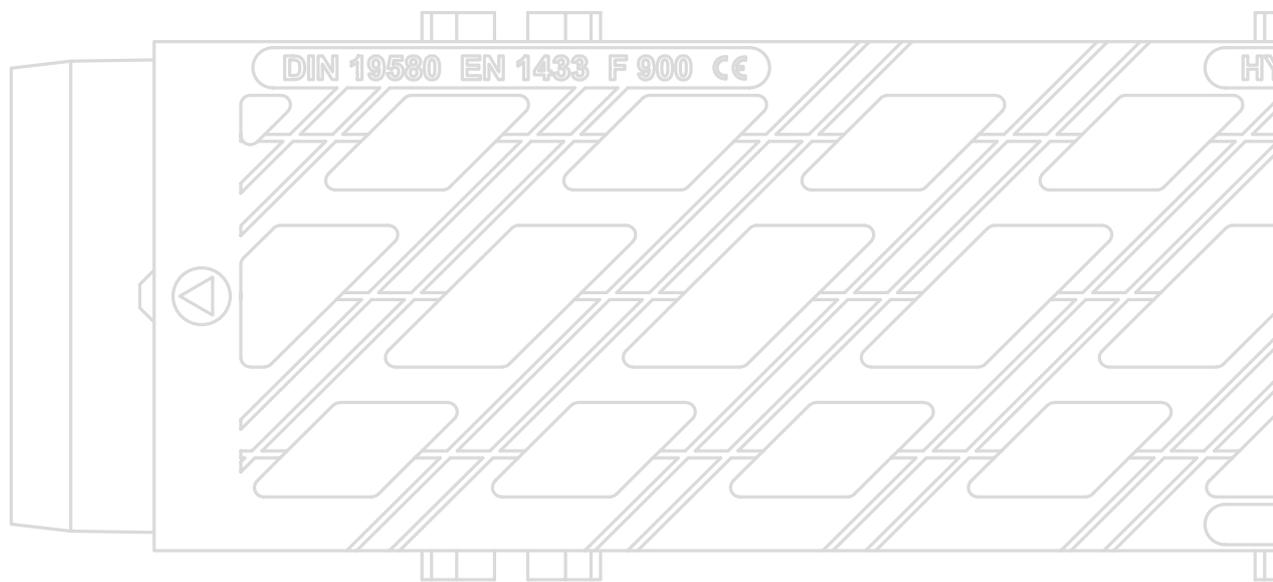


# TECHNICAL MANUAL

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## for Drainage Channels



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## IMPORTANT INFORMATION

The installation instructions contained in this manual are only provided as a recommendation. The construction companies charged with installation can naturally incorporate any of their own improvements. The construction company is responsible for the correct installation of the drainage channels. This means that the latest version of all technical regulations must be observed and complied with.

Today there are a number of conventional installation methods. The selection of the best method for your project is the responsibility of the respective planning engineer who has the necessary knowledge to assess the respective situation. There is also a wide range of concrete qualities on the market and their suitability can best be judged by the planning engineer.

All installed parts must be examined before installation to ensure that they are undamaged. For reasons of liability never install damaged parts and contact the supplier immediately to submit a claim.

### In general the following applies for the installation instructions contained in this document:

1. The drainage channel laying method depends on the installation location, corresponding traffic loads, and the planned top course. The installation locations are classified in DIN EN 1433 in the classes A15 to F900. From class C 250 onwards, all gratings must be anchored to ensure traffic safety. The foundation of the drainage channel must be suitable to bear the traffic load.
2. Horizontal traffic loads and the thermal behaviour of the top course must be compensated by adequately dimensioned concrete encasement of the channel body and also by expansion joints running lengthways on the channel, especially in directly adjoining concrete surfaces. Joints at right angles to the channel must always be implemented as butt joints.
3. The laying direction of the channel is always opposite to the direction of flow and starts at the ground pipe union. Adjoining surfaces must be executed to be approx. 3 to 5 mm higher than the top edge of the grating or edge protection, taking settling and compression into account.
4. Undermining and washing out of the top course and channels must be prevented by suitable measures.
5. If extreme horizontal forces exerted at right angles to the channel are expected, e.g. at railway crossings, ramps or motorways, the drainage channels should be secured at the sides with a reinforced concrete top course.

The basic materials of the fibre-reinforced concrete are always selected by HYDROTEC in compliance with ecological considerations. The basis of concrete is simple and nature supplies what

is needed for its production. Cement made of limestone and clay as well as an aggregate of sand or gravel and also water. The overall reserves of these raw materials are adequate for long-term use.



### HYDROTEC drainage systems made of reinforced concrete have outstanding features:

- Properties such as strength and durability are calculated for conventional top course types (concrete bricks, asphalt, concrete)
- Frost-resistance to the eco-standard & DIN EN 1433
- Perfect interaction with the foundation due to the mass and form of the channels. A wide contact surface guarantees stability during installation
- Optimum connection between the cast iron and concrete
- Non-flammable in compliance with DIN 4102
- Environmental regulations are fully met, as concrete is 100 % recyclable

### Strength is increased by the additional reinforcement of the concrete with fibres:

- The formation of cracks due to shrinkage and tension is effectively minimised
- Flexural tension, pressure and splitting tensile strength are improved
- Resistance to freeze-thaw cycles is increased
- The minimum water penetration depth ensures water impermeability in compliance with DIN EN 206

# INSTALLATION SECTION

## EN 124 / EN 1433



**Class A 15**  
Traffic areas used only by pedestrians and cyclists and similar areas, e.g. greenspace.



**Class D 400**  
Road surfaces (incl. pedestrian streets), parking lots and similar, paved traffic areas, e.g. car parks on public freeways.



**Class B 125**  
Pavements, pedestrian areas and similar surfaces, e.g. parking space for cars and multi-story car parks



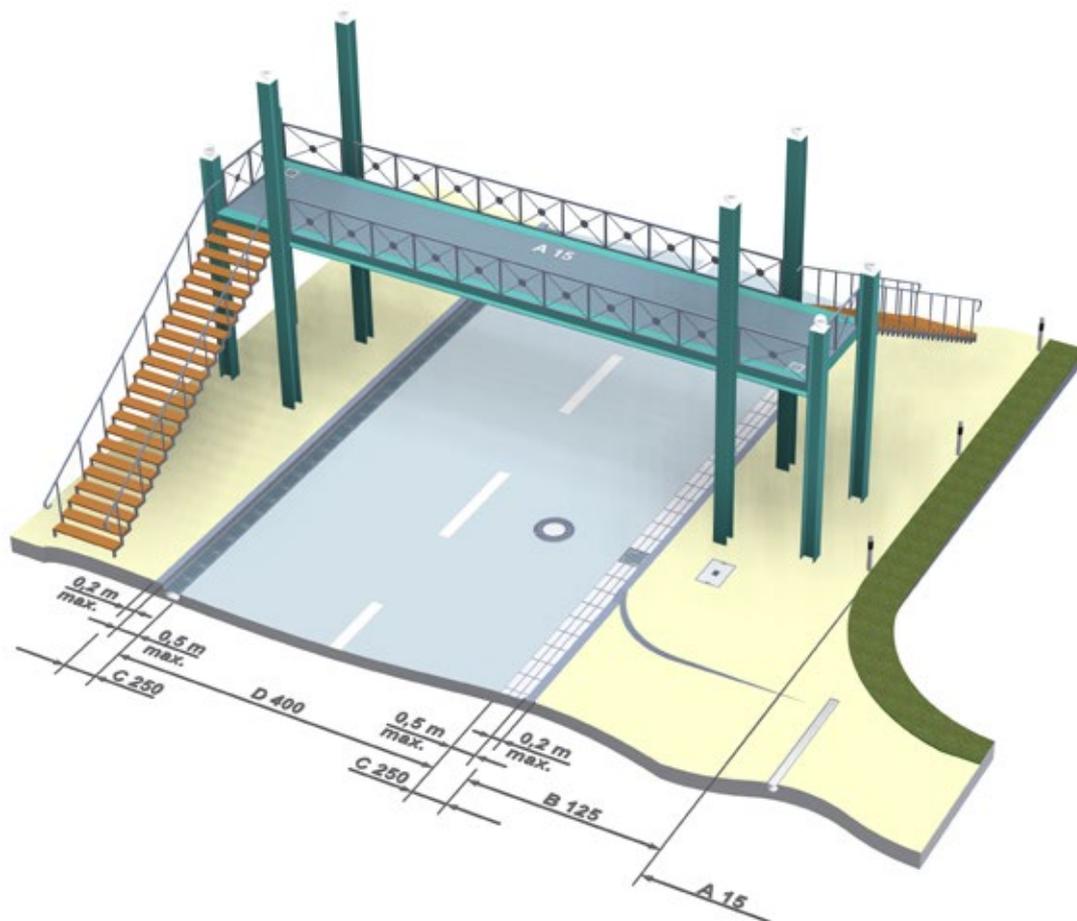
**Class E 600**  
Non-public traffic areas used by vehicles with a particularly wheel load, e.g. traffic routes in industrial building, dock facilities



**Class C 250**  
Drainage channels in the area of the kerbside and for emergency lanes in road construction.



**Class F 900**  
Special areas e.g. flight operation areas at airports



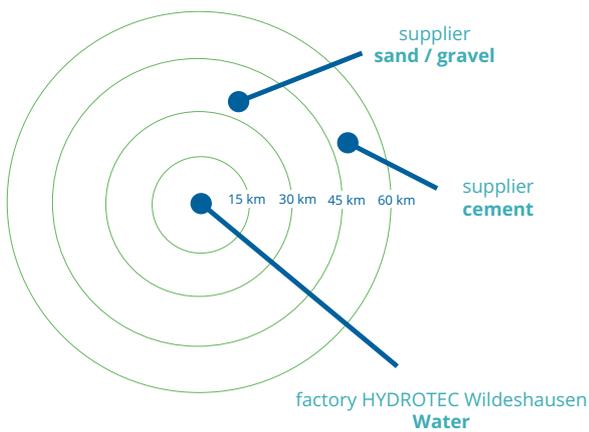
# POSITIVE ECO-BALANCE



### Sustainability in focus

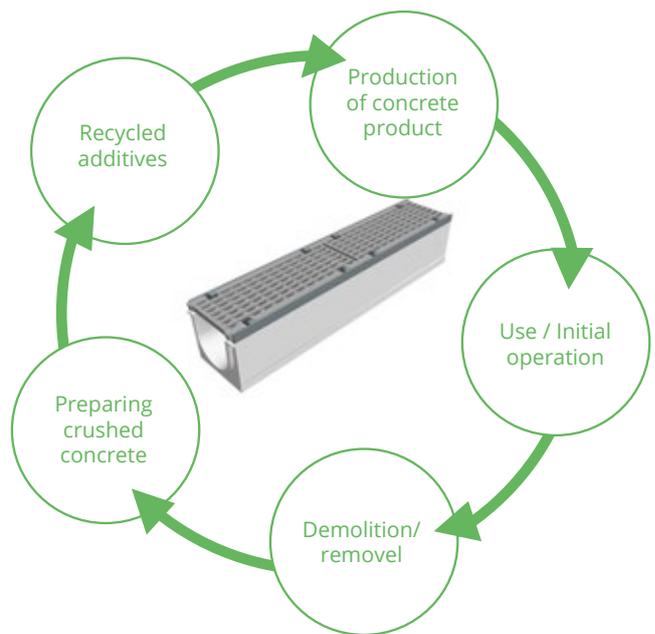
HYDROTEC always selects the raw materials for its fibre-reinforced concrete with ecological perspectives in mind. The basis for concrete is simple, and nature offers what we need to make it: cement from limestone and clay, aggregate from sand and/or gravel and, finally, water. These raw materials are abundantly present as natural reserves in the long term and give the concrete a very long lifespan and the associated properties. Safety, resilience, ability to be moulded and economic viability made concrete one of the most important construction materials - then, now and in the future.

### HYDROTEC supply sources for the production of concrete



Ecology combined with economy is our goal in concrete production. This goal is achieved particularly through short transport routes, which not only protect the environment, but also keep transit costs low. In order to achieve this goal, HYDROTEC deliberately selects suppliers from the region.

### 100 % recyclable



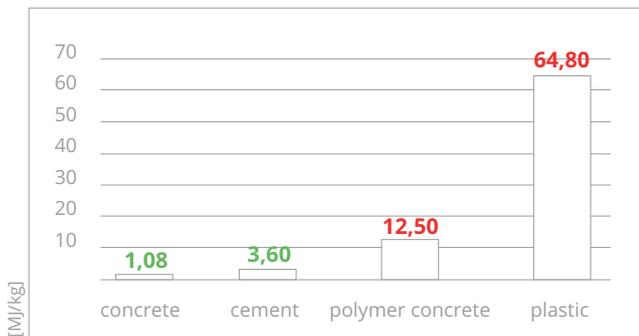
Concrete is one of the few materials which have an extremely strong eco-balance. The highest possible ecological requirements are already fulfilled when raw materials which were extracted in an environmentally friendly way are selected. In contrast with other materials, the production of concrete requires a very low amount of energy. At the end of its lifespan, concrete can be completely recycled, which keeps its environmental footprint to a minimum.

### Made in Germany

HYDROTEC has been producing its fibre-reinforced concrete drainage channels in Germany for 45 years. At the Wildeshausen factory, over 100 highly-qualified employees guarantee quality, efficiency and environmental sustainability in every working process.

# POSITIVE ECO-BALANCE

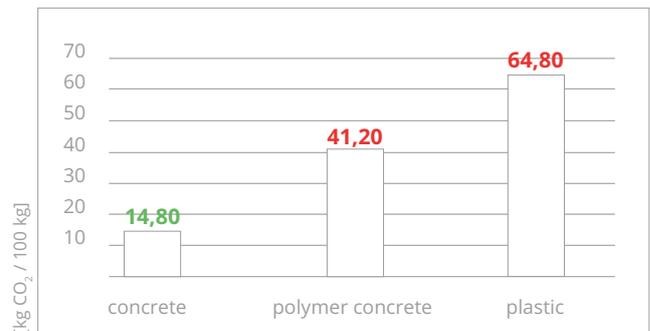
## Primary energy requirements for the production of...



Concrete is by far the material which is produced in the most energy efficient way, as clearly shown in the below diagram. The regional availability in all parts of Germany is only one indicator which shows that the raw materials required for producing concrete may be transported and processed with little effort. Only the production of cement requires a similar level of energy use, which, given the low proportion of approx. 15 % in concrete, does not have a significant influence.

## CO<sub>2</sub> - emissions for the production of...

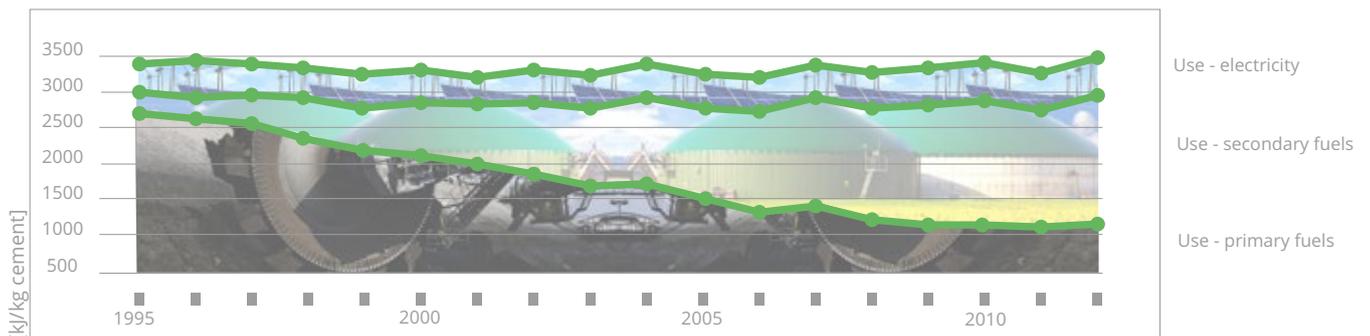
In comparison with other materials, such as polymer concrete or plastic, concrete produces a significantly lower amount of CO<sub>2</sub> emissions in the production process. This leads to a reduction in CO<sub>2</sub> of approx. 60% by comparison with polymer concrete and nearly 80% in comparison with the production of plastic.



## Specific energy use in cement production\*

In recent years, there has been a noticeable development in the use of cement with regard to the switch from primary to

secondary energy. This clear trend pursues a clear goal: minimising primary energy and maximising secondary energy.



Primary fuels: Oil, gas, coal / secondary fuels: Refuse (biogas, residual waste etc.)  
 \*Source: VDZ - Verein deutscher Zementwerke - Association of German Cement Factories

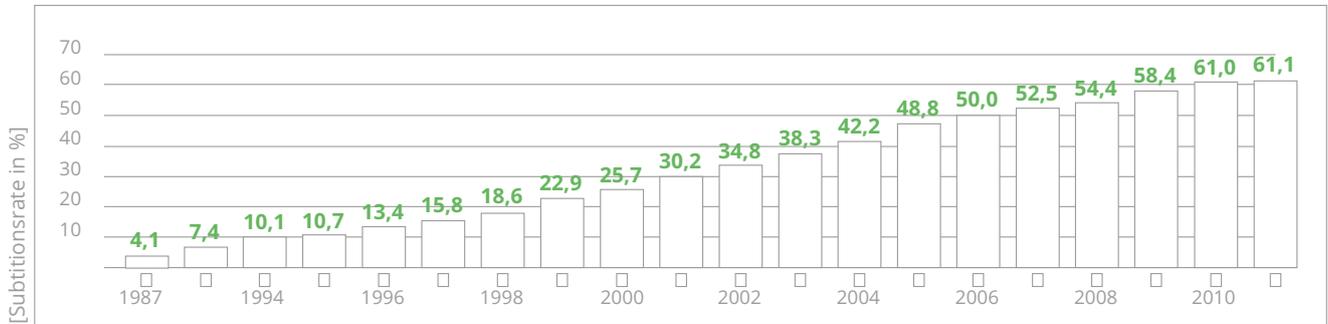
# POSITIVE ECO-BALANCE

## Development of alternative fuel use in the German cement industry\*

As cement production is energy and raw material-intensive, the cement industry is continuously developing new ways to reduce the use of primary raw materials, such as using alternative fuels. The German cement industry recognised these possibilities early on and is now a global leader, particularly in the use of

suitable alternative fuels. In 2011, over 60% of the fuel energy required was substituted with replacement fuels in Germany.

**61,1 %** - This amounts to an energy equivalent of 2 400 000 tons of coal which was saved!



\*Source: VDZ - Verein deutscher Zementwerke - cement production for environmental protection

## The saving of 2.400.000 tons of coal is enough to...



**...provide 3.000.000 households** with electricity for a whole year. This applies to three-person households with an average energy use of 6500 kWh.



**...celebrate 3500 Oktoberfests** and cover their entire energy requirements. The electricity and gas requirements per Oktoberfest are around 5.5 million kWh.

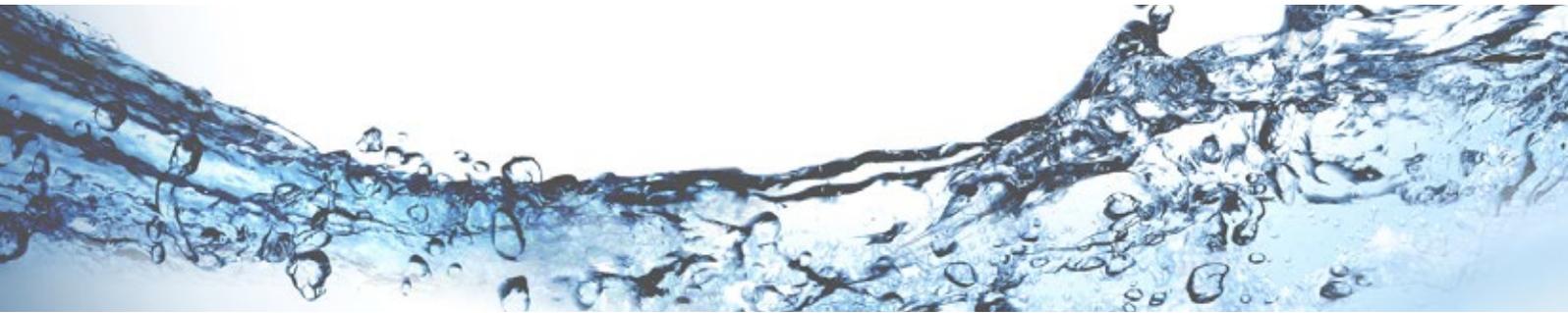


**...200 round-the-world trips** trips with a huge container ship with a load of 9000 containers and fuel usage of 200 tons/day



**...heat 1.650.000 apartments** for a whole year. The apartments are 75m<sup>2</sup> with an oil heating requirement of 1155 litres/year.

## RESISTANT AND WATERTIGHT



HYDROTEC drainage systems have Class C 35/45 pressure resistance in accordance with DIN EN 206. However, the concrete is analysed not only according to its load-dependent effects but its effects which are not dependent on load. The various exposure classes give an indication of what kind of environmental effect the concrete involved must deal with in the long term. The high quality of the concrete in HYDROTEC drainage chan-

nels C35/45 allows a waterproof drainage system to be created. The maximum water penetration depth of 8mm, along with the professional pointing of individual channel elements, guarantee a secure and complete drainage of liquids. The well-conceived MAXI drainage channels have a tongue and groove joint which allows the individual parts to be quickly and tightly joined together.

Exposure class	Description of the application	Example of application	Minimum pressure
XC4	Alternately wet and dry	Outdoor parts with direct exposure to rain	C25/30
XD3	Alternately wet and dry	Parts of bridges with frequent exposure to spray water containing chloride	C35/45
XS3	Tidal areas, spray water and atomised spray water	Quay walls in ports	C35/45
XF3	High water saturation, without thawing	Open water tanks	C35/45
XA3	Chemically strong, corrosive environment	Industrial drainage systems with chemically corrosive waste water	C35/45

Full information in DIN 1045-2

## FIREPROOFING INCLUDED



HYDROTEC drainage channels are not only resistant to high temperatures, but are not flammable according to DIN 4102! In case of fire, where temperatures may reach up to 1000°C, the high performance of concrete prevents the fire from spreading

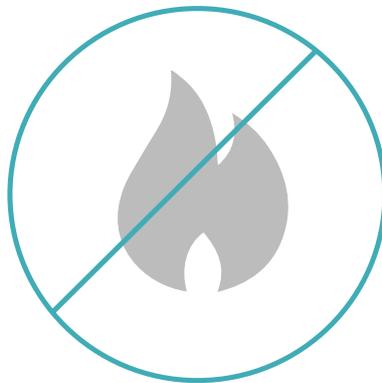
through the concrete, as concrete is not flammable. These specific qualities of concrete allow planners in particular to create a fireproof building for clients.

### For flammable liquid in the Drainage Channel...

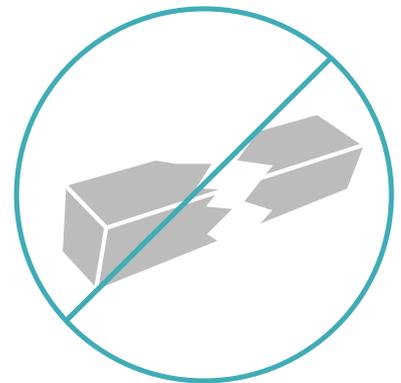
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...occurs no poisonous gases!

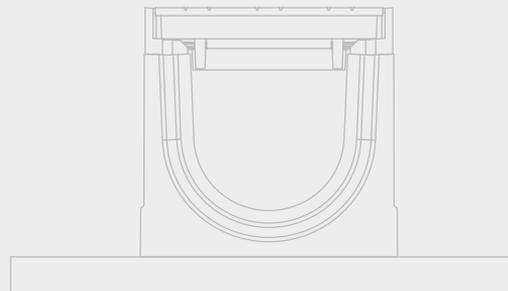


...non-flammable!



...won't destroyed!

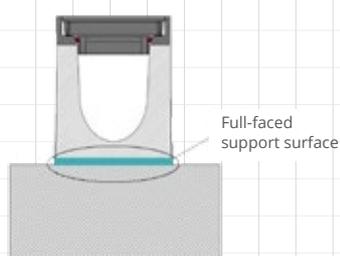
## HIGHEST STABILITY, PERFECT JOIN



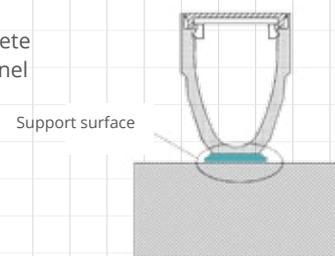
HYDROTEC drainage channels, with their own high weight, guarantee a high level of stability in position which leads to quick and smooth installation. The MAXI drainage channel offers comprehensive support which guarantees stable and fixed positioning during installation. Compared to drainage channels made of polymer concrete, the MAXI drainage channel has a much larger support surface, omitting the risk of wobbling/toppling.

A perfect unit is built from a MAXI drainage channel and the base and/or concrete cladding due to almost identical material properties. This combination has a strong bond, as two identical materials join to form one unit. The properties of polymer concrete differ from natural concrete due to the use of polyester resin as a binding agent.

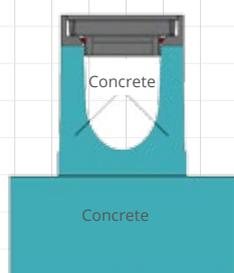
MAXI drainage channel made of fibre-reinforced concrete



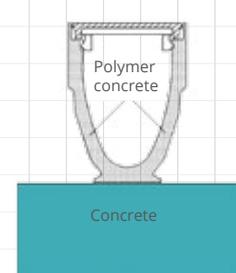
Polymer concrete drainage channel



Perfect join between concrete and concrete



Weak join between different materials

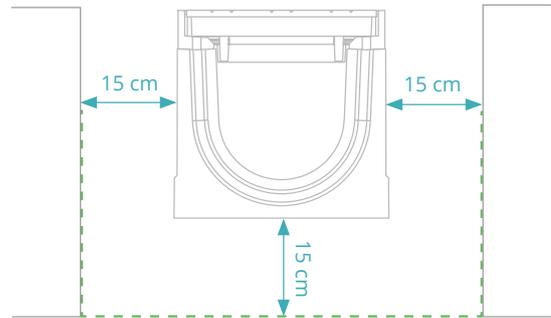


# INSTALLATION INSTRUCTIONS

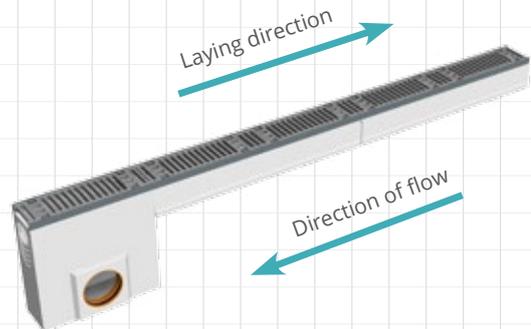


Prior to installation, please choose the right loading class for your application to DIN EN 1433.

**1.**  
Excavate the pit with an adequate width so that a concrete encasement of at least 15 cm (class C 250) can be installed. The thickness of the encasement varies depending on the installation situation and load class. Further information on the thickness of the concrete encasement is contained in our installation instructions.

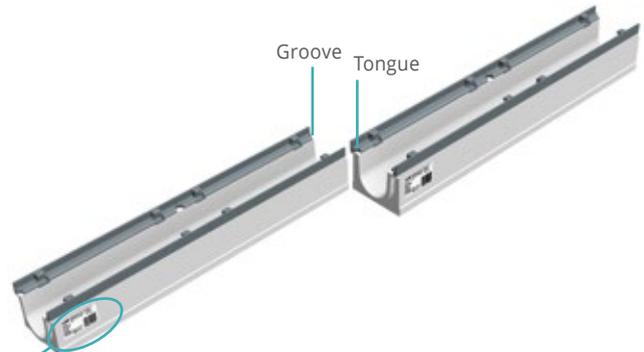


**2.**  
Before laying the channel elements (gratings can be removed for laying), span a cord and ensure that the concrete bed is sufficiently thick (e.g. C 250 = min. 15 cm). The laying direction of the channel elements is always opposite to the direction of flow and starts at the ground pipe union or the feed box! The same installation instructions apply for feed boxes as for the drainage channels.



# INSTALLATION INSTRUCTIONS

**3.**  
The channel elements are marked with direction arrows that indicate the direction of flow. Join the individual elements with the tongue and groove connection provided. On channel elements with a slope each element is marked with a serial number to permit simple installation in a chronological order.

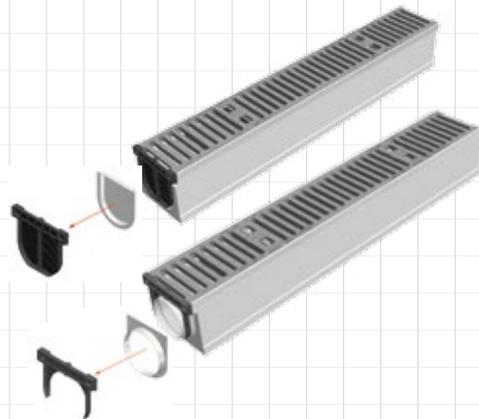


Concrete encasement necessary

Maximum frost and thawing salt resistance in compliance with DIN EN 1433



**4.**  
After laying the channel, fit the end sections at the beginning and end of the channel to connect the outlet point to the drainage system.



**5.**  
The concrete encasement can then be provided while ensuring that the gratings are once more placed in the channel elements to protect the channel body against horizontal forces. When laying the channels in concrete, configuration of expansion joints is specified, and existing expansion joints are continued throughout the channel run.

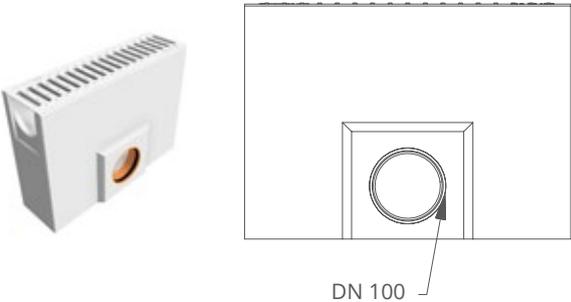
When laying the adjoining top course, always ensure that the top edge of the drainage channels is seated permanently 3 - 5 mm lower than the adjoining surface.



# CONNECTION OPTIONS - FEED BOX



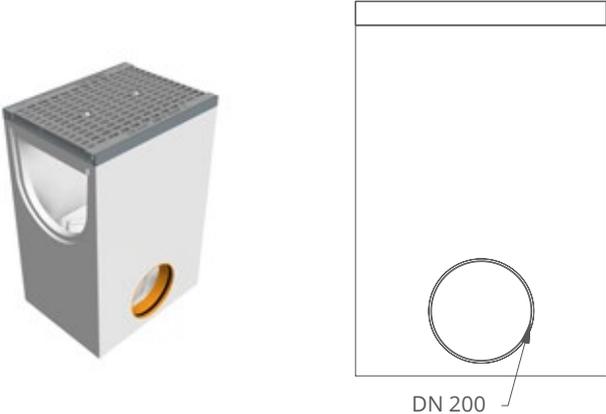
MINI 100 - DN 100



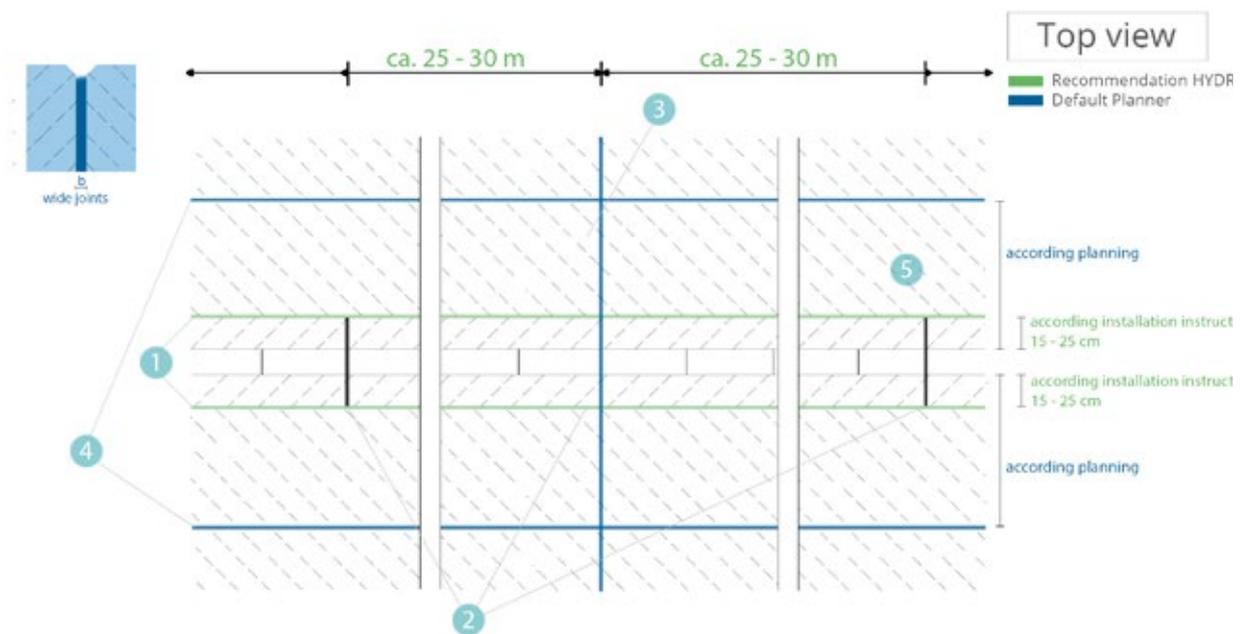
TOP/MAXI 100/150/200 - DN 150



MAXI F1 300/400 - DN 200



## EXPANSION JOINT REQUIREMENT



If the project planning engineer or architect do not have any specifications, we recommend configuring the expansion joints as shown in the following figure:

1. Positioning of the expansion joints depends on the channel type selected for the respective construction project. We recommend positioning the joint above the outer edge of the concrete encasement.
2. Expansion joints should always be positioned vertically in relation to the channel in the concrete encasement. We recommend a distance of approx. 25 – 30 m. The joint width must be specified by the project planning engineer. As a general rule, always comply with the planning engineer's specifications!

3. When configuring the expansion joints in the concrete top course, always comply with the specifications of the project planning engineer or architect.

4. Furthermore, expansion joints must also be positioned parallel to the channel run. In this respect contact the project planning engineer for information on the expansion joints running parallel to the channel run. Never position expansion joints directly between the channel and the adjoining concrete encasement!

5. Top course of concrete

## SUMMARY OF SLOPE TYPES

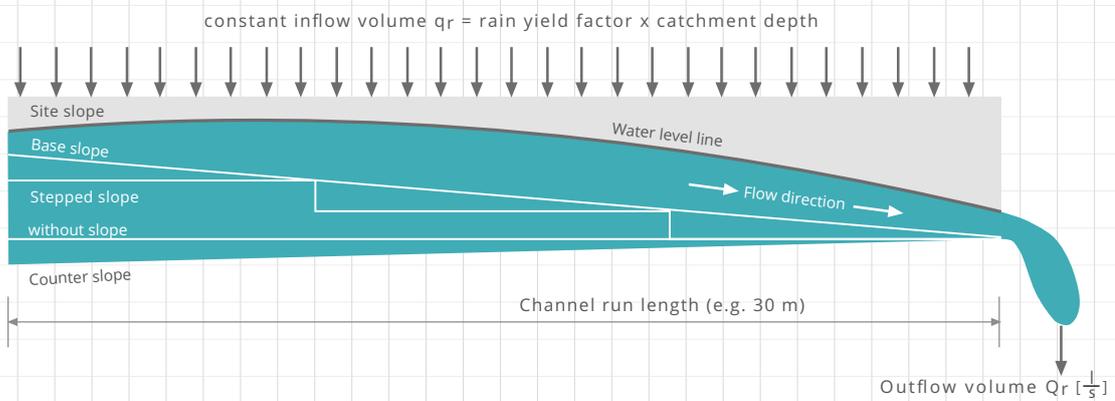


### Outflow volume / Water level / Base formation

The shape of the channel base with or without slope has no effect on the inflow volume of the channel run. The water level line is always the same. The inflow volume is only determined by the

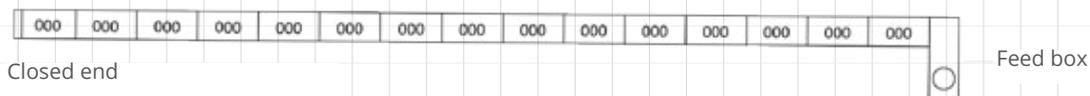
channel cross-section at the end of the channel run, the slope has no impact at all.

**Result:**  
Less effort without slope



### Channel run without slope

The channel run is straight, and drainage is achieved by the existing slope of the respective road surface. The drained water is fed into the drainage system through a feed box.

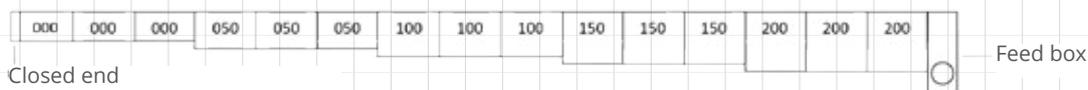


## SUMMARY OF SLOPE TYPES

### Channel without slope (stepped slope)

Constant drainage is achieved by connecting channel elements with different constructional depths. The channel run can be

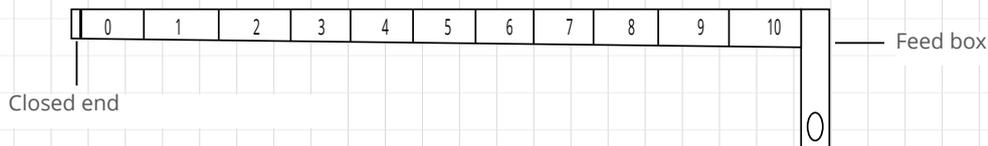
connected to the drainage system by means of an open end.



### Channel run with integrated slope

In this case drainage is achieved by a continuous integrated slope. The channel run has an integrated linear slope with a

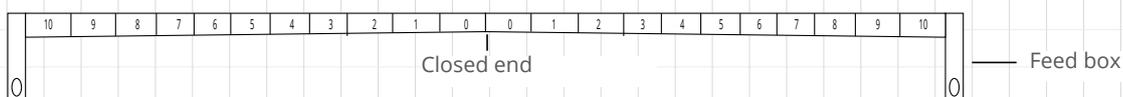
continuous inclination of 0.5 % or 1.0 %. The channel can be connected to the drainage system directly with a feed box.



### Channel with integrated slope (counter-slope)

In this case drainage is achieved by means of a continuous, integrated slope that is interrupted in the middle of the channel run. If channel elements are laid in two directions, it

is necessary to join two counterfacing elements. We therefore recommend using a face end to prevent the formation of a gap.



For hydraulic reasons we recommend drainage without slopes!

## PROJECT-SPECIFIC PLANNING

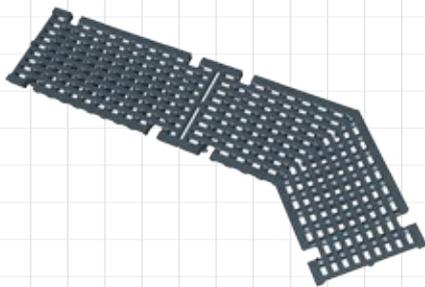


### HYDROTEC offers support at the planning stage

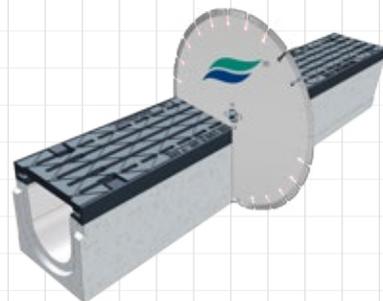
We can help you with the hydraulic calculations so that you know as quickly as possible which drainage systems meet your requirements. We also assist you in positioning the drainage systems and draw up installation plans with you to ensure optimum drainage.

### HYDROTEC adapts to the individual needs of each customer

With our cutting service the channel elements can be cut off at right angles, at a specific angle or as a mitre cut to suit your requirements exactly. We naturally also provide assistance in determining the exact angle in degrees etc. As a result the individual channel elements can be fitted more easily and quickly. As our customer you therefore profit from being able to work efficiently and in particular economically.



e.g. 22.5° angle, welded



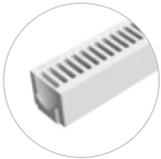
90° separating cut, channel element including grating

# SYSTEM OVERVIEW

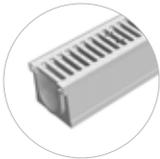
## A 15



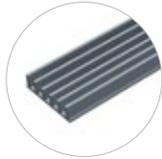
## B 125



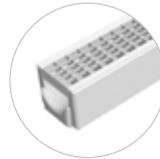
SYSTEM MINI



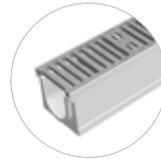
SYSTEM TOP



SYSTEM HYDROline



SYSTEM MINI



SYSTEM TOP

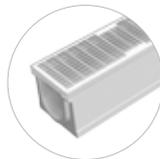


SYSTEM HYDROline

## C 250



SYSTEM MINI



SYSTEM TOP



SYSTEM TOP SLOT



SYSTEM MAXI



SYSTEM HYDROline

## D 400



SYSTEM MAXI



SYSTEM HYDROline



SYSTEM HYDROblock

## E 600



SYSTEM MAXI



SYSTEM MAXI F1



SYSTEM HYDROline



SYSTEM HYDROblock

## F 900



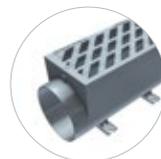
SYSTEM MAXI



SYSTEM MAXI F1



SYSTEM HYDROline



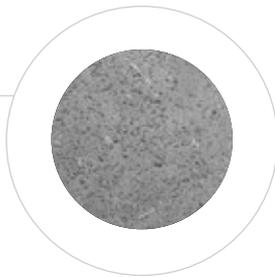
SYSTEM HYDROblock

## SYSTEM BENEFITS AT A GLANCE



### Concrete

All drainage channel elements made of fiber reinforced concrete (concrete strength class C35/45)



### Weather-resistant

Resilient against de-icing salt to EN 1433 and ÖNORM standards (marked "+R" = highest de-icing salt resilience class, EN 1433 standard).



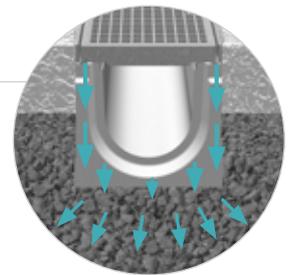
### Audit

External auditing to DIN 19580 by the „Official Material Testing Institute in Bremen“ (MPA) and internal auditing to DIN EN 1433 standard.



### Stability

The smooth external surfaces (U-form) guarantee an optimal transfer of loads into the substructure.



**Non-flammable**

HYDROTEC Drainage Channels are resistance against high temperature and non-flammable in compliance with DIN 4102.



**Thermal expansion**

The lower bodies have the same coefficient of thermal expansion such as the concrete casing.



**Environmentally friendly**

Low CO<sub>2</sub> emission and low energy requirement in manufacturing.



**100 % recyclable**

Natural building product and fully recyclable.



**End pieces**

Easy connection to ground pipes.



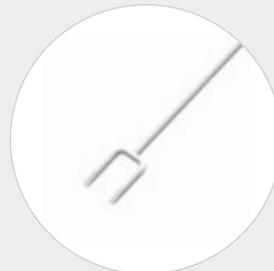
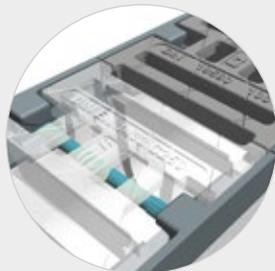
**Pipe collar connection**

Liquid-tight connection for ground pipes.



**Locking system**

The installation bar is easy for opening and closing the TOP/MAXI Drainage Channels from standing position.

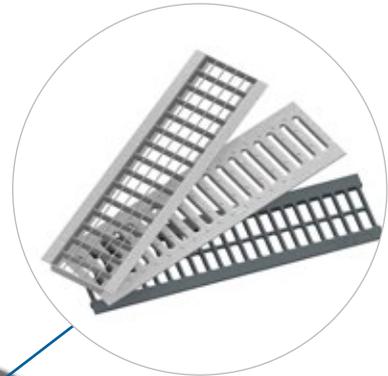


# SYSTEM MINI



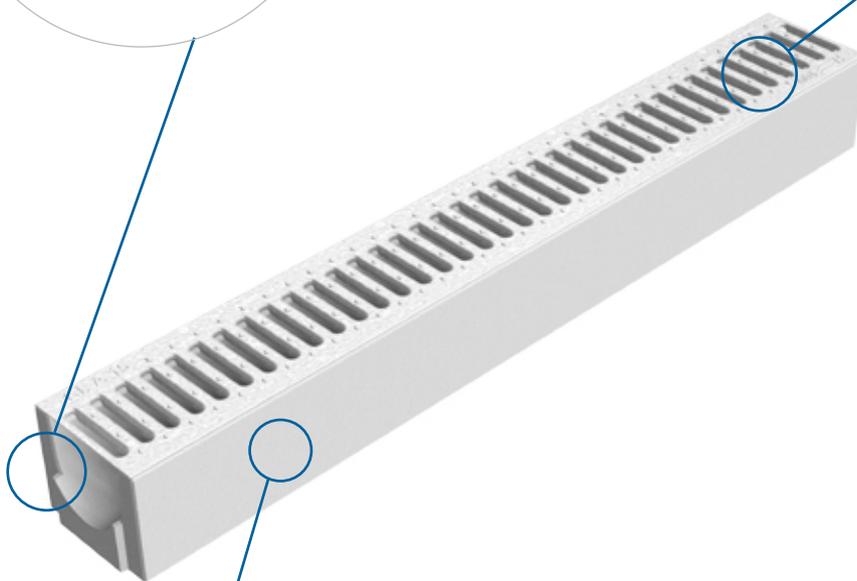
**Facing profile for exact fit**

The profile serves for fast and simple connection to the channel.



**Grating selection**

- Galvanised mesh grating (B 125)
- Galvanised slotted grating (A 15)
- Iron slotted grating (C 250)



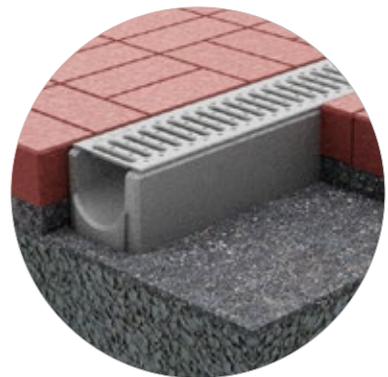
**Optimal for paving**

The straight external surfaces guarantee an easy and smooth installation.



**Vertical outlet**

Outlet for KG pipe DN 100.

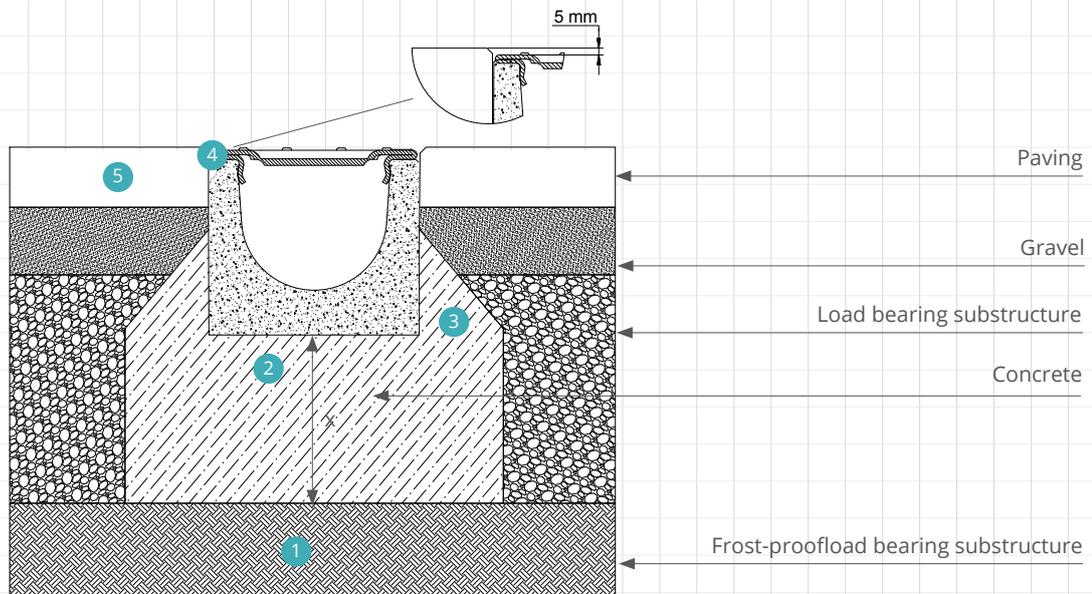


- Load classes A 15 / B 125 / C 250
- Practical system for easy D.I.Y. installation

- No jamming of gratings between adjoining paving stones  
The overlaid grating replaces edge protection
- Precise fitting contoured channel ends for quick joining

# SYSTEM MINI

## Installation instructions (A 15 - C 250)

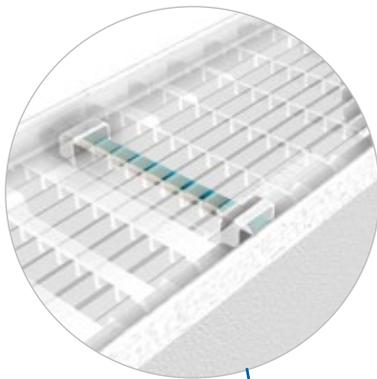


1. Before starting installation, ensure that the substructure is frost-proof and has a sufficient bearing capacity. The substructure must be correctly compressed (depending on the load class) to prevent „sinking“ of the channel. Generally this is determined by the project planning engineer or structural engineer.
2. When the MINI system is installed, a concrete bed in compliance with load class (A 15 / B 125) is laid. When a class A 15 channel system is installed, the channel must be laid on a layer of at least 5 cm of concrete (C25/30). Channel systems of class B 125 require a concrete bed with a thickness of 10 cm.
3. If the channel is positioned on the concrete bed, it is first protected against horizontal forces. To this purpose concrete encasement with a width of 10 cm and a height of approx. 6 cm is necessary.
4. When laying the stretchers or plaster stones ensure that the top edge of the channel is seated permanently approx. 3 - 5 mm below the adjoining surface.  
Asphalt = 5 mm  
Concrete = 3 mm
5. The stretchers on the right and left along the channel must be laid in fresh concrete and then backfilled with cast concrete or grouting mortar.

x (according to calculation)

A 15	10 cm concrete C25/30
B 125 / C 250	15 cm concrete C25/30

# SYSTEM TOP



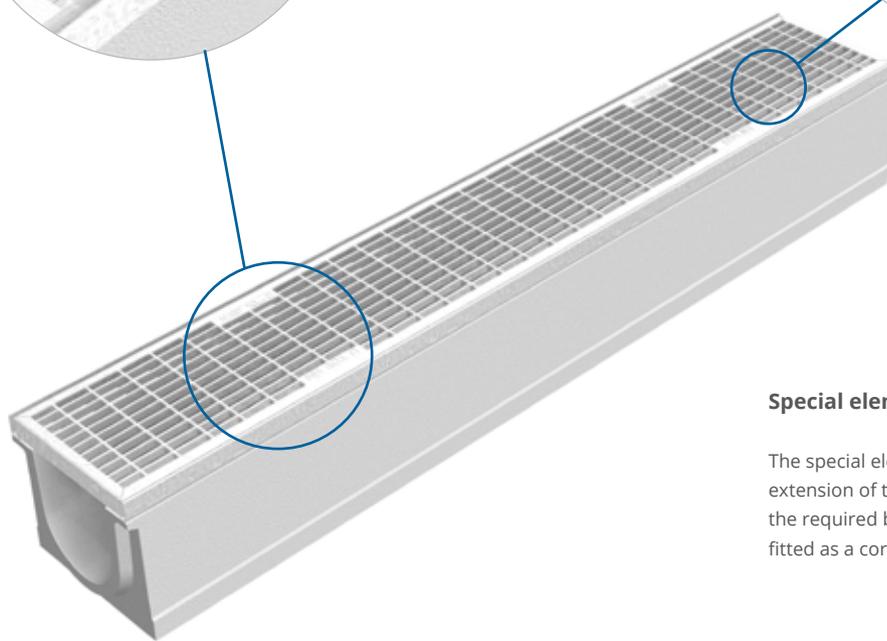
### Screwless locking system

Easy opening and closing with the installation bar.



### Grating selection

- Galvanized slotted grating (A 15/C 250)
- Galvanized mesh grating (C 250)
- Ductile iron slotted grating
  - transverse slots (C 250)
  - longitudinal slots, GRIP (C 250)



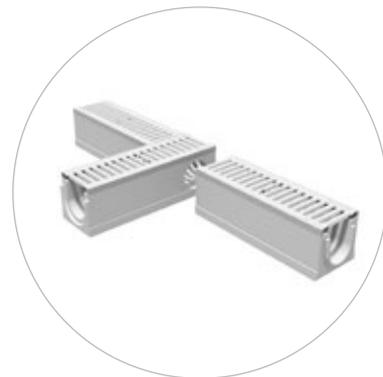
### Special element

The special element permits extension of the channel run with the required branches. It can also be fitted as a corner or T-element.



### Vertical outlet

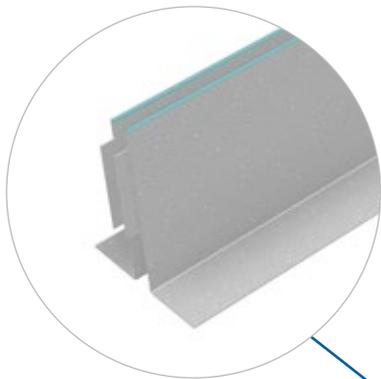
Liquid-tight connection for ground pipes.



- Load classes A 15 / B 125 / C 250, EN 1433, Type M
- Fiber-reinforced concrete C35/45 channel
- Connecting profiles for precise fit

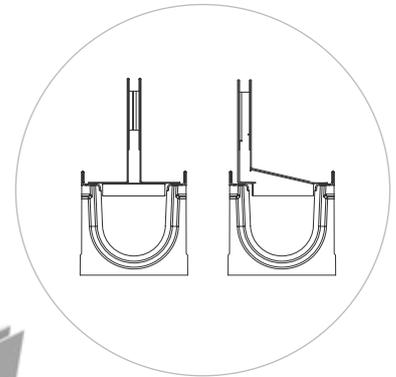
- Secure anchoring by longitudinal strut prevents "outgrowing" of the channel
- Secure rebated joint

# SYSTEM TOP 100 SLOT



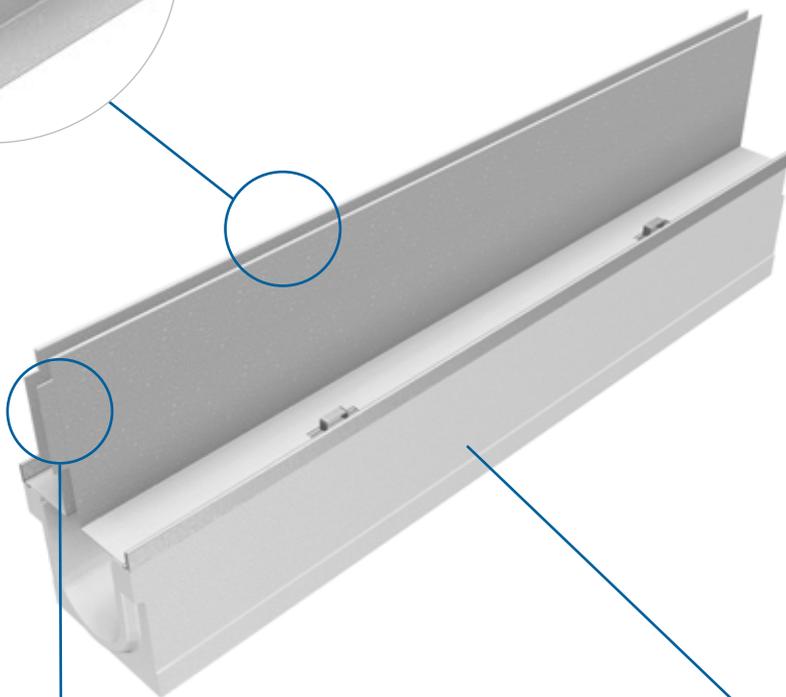
### Stability

Stronger frame upper edge for more stability.



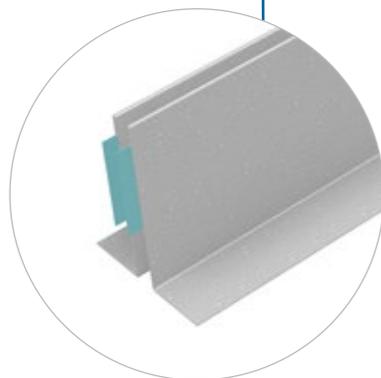
### Slot channel element

- centric
- eccentric



### Channel body

according to DIN EN 1433



### Guide tabs

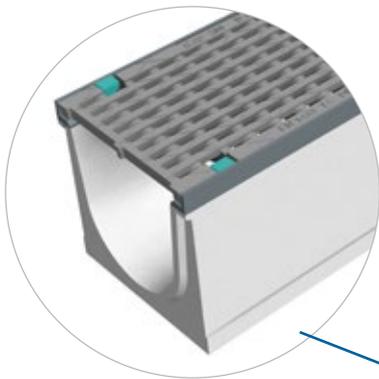
Easy and quick assembling.



- Different heights and loading classes
- Material: Galvanised steel or stainless steel
- Slope channels are available on request

- Special elements with continuous slots
- Lateral slot frames allow flush installation on facade

# SYSTEM MAXI



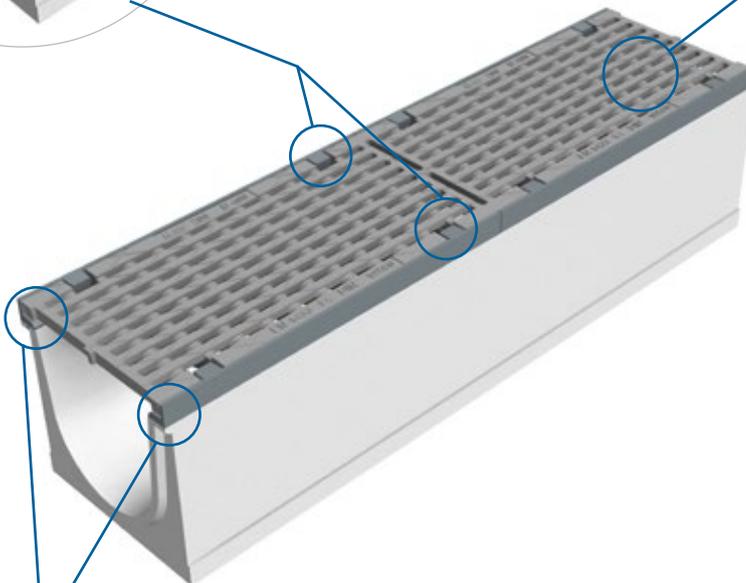
### Longitudinal restraints

With 8 safety points per meter, braking forces are effectively absorbed and discharged.



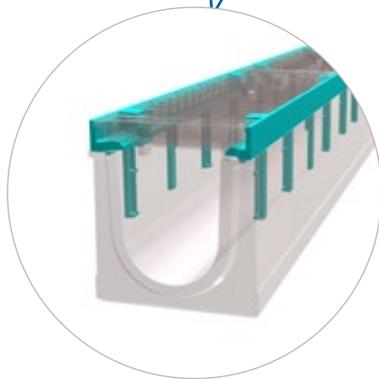
### Grating selection

- Ductile iron slotted grating
  - transverse (C 250)
  - longitudinal (D 400 - F 900)
  - mesh (E 600)



### Special element

The special element permits extension of the channel run with the required branches. It can also be fitted as a corner or T-element.



### Ductile iron edge protection

The 5 mm powerful ductile iron edge protection provides the highest stability in all load classes.



- Load classes C 250 - F 900, EN 1433, Type M
- Secure rebated joint
- Cast iron grating with longitudinal or cross slots
- Longitudinal slots prevent water overflow, thus ensuring high water absorption capacity

- Screwless, patented grating locking system
- Firmly anchored ductile cast iron edge protection
- Fiber-reinforced concrete C35/45 channel
- Secure anchoring by longitudinal strut prevents "outgrowing"
- Connecting profiles for precise fit

# SYSTEM MAXI F1



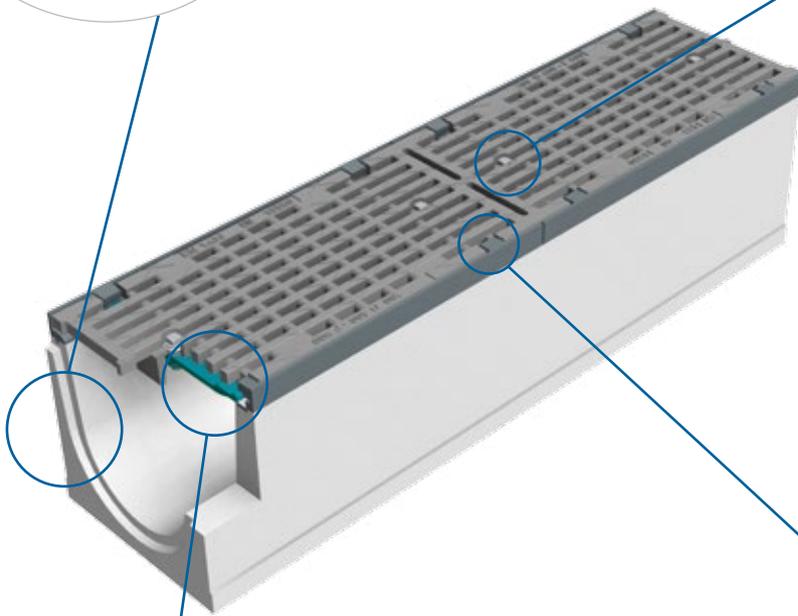
### Sealing

The individual joint connections can be sealed with a sealant.



### 4 special screws per running metre

The special screws of the MAXI F1 system ensure safe fixture with only four stainless steel screws per running metre.



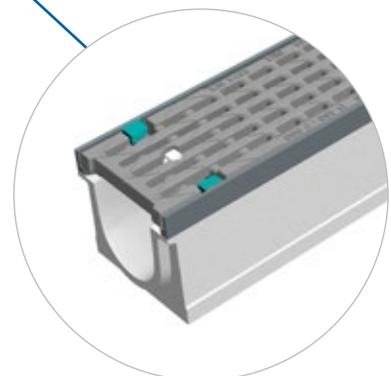
### Longitudinal restraints

With 8 safety points per meter, braking forces are effectively absorbed and discharged.



### Special locking system

Two special screw bars per grating guarantee traffic safety in all load classes and ensure that the MAXI F1 also satisfies the highest safety requirements.

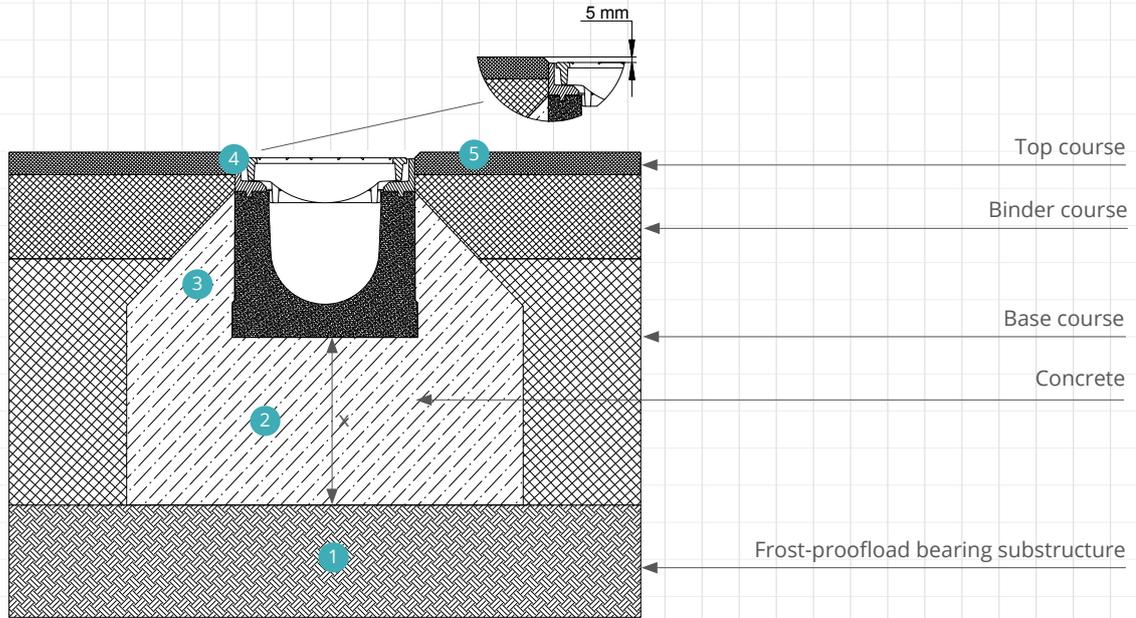


- Load classes A 15 - F 900, EN 1433, Type M
- 2 gratings made of ductile iron with longitudinal slots (12 mm slot width)
- Traffic safe special screw locking system of the cover gratings

- Secure anchoring prevents "outgrowing"
- Prefabricated parts for easy assembling of the sections
- Secure rebated joint for optional sealing in line with "WHSG"

# SYSTEM TOP / MAXI

## Installation instructions (A 15 - C 250)



### Asphalt

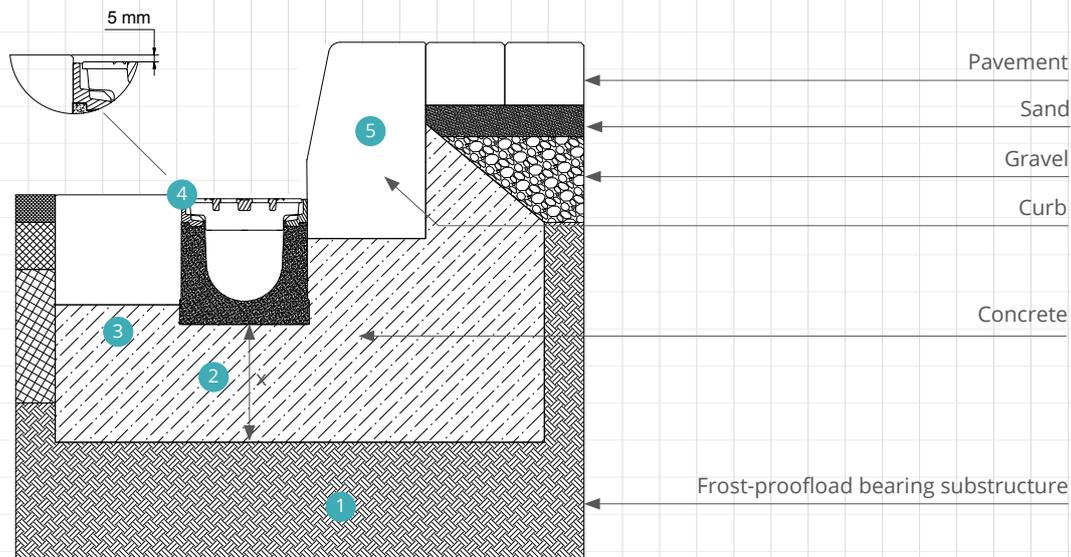
1. Before starting installation, ensure that the substructure is frost-proof and has a sufficient bearing capacity. The substructure must therefore be compressed correctly (depending on the load class) to prevent „sinking“ of the channel run. This is generally specified by the project structural or planning engineer.
2. When installing the TOP/ MAXI system a concrete bed is laid, depending on the load class (A 15/C 250). When installing a channel system of class C 250 we recommend laying the channel on a layer of concrete with a minimum thickness of 15 cm (C25/30). Channel systems of classes A 15 – B 125 require a concrete bed with a minimum thickness of 10 cm.
3. When the channel is on the concrete bed, it is first protected against horizontal forces. To this purpose we recommend concrete encasement up to the border that can then be separated downwards at a 45° angle.
4. The top edge of the drainage channel must be seated permanently approx. 5 mm lower than the adjoining surface.
5. The adjoining surface (asphalt) must be laid down in a manner that prevents horizontal forces acting on the channel.

x (according to calculation)

A 15	10 cm concrete C25/30
B 125 / C 250	15 cm concrete C25/30

# SYSTEM TOP / MAXI

## Installation instructions (A 15 - C 250)



### Asphalt/stretchers/curb stones

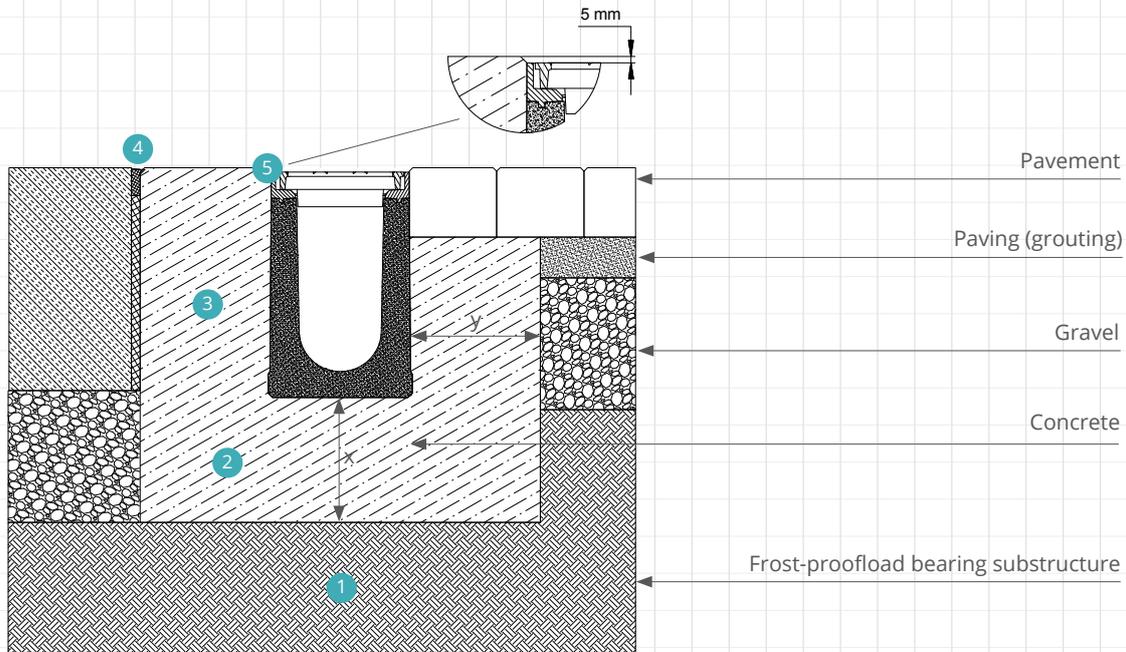
1. Before starting installation, ensure that the substructure is frost-proof and has a sufficient bearing capacity. The substructure must therefore be compressed correctly (depending on the load class) to prevent „sinking“ of the channel run. This is generally specified by the project structural or planning engineer.
2. When the TOP / MAXI system is installed, a concrete bed in compliance with load class (A 15/C 250) is laid down. When installing a channel system of class C 250 we recommend laying the channel on a layer of concrete with a minimum thickness of 15 cm (C25/30). Channel systems of classes A 15 – B 125 require a concrete bed with a minimum thickness of 10 cm.
3. If the channel is positioned on the concrete bed, it is first protected against horizontal forces. To this purpose concrete encasement with a width of 15 cm is necessary, while the height in this case depends on the height of the stretchers and curbs.
4. The stretchers must be laid in fresh concrete and backfilled with concrete mortar. It is important that the top edge of the stretchers is seated permanently at least 5 mm higher than the drainage channel.
5. The curb must also be laid in fresh concrete and then backfilled with grouting mortar.

x (according to calculation)

A 15	10 cm concrete C25/30
B 125 / C 250	15 cm concrete C25/30

# SYSTEM MAXI

## Installation instructions (D 400 - F 900)



### Concrete top course/pflaster stones\*

**1.** Before starting installation, ensure that the substructure is frost-proof and has a sufficient bearing capacity. The substructure must therefore be compressed correctly (depending on the load class) to prevent „sinking“ of the channel run. This is generally specified by the project structural or planning engineer.

**2.** When installing the MAXI system a concrete bed is laid, depending on the load class (D 400 – F 900). When a class D400 channel system is installed, the channel must be laid on a layer of concrete with a minimum thickness of 20 cm (C25/30). Channel systems of classes E 600 – F 900 require a concrete bed with a minimum thickness of 25 cm. At sites which are exposed to high loads (E 600/F 900) we recommend additional reinforcement of the concrete encasement.

**3.** If the channel is positioned on the concrete bed, it is first protected against horizontal forces. To this purpose concrete encasement with a minimum width of 15 cm and a height of approx. 12 cm is necessary, depending on the channel version and load class. For sites exposed to high loads (E 600/F 900) we recommend additional reinforcement such as Ø8mm steel rods at intervals of 300 mm.

**4.** We recommend positioning an expansion joint at approx. 15–25 cm from the outer edge of the channel (depending on the class), as the concrete can move due to fluctuations in temperature. The thickness of the expansion joint must be adapted to site conditions.

**5.** The edge protection of the drainage channel must be seated at least 5 mm lower than the adjoining surface.

x (according to calculation)

D 400	20 cm concrete C25/30
E 600 / F 900	25 cm concrete C25/30

y (according to calculation)

D 400	20 cm concrete C25/30
E 600 / F 900	25 cm concrete C25/30

# SYSTEM HYDROline



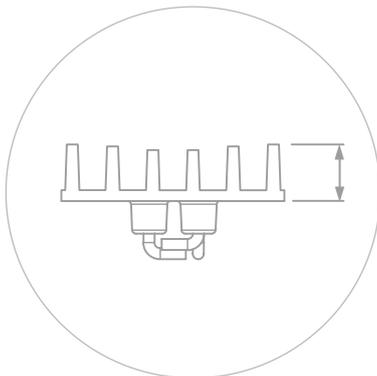
### Vertical outlet

Outlet drain element with an easily removable grating and integrated connection for a KG pipe (DN 100).



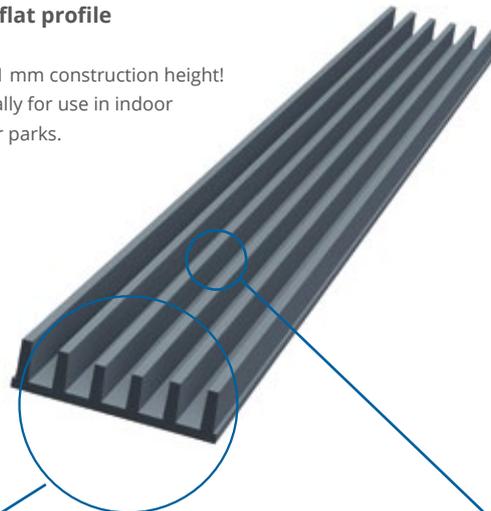
### Grating fixture

The grating is secured by a bar as protection against theft and vandalism.



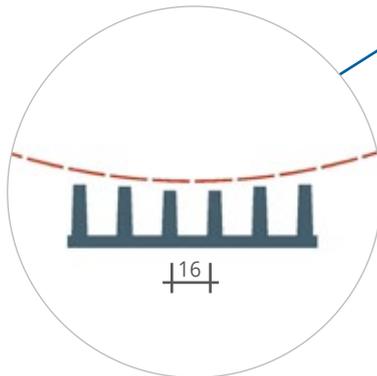
### Ultra flat profile

Only 31 mm construction height!  
Especially for use in indoor and car parks.



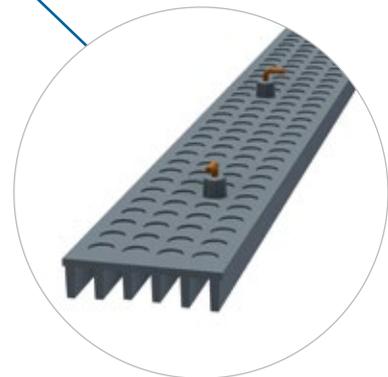
### Concrete anchor

HYDROline features three concrete anchors, and these combined with the grooved underside ensures a very strong connection with the concrete.



### Concave arrangement

The concave arrangement of the slots serves to enhance the transport energy so that the water is well drained even on slight slopes. This in particular prevents flooding.

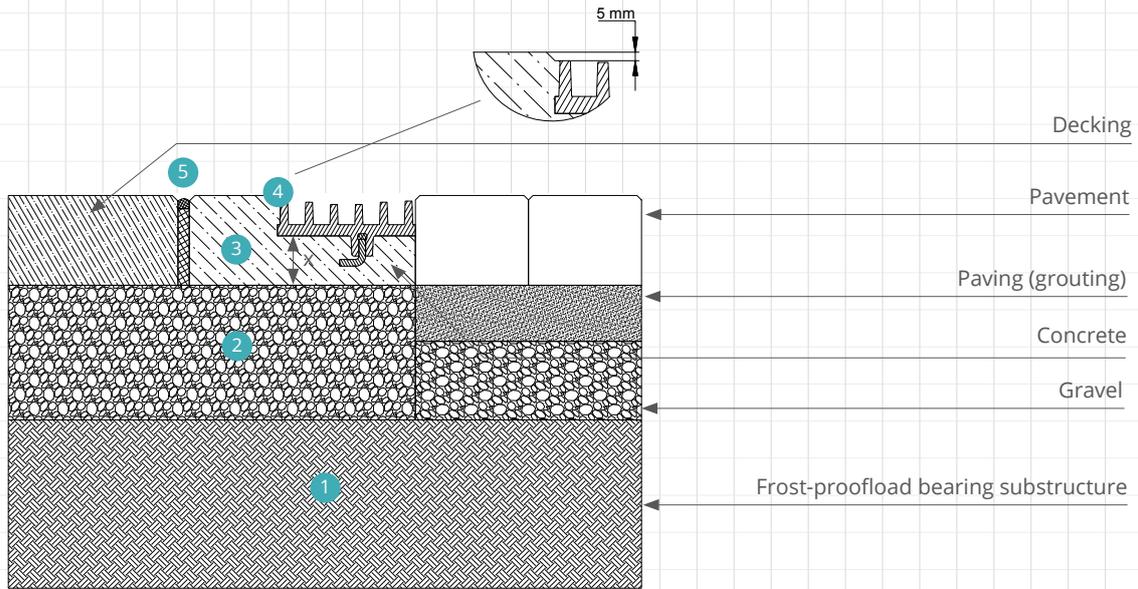


- Load classes A 15 - F 900
- Low height of construction
- Low requirements for construction work
- Extreme resistance
- Easy cleaning

- One piece = rattle free
- Ergonomic handling and easy construction work
- Grooved underpart and concrete anchors as well as sideways noses for the fixed connection in the bed of concrete

# SYSTEM HYDROline

## Installation instructions (A 15 - F 900)



**1.** Before starting installation, ensure that the substructure is frost-proof and has a sufficient bearing capacity. The substructure must be correctly compressed (depending on the load class) to prevent „sinking“ of the channel. This is generally specified by the project structural or planning engineer.

**2.** A prerequisite for the installation of the HYDROline is an existing foundation to bear loads. The dimension or thickness of the foundation depends on the structural calculations for the respective construction project as well as the selected load class.

**3.** If the conditions described in sections 1 and 2 are met, the HYDROline flat channel can be installed with the aid of concrete (C25/30). The concrete anchors and lengthways grooves ensure a firm connection with the concrete.

**4.** The top edge of the drainage channel must be seated permanently 5 mm lower than the adjoining surface.

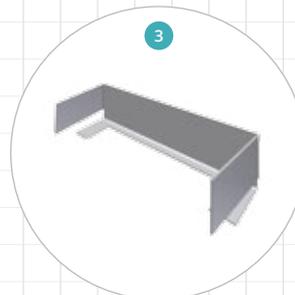
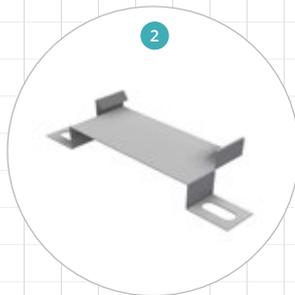
**5.** We recommend positioning an expansion joint at approx. 20 cm from the outer edge of the flat channel, as the concrete can move due to fluctuations in temperature.

x (according to calculation)

C 250	15 cm concrete C25/30
D 400	20 cm concrete C25/30
E 600 / F 900	25 cm concrete C25/30

# SYSTEM HYDROline

## Accessories



### 1. HYDROline Connection piece

We recommend the HYDROline Connection piece for professional and straightly installation.

### 2. HYDROline Mounting support

The Mounting support can be fixed with threaded rods on favored height. The HYDROline drainage channel is ready for laying, when all Mounting supports are installed.

### 3. HYDROline End piece

The End piece is provided for channel run closure and fits the channel ends.

### 4. HYDROline Mounting support with pedestal

The mounting support with pedestal is the complete set for the drainage channel installation and concrete pavement in one step. The height is variable (max. 300 mm) and it includes HYDROline Connection pieces for professional and straightly installation.

### 5. HYDROline Cleaning shovel

If the Drainage channel isn't functional because of mud, it can be cleaned with the Cleaning shovel.

## SYSTEM HYDROline

### Laying instructions



The HYDROline flat channel is suitable for installation in an existing recess (e.g. for renovation) or for installation in homogenous concrete with the aid of the mounted installation aids. The existing base course must be examined and approved by the architect or planning engineer depending on the required load class.

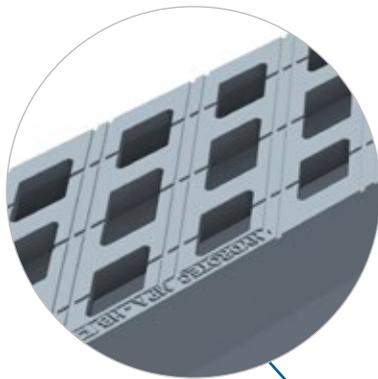
#### Installation version A (existing recess)

Fill the existing recess with fresh concrete and lay down the HYDROline using a cord. Furthermore it must be ensured that one end section is positioned at the end and at the beginning of the channel run. Channel run is started with the outlet drain element. Individual elements are connected with a connection element. Flat channel snaps easily into the connection element. Channel must be seated at least 3 mm lower than the adjoining surface.

#### Installation version B (homogenous concrete)

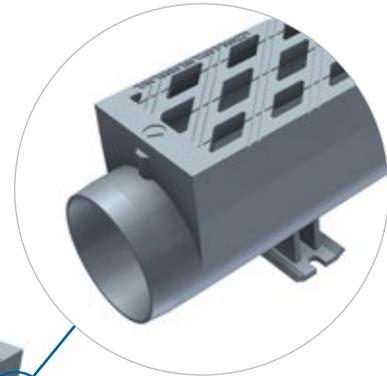
When installing the HYDROline in homogenous concrete we recommend the use of the HYDROTEC installation supports. The installation support and the connection element permit exact installation at the correct height. The installation supports must be placed at the joints of the HYDROline. In this case we also recommend placing end sections at the beginning and end of the channel. Before laying down the concrete layer the flat channel must be covered and taped to prevent the ingress of concrete. The channel run must be at least 3mm lower than the adjoining surface.

# SYSTEM HYDROblock



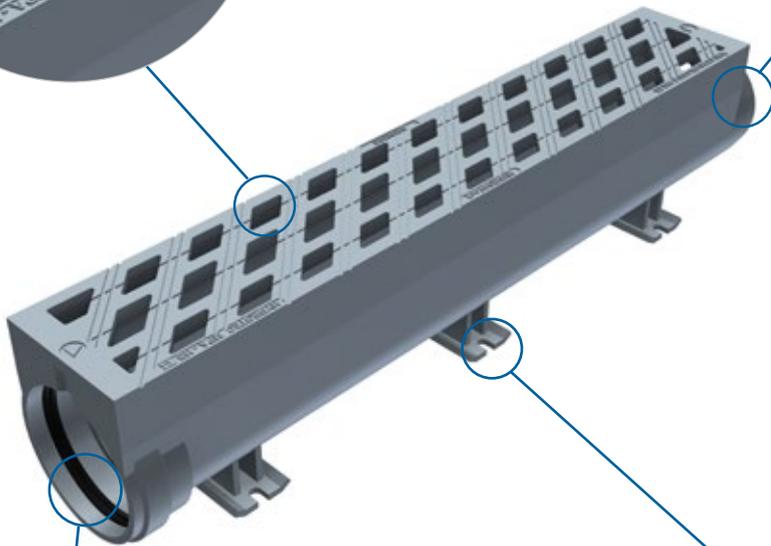
### Monolithic construction

With the monolithic construction of ductile cast iron, the security slot system is suitable for longitudinal and crosswise traffic loads.



### Reliable sealing

The spigot end permits connection of commercially available plastic pipes.



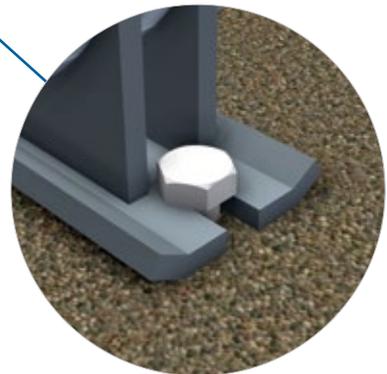
### Anchoring

The bases can also be anchored in the foundation that provide a very strong connection that withstands all load classes (F 900).



### Spigot seal

It permits simple and tight installation due to the integrated spigot seal.



- Load classes A 15 - F 900
- Patented drainage system type
- Minimal planning and installation requirement
- Low maintenance
- Theft and vandalism protection
- Best of class frost and de-icing salt resilience

- Easy handling
- Monolithic system made of ductile cast iron
- Safety slot system suitable for driving over at right angles and longitudinally
- Up to 50% greater run-in diameter compared with similar system

# SYSTEM HYDROblock

## Special elements

**HYDROblock 100** / 4-fold screwed / Allen key 8 mm



1. Outlet vertical  
DN 100

2. Outlet / connection element  
face side / left / right  
with lateral outlet DN 100

3. Feed box  
with dirt catcher and  
outlet DN 100

**HYDROblock 150** / 4-fold screwed / Allen key 10 mm



1. Outlet vertical  
DN 150

2. Outlet / connection element  
face side / left / right  
with lateral outlet DN 150

3. Feed box  
with dirt catcher and  
outlet DN 150

**HYDROblock 200** / 4-fold screwed / Allen key 10 mm



1. Outlet vertical  
DN 200

2. Outlet / connection element  
face side / left / right  
with lateral outlet DN 200

3. Feed box  
with dirt catcher and  
outlet DN 200

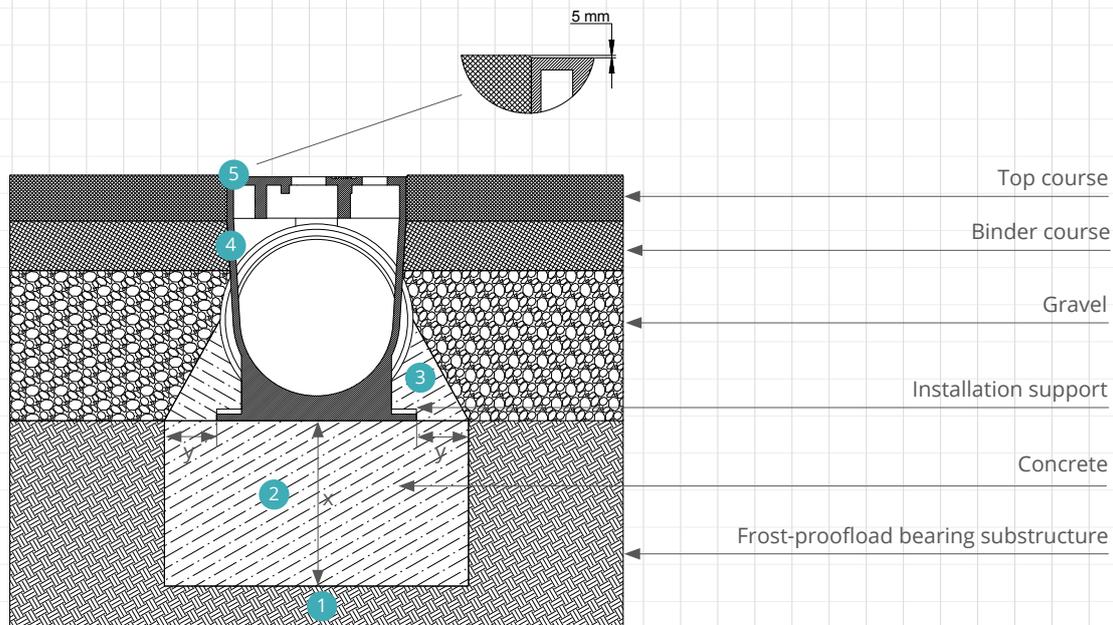
**HYDROblock 300** / 4-fold screwed / Allen key 14 mm



1. Outlet vertical  
DN 250

# SYSTEM HYDROblock

## Installation instructions (F 900)



### Asphalt/pflaster stones

1. Before starting installation, ensure that the substructure is frost-proof and has a sufficient bearing capacity. The substructure must therefore be compressed correctly (depending on the load class) to prevent „sinking“ of the channel run. This is generally specified by the project structural or planning engineer.
2. When installing the HYDROblock system, load-bearing foundations are necessary with a minimum height of 20 cm. The exact dimensions must be adapted to the structural conditions of the respective construction project.

3. It is recommended to reinforce the channel element with an installation support made of concrete C25/30. The system can also be optionally fixed to the foundation by the bases.
4. Sealing tape may be necessary for sealing depending on the adjoining surface. The project planning engineer or project manager of the construction site is responsible for specifying whether sealing tape is necessary.
5. The surface of the HYDROblock system must be permanently seated approx. 5 mm lower than the adjoining surface.

x (according to calculation)

D 400	20 cm concrete C25/30
E 600 / F 900	25 cm concrete C25/30

y (according to calculation)

D 400	15 cm concrete C25/30
E 600 / F 900	20 cm concrete C25/30

## SYSTEM HYDROblock

### Laying instructions



- 1.**  
The concrete bed is laid in accordance with the necessary load class to install the HYDROblock.
- 2.**  
Before the elements can be joined, apply a lubricant to the spigot.
- 3.**  
The elements are then connected with the joint and spigot connection.
- 4.**  
The HYDROblock laying tool is then used to pull the elements together.
- 5.**  
After connection the element is set at the correct height.
- 6.**  
Finally it is checked whether the element is horizontal.

# HYDRAULIC CALCULATOR

 [WWW.HYDROTEC.COM/RINNENBEMESSUNG](http://WWW.HYDROTEC.COM/RINNENBEMESSUNG)

HYDRAULIC CALCULATION OF DRAINAGE CHANNELS

HYDROTEC

HOME | REGISTER | INSTRUCTIONS   

REGISTER NEW USER

Register new user

Email\*

Password\*

Repeat password\*

Language

Gender  Mr.  Mrs.

Title

First name

Last name\*

Company\*

Country

Yes, I would like to receive the HYDROTEC newsletter by email.

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Version 1.1.1 | [Legal](#) | [Privacy Statement](#)

The HYDROTEC hydraulic calculator enables you to calculate your material requirements for your construction project yourself. It will provide end-to-end information that you need to determine the optimum channel elements and accessories to suit your requirements. The HYDROTEC technical support team will be pleased to help you obtain the required data.

Step by step instruction as pdf file on our homepage:

[WWW.HYDROTEC.COM](http://WWW.HYDROTEC.COM) - DOWNLOADS

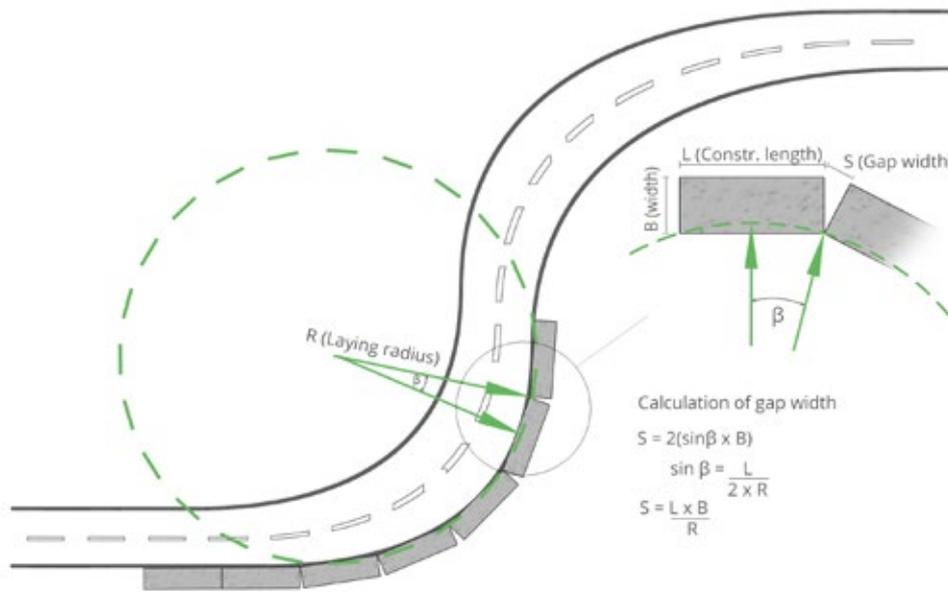
## HYDRAULIC CALCULATOR

### Drainage capacity of HYDROTEC Drainage Channels

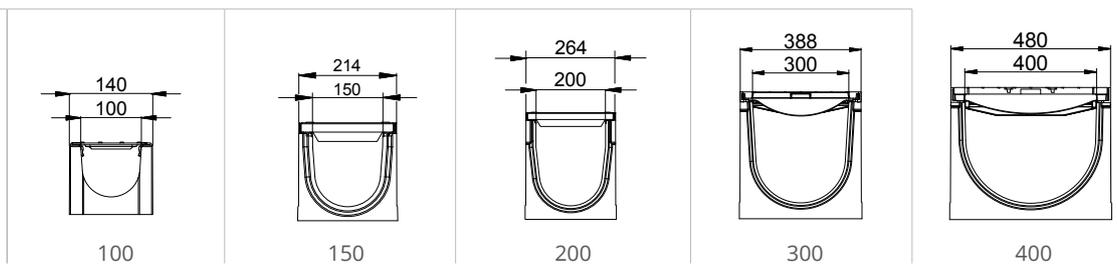
Channel type	Nominal width a (mm)	Constr. depth h (mm)	Clear height h (mm)	Outflow cross-section A (cm <sup>2</sup> )	Reduction factor $\mu$	Max. outflow capacity litres/s $Q=\mu A^*\sqrt{2*g*\Delta h}$
MINI A	100	120	80	69	0,8	<b>2,19</b>
MINI B	100	120	60	49	0,8	<b>1,34</b>
MINI C	100	120	75	62	0,8	<b>1,90</b>
TOP/ MAXI	100	160	90	79	0,8	<b>2,66</b>
	100	185	115	104	0,8	<b>3,95</b>
	100	210	140	129	0,8	<b>5,41</b>
	100	235	165	154	0,8	<b>7,01</b>
	100	260	190	183	0,8	<b>8,94</b>
TOP/MAXI	150	210	115	181	0,8	<b>6,88</b>
	150	235	140	186	0,8	<b>7,80</b>
	150	260	165	223	0,8	<b>10,15</b>
	150	310	215	298	0,8	<b>15,48</b>
TOP/MAXI	200	310	205	367	0,8	<b>18,62</b>
MAXI F1	300	400	300	802	0,8	<b>49,22</b>
	400	400	335	1242	0,8	<b>80,55</b>
HYDROblock	100	100	100	78	0,9	<b>3,11</b>
	150	150	188	176	0,9	<b>9,62</b>
	200	200	200	313	0,9	<b>17,65</b>
	300	300	300	700	0,9	<b>48,33</b>

# ADDITIONAL INFORMATION

## Laying a radial arrangement



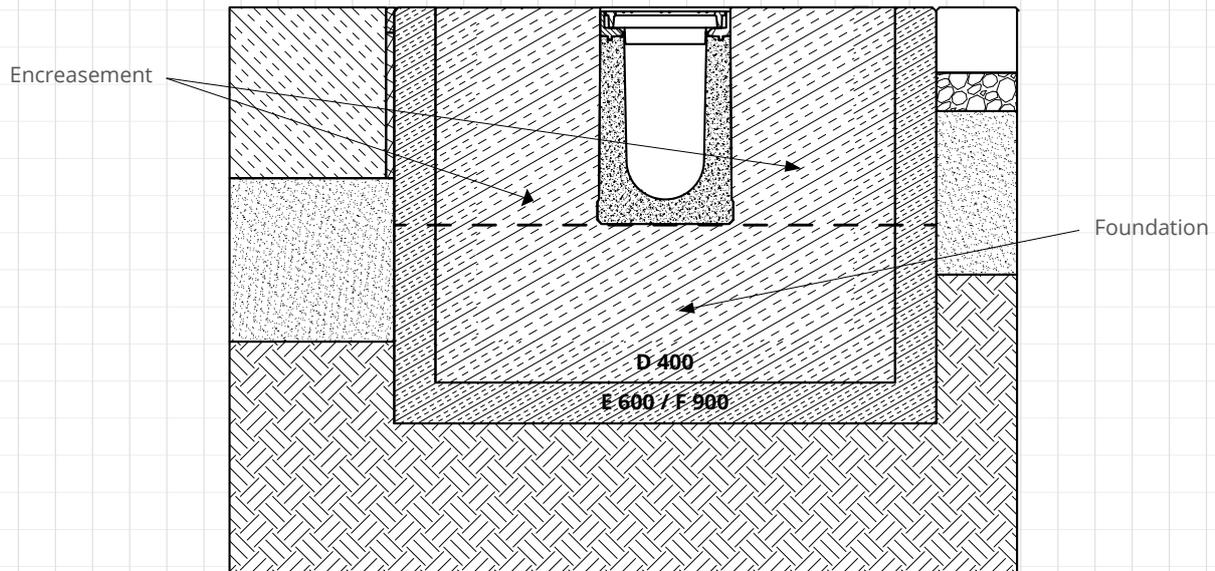
Length L (mm)	500	1000	500	1000	500	1000	500	1000	500	1000
Radial installation R (m)	Gap width S (mm)									
5,0	14,0	28,0	21,4	42,8	26,4	52,8	38,8	77,6	on request	
7,5	9,3	18,7	14,3	28,5	17,6	35,2	25,9	51,7		
10,0	7,0	14,0	10,7	21,4	13,2	26,4	19,4	38,8		
15,0	4,7	9,3	7,1	14,3	8,8	17,6	12,9	25,9		
20,0	3,5	7,0	5,4	10,7	6,6	13,2	9,7	19,4		
25,0	2,8	5,6	4,3	8,6	4,3	10,6	7,8	15,5		
30,0	2,3	4,7	3,6	7,1	4,4	8,8	6,5	12,9		
35,0	2,0	4,0	3,1	6,1	3,8	7,5	5,5	11,1		



█ Gap dimension exceeded     
 █ Max. permissible     
 █ Optimal

## ADDITIONAL INFORMATION

### Drainage Channel Typ M



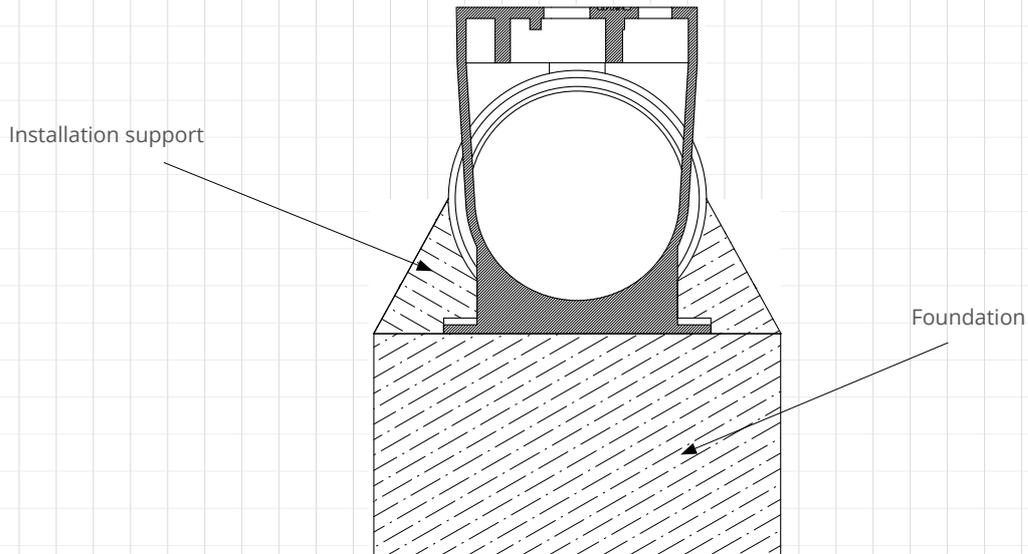
According to DIN EN 1433 drainage channels are classified in two types, type „M“ and „I“.

A drainage channel type M requires a foundation and encasement of concrete that can discharge occurring vertical and

horizontal loads into the foundation after installation. The HYDROTEC drainage systems type MINI / TOP / MAXI are installed according to DIN EN 1433 with such foundations or encasement. Detailed information on installation of type M is given in our installation instructions.

## ADDITIONAL INFORMATION

### Drainage Channel Typ I

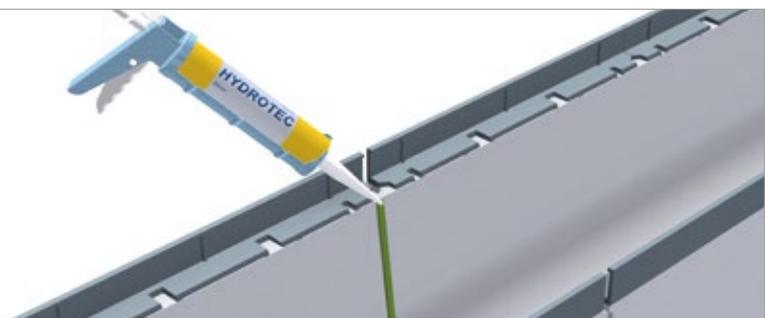


A drainage channel type I does not require a concrete encasement for bearing the loads. Foundations are only required to discharge the exerted vertical and horizontal forces. The HYDROblock drainage system is installed in compliance with

DIN EN 1433 type I and does not require concrete encasement. Detailed information on installation of type I is given in our installation instructions.

## ADDITIONAL INFORMATION

### Joint sealing



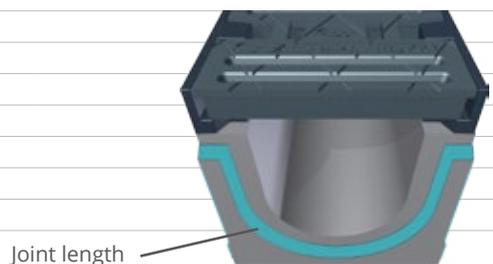
We recommend the use of joint sealant for sealing the HYDROTEC drainage systems. For example, you require the following materials for effective sealing:

e.g. Sika Primer 3 (bonding emulsion), (1 litre/container) corresponds to approximately 100 joints for MAXI 100  
 e.g. Sikaflex PRO3 WF (sealant), (310 ml/container) corresponds to approx. 10 joints for MAXI 100

Before sealing the joints the connection surfaces (tongue and groove) must be thoroughly cleaned. The surfaces must be free from dust and loose particles. The bonding emulsion (Sika Primer 3) can then be applied to create a basis for the use of the sealant (Sikaflex PRO3 WF). You can determine your sealant requirements with the table. Please note that you will require 100 ml of sealant to achieve a joint seal of approx. 100 cm.

#### Joint lengths (cm)

Typ	MAXI 100 / TOP 100	MAXI 150	MAXI 200	MAXI F1 300	MAXI F1 300
000	27	40			
050	32	50	61	81	92
100	37	60	-	-	-
150	42	-			
200	47	-			
011	27	40			
021	28	42			
031	29	44			
041	30	46			
051	31	48			
061	32	50			
071	33	52			
081	34	54			
091	35	56			
101	36	58			

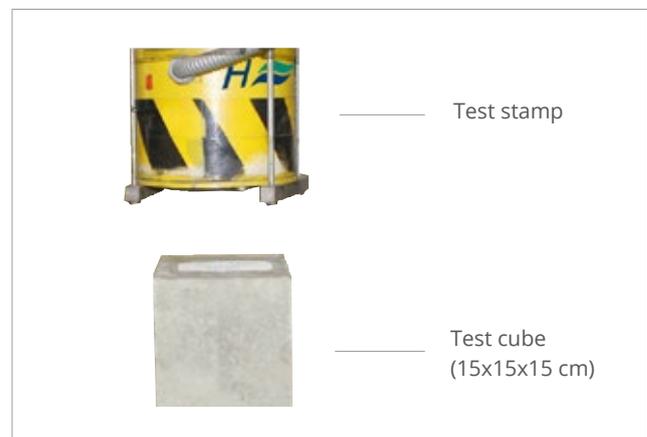


## ADDITIONAL INFORMATION

### Concrete properties to DIN EN 206

Concrete is classified in different categories and varies with regard to its resistance to pressure. The quality of the concrete is analysed 28 days after production in the form of cubes with an edge length of 15 cm or cylinders with a diameter of 15 cm. The results of these tests provide the values required to determine the pressure resistance. HYDROTEC drainage systems have a pressure resistance of class C 35/45.

The concrete is not only analysed with regard to load-related effects but also for non-load related effects. The various exposure classes provide information on the environmental influences that the concrete has to withstand for a prolonged period of time.

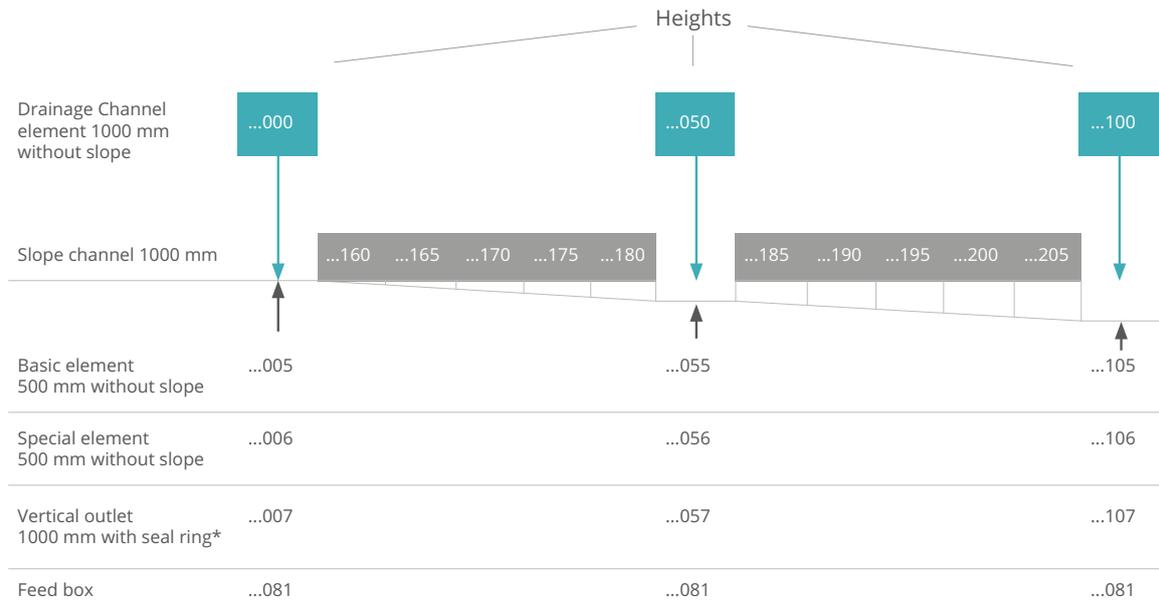


Exposure class	Description of the application	Example of application	Minimum pressure
XC4	Alternately wet and dry	Outdoor parts with direct exposure to rain	C25/30
XD3	Alternately wet and dry	Parts of bridges with frequent exposure to spray water containing chloride	C35/45
XS3	Tidal areas, spray water and atomised spray water	Quay walls in ports	C35/45
XF3	High water saturation, without thawing	Open water tanks	C35/45
XA3	Chemically strong, corrosive environment	Industrial drainage systems with chemically corrosive waste water	C35/45

Vollständige Darstellung in DIN 1045-2

# ADDITIONAL INFORMATION

## Modular system / Color preservation of gratings



### Modular System

The modular system is a simple principle for selecting the required channel elements. It is possible to select channel elements without a slope (...000,...050,...100) and with a slope (...011,...021,...,...101). With the various depths it is possible to combine channel elements with and without slopes to achieve an optimum drainage performance.

#### Example TOP 100:

The channel run can start with five sloping channels (...011, ...021,...,...051). The individual numbers refer to the construction depth of the channel elements or the inlet and outlet depths. The number ...001 has an inlet depth of 160 mm and an outlet height of 165 mm. Correspondingly the next four channel elements are 5 mm higher, whereby the last element (...051) finishes with an outlet depth of 185 mm. Here another slope element (...061) or standard element (...050) can be connected, as both have an inlet depth of 185 mm. Another option would be another feed box or sink trap with a depth of 185 mm. Channel elements with a slope (TOP system) can be laid at a maximum construction depth of 210 mm (...101). Subsequent connection is only possible with standard elements (...100).

### Color preservation of gratings

Colored surface coatings on cast parts for traffic surface drainage only have a cosmetic function. This color coating cannot be regarded as general corrosion protection. During the production of cast iron a fine layer of iron dust is deposited on the cast part which can form red-brown marks when it comes into contact with moisture. These red marks are regarded as rust or patina that do not, however, have any negative effect on the cast iron functionality.





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