating, the polymer concrete construction material is liquid-tight, resistant to aggressive media and frost-thaw cycles and de-icing salt.

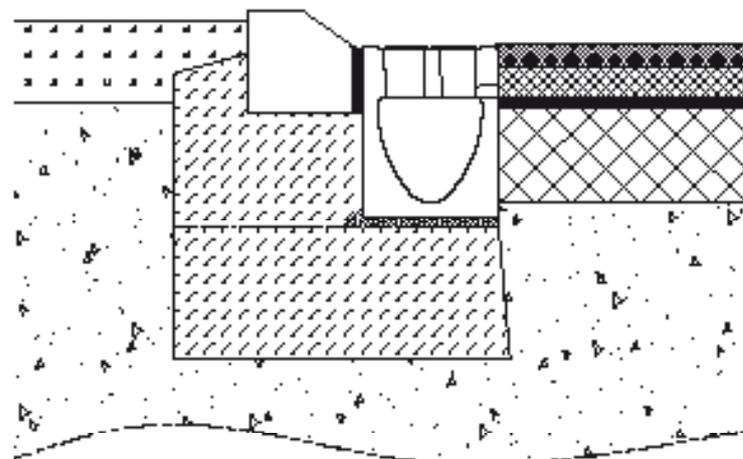
Product features

- highly-resistant, durable polymer concrete material, frost-thaw and de-icing salt resistant
- V-shaped cross-section for optimum hydraulics
- Application for PA/2PA
- Installation with foundation cut out at the side of the carriageway
- Level of the DF opening is variable

NEW
Optionally with integrated seal at channel joint, to protect the foundation from de-icing salt attack



Drainage of porous asphalt



It is installed practically with foundation cut out at the road side

ACO DRAIN® Monoblock (watertight) for the widening of the A3 motorway to 8 lanes near Cologne

More safety, less noise

With approx. 12,550 kilometres, the German motorway network is one of the densest in the world. The competent federal states are responsible for the necessary repairs and widening measures on behalf of the Federal Ministry of Transport and Digital Infrastructure. With the widening of the A3 motorway between Cologne-Dellbrück and Cologne-Mülheim to four lanes and a hard shoulder in each direction, in future it will be possible to cope with the steadily increasing traffic volume in this region.

A porous asphalt (PA) was used as the asphalt surface course to reduce noise emissions. This is a special form of the asphalt surface course, because the air-voids content of 22 - 28 % by vol. is significantly higher than other asphalt surface courses used (5 - 7 % by vol.). The high air-voids content enables the surface water to pass through the asphalt, so that the surface water is drained from the sealing layer between the binder and surface course. The noise emissions due to rolling (tyre) noises are reduced by up to 5 dBA compared to conventional carriageway surfacings. In addition, so-called spray plumes can be largely avoided and the risk of aquaplaning is reduced significantly.

Drainage on two levels

The special channels of load class D 400 for draining porous asphalt have inlet openings arranged in two layers. On the one hand the surface water flows through the horizontal openings in the top, and on the other hand, the water that passes through the porous asphalt can be drained from the waterproof tack or bond coat and into the vertical inlet openings. The collected water is then passed via the sump box combinations and into the drainage pipes. Inspection elements with a cast iron grating cover made of nodular cast iron (GJS) enable access to the channel train for maintenance and cleaning purposes.



ACO DRAIN® Monoblock RD 300 DF for the widening of the A3

Compact design increases laying rate

The monolithic channels made of polymer concrete, which have been developed to drain large areas of porous asphalt, were installed with a higher laying rate and without large numbers of personnel and machinery thanks to their compact design. Because due to a comparable density with significantly higher strength values, polymer concrete products with the same loading capacity are lighter than comparable concrete products.



ACO DRAIN® Monoblock RD 200 V DF on the A1 motorway, Hamburg section



ACO DRAIN® Monoblock PD 100/200 V

The channel as an architectural design element

The requirements set for drainage elements, especially with regard to their design and aesthetic appearance, increase continuously. The ACO DRAIN® monoblock system PD satisfies landscape gardening requirements. The surface design was based on the high-

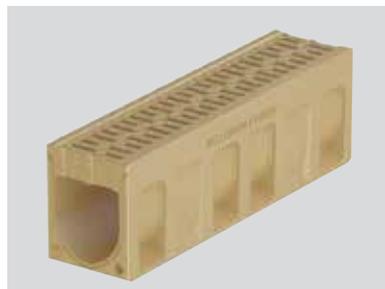
est quality and aesthetic standards. The uncomplicated, modular system also offers design freedom. ACO Monoblock PD thus satisfies the ideals of all target groups – from the designer through to the building materials trade.

ACO DRAIN® Monoblock PD 200 V

- universal laying direction thanks to new type of tongue and groove system with recessed and raised lobes
- all-round sealing groove (for the option of a seal in accordance with the standard, e.g. with an elastic sealant)
- V-shaped cross-section

Areas of use

- Landscape gardening
- Car parks
- Pedestrian zones and market squares (public spaces)
- School playgrounds
- Wherever protection against vandalism is required
- Railway platforms



Channel body of type PD 200 V made of polymer concrete, natural



Channel bodies of type PD 100 V are made of polymer concrete and are through-dyed in anthracite black

As with all monoblock channels, the surface must not be driven over with steel wheels.



Simply loosen the cover using the ACO DRAIN® grating hook



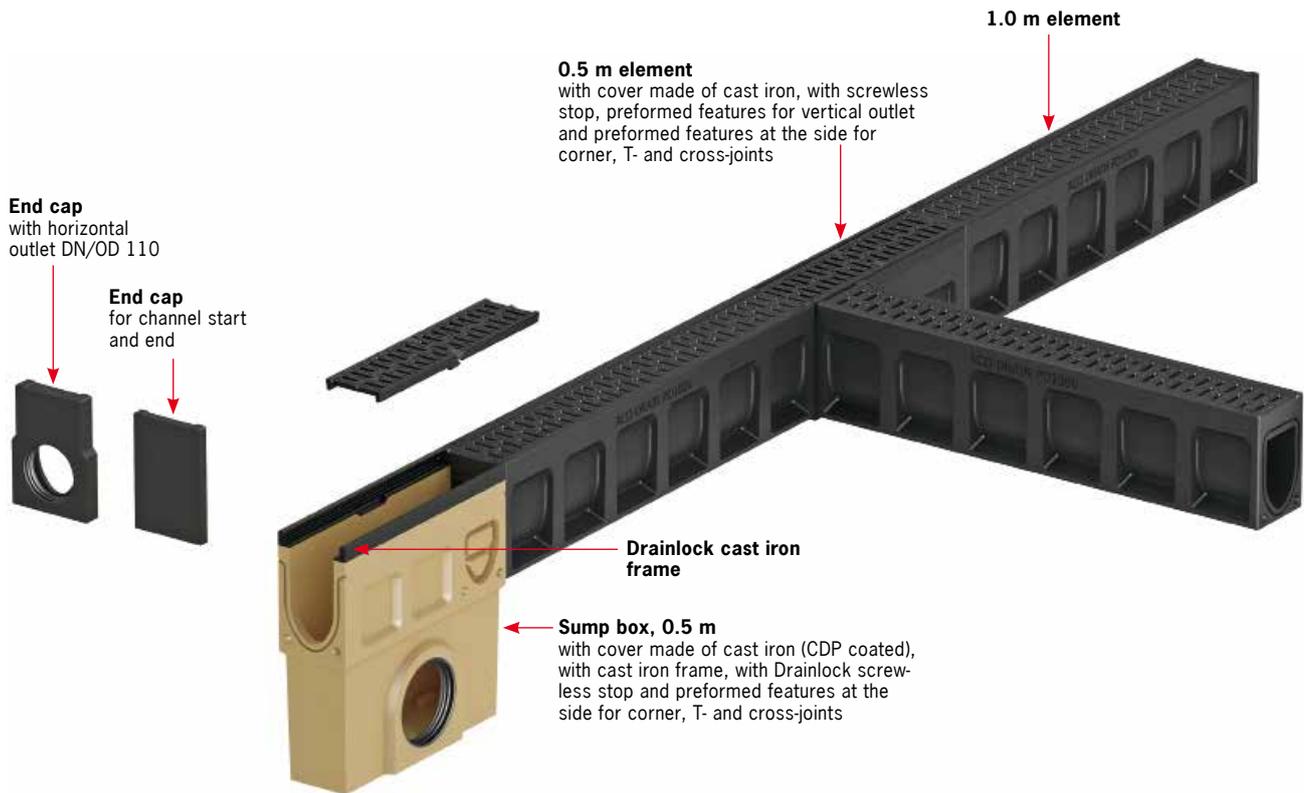
Easy cleaning of the channel possible at any time



The grating is pressed on briefly to lock it

The system at a glance

The monoblock system is made up of only 6 components. Type PD 100 V is shown here.



PD 100 V technical data

Designation	Overall length [cm]	Overall width [cm]	Overall height [cm]	Weight [kg]	Inlet cross-section [cm ² /m]
Channel PD 100 V Class D	100	15	23	32	202
Channel with inspection opening	50	15	24	22	202
Sump box, one-piece DN 100	50	15	50	32.5	202
Sump box, one-piece DN 150	50	15	50	32.5	202

The outstanding features of the channel are:

- significantly higher load absorption and distribution, including in the horizontal direction
- improved durability compared to the channels used to date made up of a channel and grating
- simplified installation also due to easy cutting to length of partial elements and universal laying direction

ACO DRAIN® Monoblock SD 200 V Slotted Channel

The ACO DRAIN® Monoblock SD 200 V slotted channel is a completely new ACO development. Only by using state-of-the-art production technology for processing polymer concrete in the large component production is it possible to make 4 metre long channel elements weighing 140 kg/m in series production.

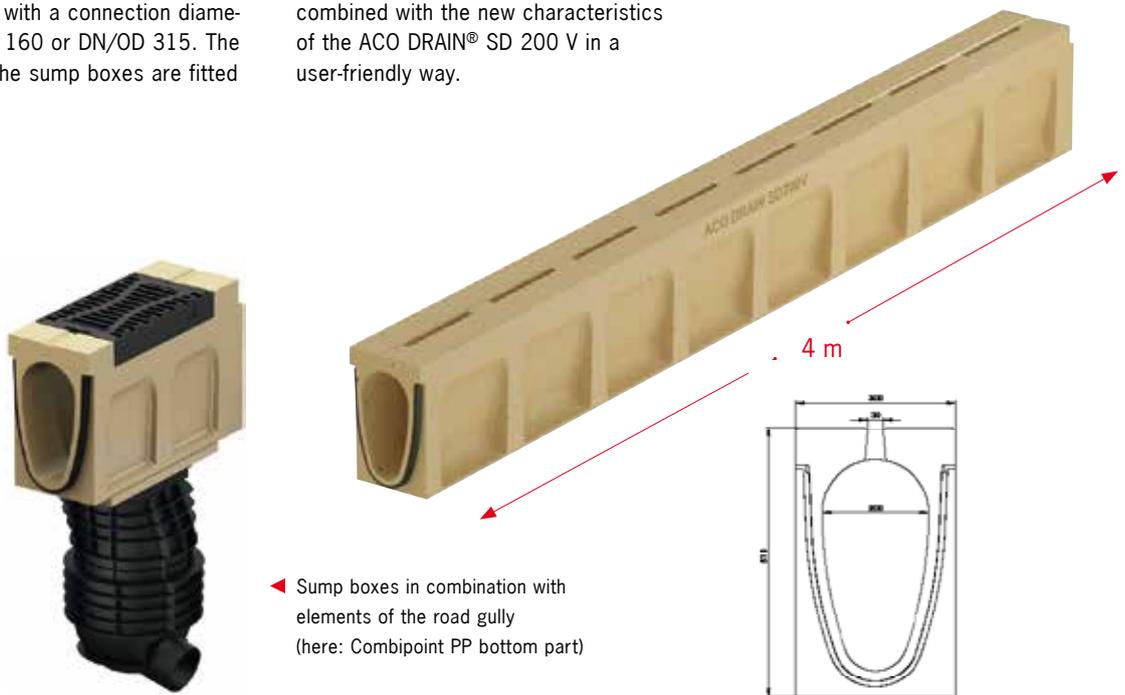
Slotted channels are traditionally used for longitudinal road drainage. The advantages of polymer concrete can only now also be used in this area of application. The connections to the drainage pipe are made using typical ACO inlet combinations with a connection diameter of DN/OD 160 or DN/OD 315. The top parts of the sump boxes are fitted

with gratings from the Multitop gully top family. They are permanently connected to the frame by hinges and cannot be undone. Screwless, traffic-safe stops enable quick access for cleaning and inspection. Alternatively, the top parts of the sump boxes can be combined with the 300 x 500 gully sections of the modular ACO Combipoint PP road gully system.

With these characteristics, application-orientated safety in road and motorway construction and hydraulic flexibility are optimally ensured. The advantages of existing ACO drainage systems are combined with the new characteristics of the ACO DRAIN® SD 200 V in a user-friendly way.

Product features

- highly-resistant, durable polymer concrete material
- integrated seal
- easily laid from above
- high laying rate due to low component weight and 4 m component length
- V-shaped cross-section for optimum hydraulics
- lateral anchoring pockets



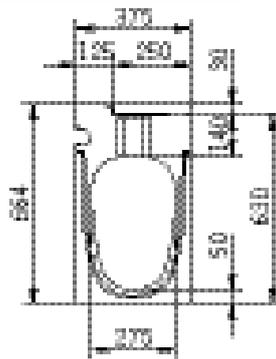
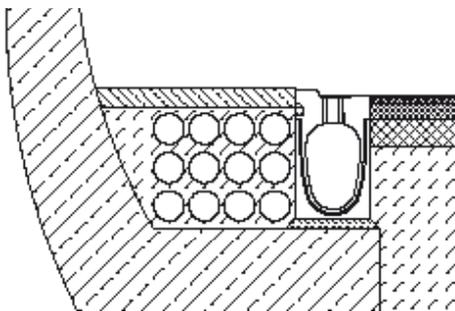
ACO DRAIN® Monoblock T 275 V Kerb Slot Channel

Structural members in tunnelling 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. An important criterion for use of polymer concrete material in tunnels is the “non-flammable” classification. ACO’s special polymer concrete mix fulfils these requirements. Polymer concrete is approved for use in tunnels in the latest edition of the ZTV-ING 03/12 (German Additional Technical

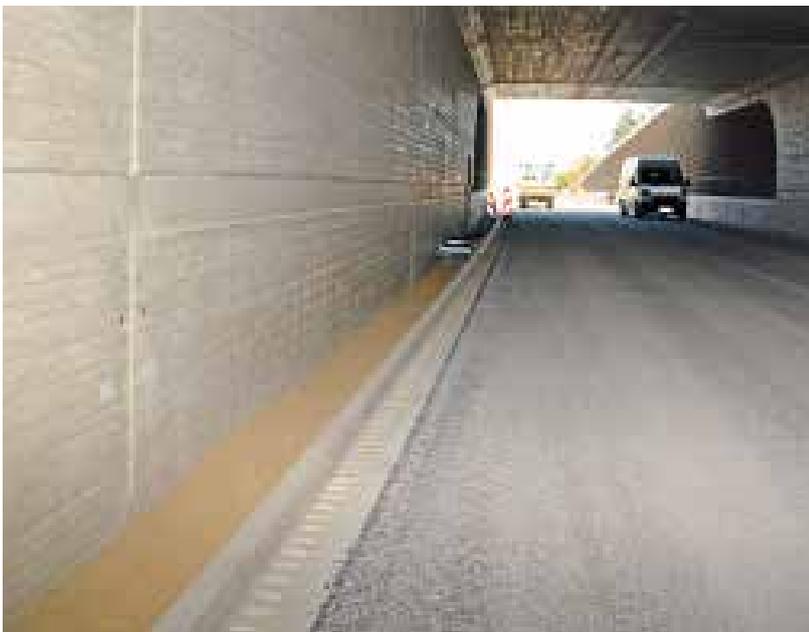
Contract Conditions and Guidelines for Engineering Structures). In case of an accident, especially with flammable liquids, escaping hazardous goods are removed from the road surface along the shortest route by the tunnel drainage and are thus separated from the oxygen supply. The tunnel products are selected on a specific project basis, according to the requirements and circumstances and thus offer the greatest leeway for design and planning.

Product features

- highly-resistant, durable polymer concrete material
- V-shaped cross-section for optimum hydraulics
- variable upstand/wall flange of 3 and 7 cm
- 25 % more room in the tunnel cross-section thanks to narrow width of the channel
- integrated seal



Installation situation of the ACO DRAIN® kerb slot in the tunnel, load class D 400



ACO DRAIN® Monoblock Channel RD 100 V/200 V



ACO DRAIN® Monoblock RD 200 V in a logistics centre

A guarantor for maximum stability, especially in the longitudinal and transverse drainage areas of motorways and dual carriageways. Monoblock channels are also at home in areas of use such as container terminals and airports. All these areas of use have one thing in common: High dynamic forces. These are generated, for example, by being driven over by approx. 120,000 vehicles daily.

Wither in the high-speed range on formula 1 racing tracks and motorways or there where heavy loads are moved. The DIBt has issued a national technical approval (No. Z 74.4-53) for use in LAU systems for the RD 100 V and RD 200 V, whereby two versions of the RD 200 V are offered depending on the application.



ACO DRAIN® Monoblock RD 100 V



ACO DRAIN® Monoblock RD 200 V

The ACO DRAIN® Monoblock RD 100 V and RD 200 V

The V-shaped cross-section is one of the characteristic features of all monoblock channels, which provides channel hydraulics and self-cleaning advantages. The lateral and full area anchoring ensures maximum hold, stability and buoyancy safety, starting during the construction phase. In the nominal sizes 100 and 200, the ACO monoblock fully satisfies the high requirements for carriageway drainage, even in heavy rain. This ensures car drivers' safety when it comes to aquaplaning. The nominal size 200 is offered in height 0.0 and additionally in height 20.0.

The application areas

- Transverse and longitudinal drainage of motorways and dual carriageways
- Haulage company depots
- Motorway car parks with truck traffic
- Airfields
- Formula 1 racing tracks



ACO DRAIN® Monoblock RD 200 V in a motorway service station



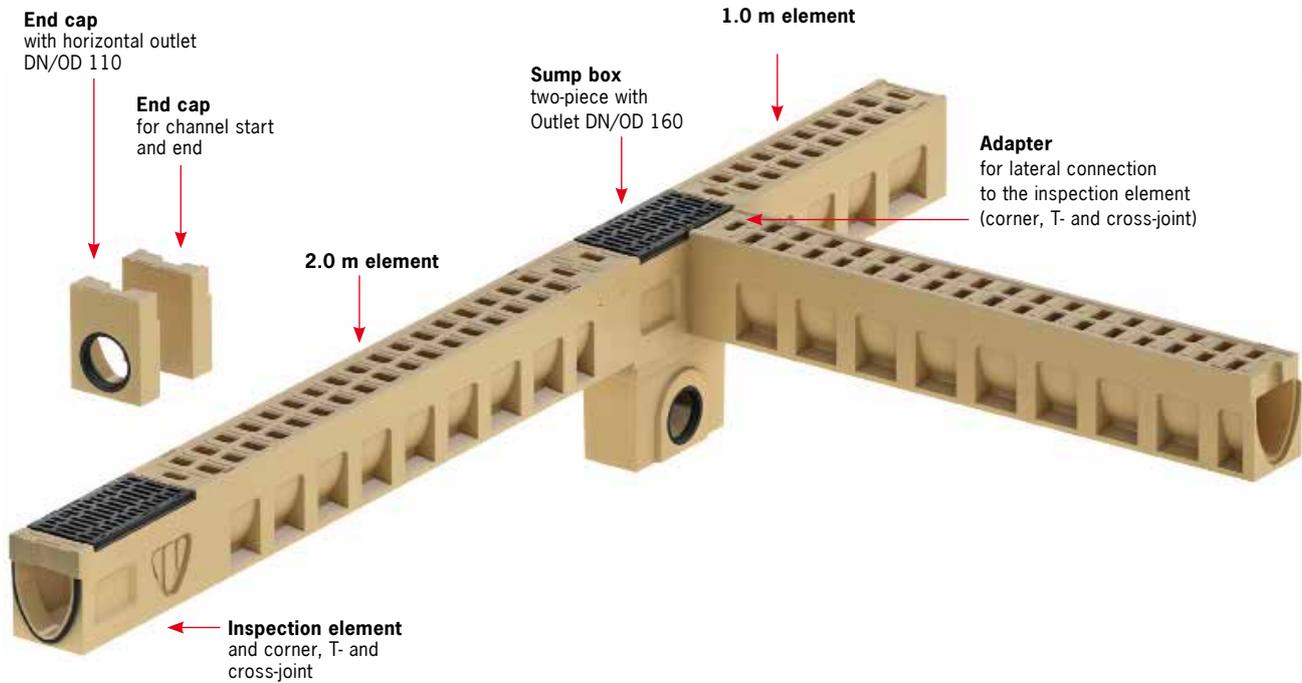
Use in racing. Here: Formula 1 racing track in Shanghai



ACO DRAIN® Monoblock RD 200 V on an airport

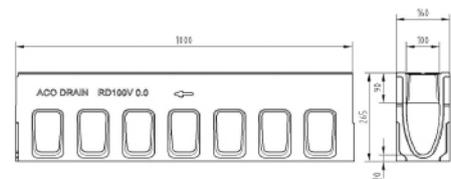
The RD 100 V/200 V system at a glance

Shown here using the example of the ACO DRAIN® Monoblock RD 200 V 0.0 (watertight)

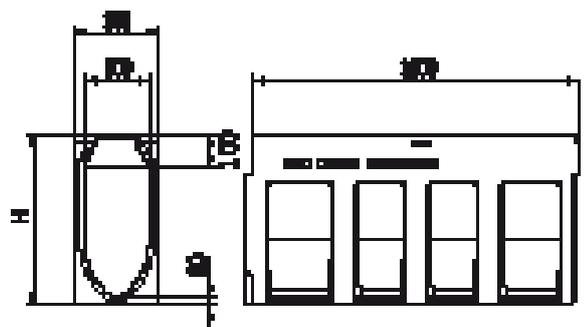


RD 100 V/200 V technical data

Designation	Overall length [cm]	Overall width [cm]	Overall height [cm]	Weight [kg]	Inlet cross-section [cm ² /m]
Channel RD 100 V Class F 900	100	16	26.5	50.5	308
Channel with inspection opening	50	16	27.5	25.3	380
Sump box, one-piece DN/OD 100	50	16	52.5	55.0	380
Sump box, one-piece DN/OD 160	50	16	52.5	55.0	380
Channel RD 200 V Class F 900	100/200	26	33/53	90/176	583
Channel with inspection opening	66	26	33/53	56.2/71.4	935
Sump box OT 0.0/20.0	50	26	36/56	48/65	935
Sump box UT DN/OD 160/200	50	26	36.5	26.5/26.5	-



Dimensions of the Monoblock RD 100 V, 1.0 m channel block



Dimensions of the Monoblock RD 200 V, 1.0 m channel block

* With national technical approval Z-74.4-53 for use in LAU systems (systems for the storage, filling and transfer of water-polluting substances).

ACO DRAIN® Monoblock channel RD 300



ACO DRAIN® Monoblock RD 300 during installation on the A3 motorway

The RD 300 channel system was especially developed for the drainage of large areas. The monoblock channel RD 300 has load class F 900 to EN 1433. The DIBt has issued a national technical approval (No. Z 74.4-53) for use in LAU systems. A special injection nozzle, which ACO provides on request, is required to seal the **safety rebate**. The safety rebate is sealed by companies with WHG approval (German Water Management Law), which have the necessary knowledge and equipment to seal large joints.

The inlet cross-section and the flow cross-section allow very large catchment areas to be connected while at the same time optimising outlet points. Large lengths of channel can be achieved. The applications engineering department dimensions the channels on a project by project basis.

A 75 cm long element is available for corner, T- and cross-joints.

The sump box is designed to contain and discharge large quantities of water. End caps, outlet end caps and adapters round off the product range.

As with all monoblock channels, the surface must not be driven over with steel wheels.



ACO DRAIN® Monoblock RD 300 on Manching airfield with sump box



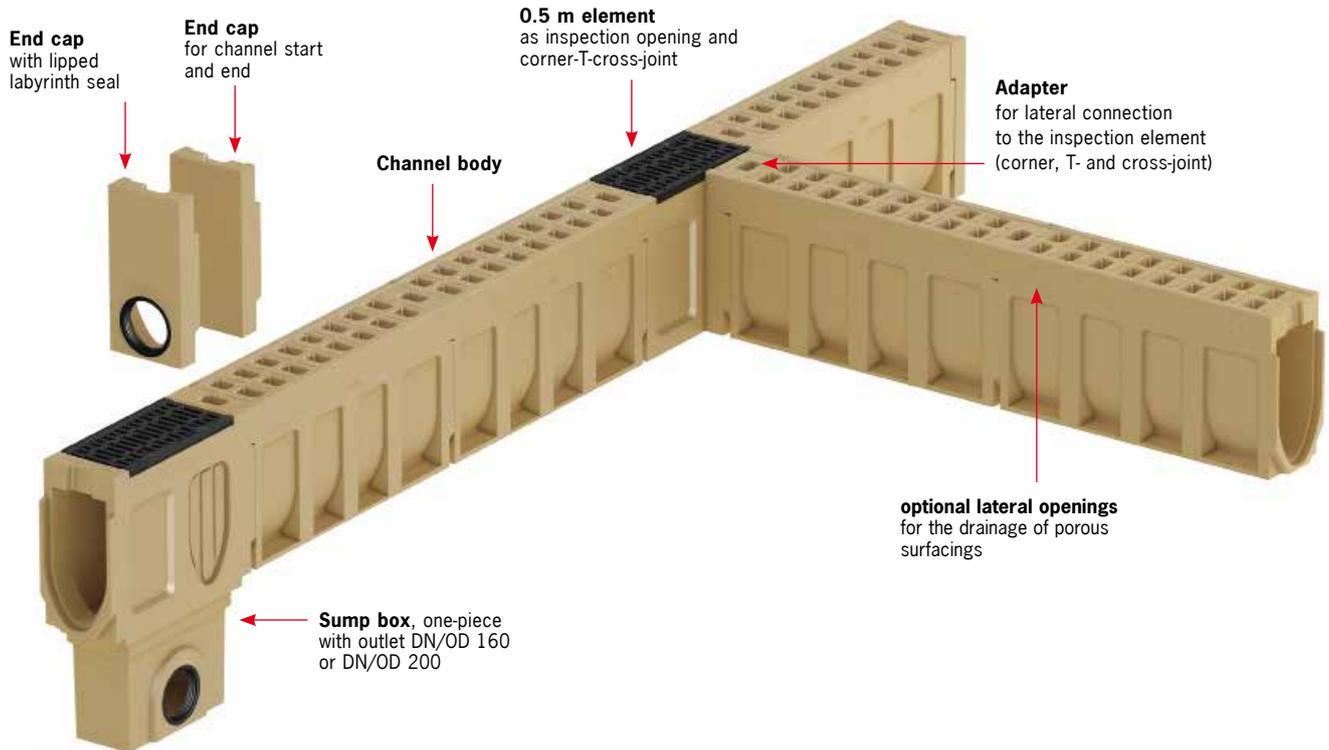
ACO DRAIN® Monoblock RD 300

Areas of use

- Transverse and longitudinal drainage of motorways and dual carriageways
- Haulage company depots
- Motorway car parks with truck traffic
- Airfields
- Formula 1 racing tracks

The monoblock system at a glance

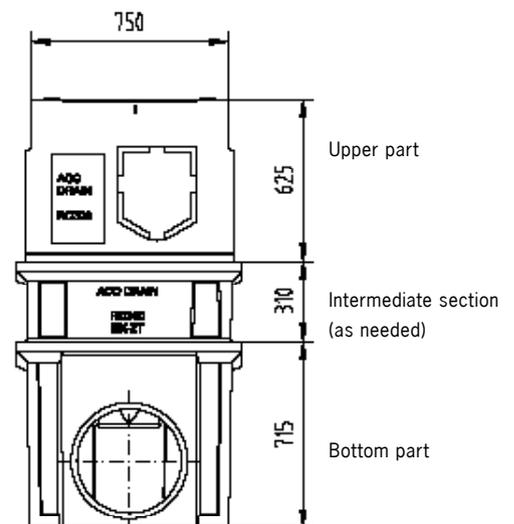
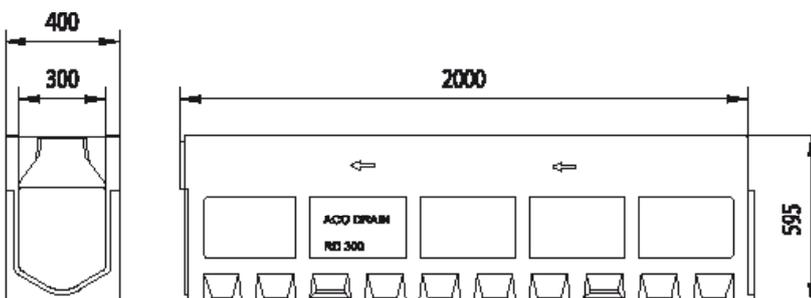
A clear, modular system – demonstrated by the example of the RD 200 V



RD 300 Technical data

Designation	Overall length [cm]	Overall width [cm]	Overall height [cm]	Weight [kg]	Inlet cross-section [cm ² /m]
Channel RD 300 V Class F 900	200	40	59.5	484	800
Channel with inspection opening	75	40	64.5	219	935
Sump box, multi-piece DN 315	75	40	165 ¹⁾	454 ²⁾	935
Sump box, multi-piece DN 400	75	40	165 ¹⁾	454 ²⁾	935

²⁾ without intermediate section 384 kg



Sump box RD 300

¹⁾ The sump box combination can also be used without the 310 mm high intermediate section. The total height is then 134 cm

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