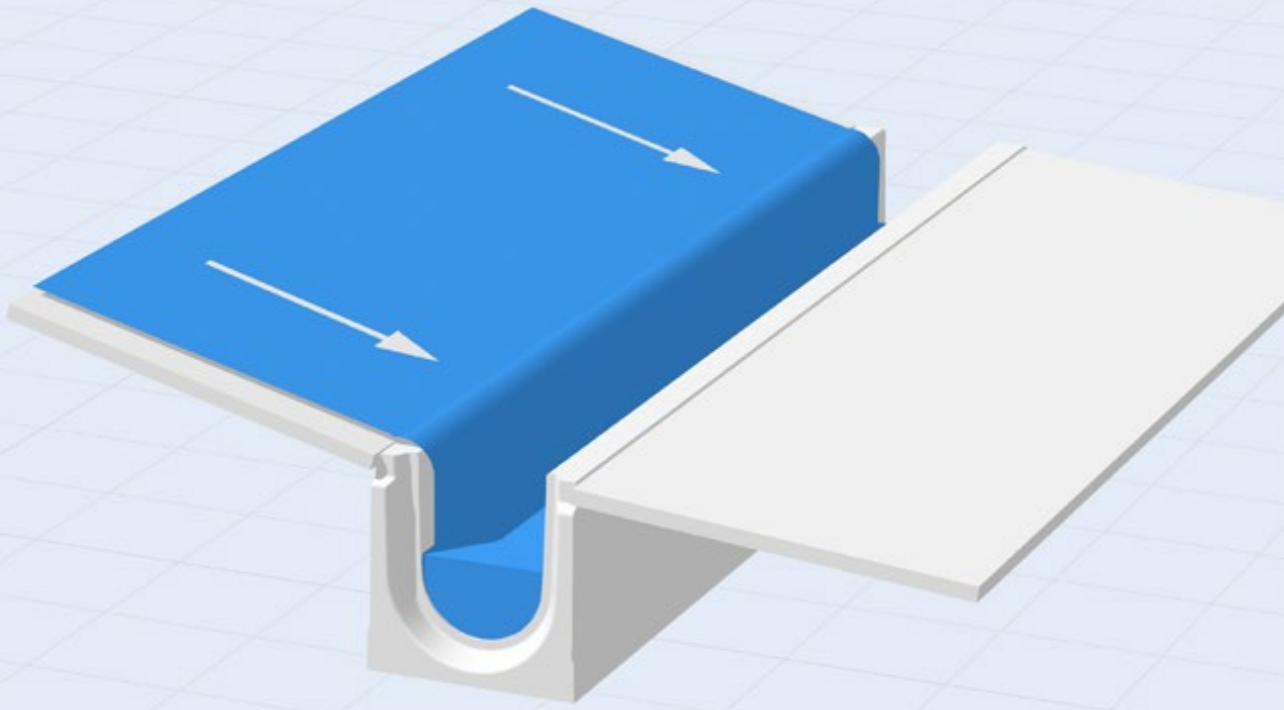
HYDROTEC

DRAINAGE CHANNELS

TECHNICAL MANUAL

Calculations, Formulas & Materials



Note

As a manufacturer of drainage channels, we give generally valid suggestions for the planning, selection and installation of drainage channels. The specific installation design must always be determined by the planning entity, taking into account all local conditions.

You supply the data - we calculate!

We are offering a hydraulic calculation service. Simply use the form on our website **www.hydrotec.com**, which can be found under the Service section.

The risk of flooding

The correct planning and professional execution of drainage systems is of enormous importance for the overall success of a building project!
Especially in road traffic, aquaplaning, i.e. the floating of the car tyre on a cushion of water while driving, is a great danger.
Great damage can be caused by flooding in other areas, too. For example, in hospitals the expensive radiology equipment (e.g. CT and MRI) is often located on the ground floor for accessibility reasons. If the car park of the hospital is flooded due to insufficient dimensioning of a drainage system and water penetrates to the ground floor of the building, the financial damage is tremendous.

PLANNING A DRAINAGE CHANNEL

Consideration in planning

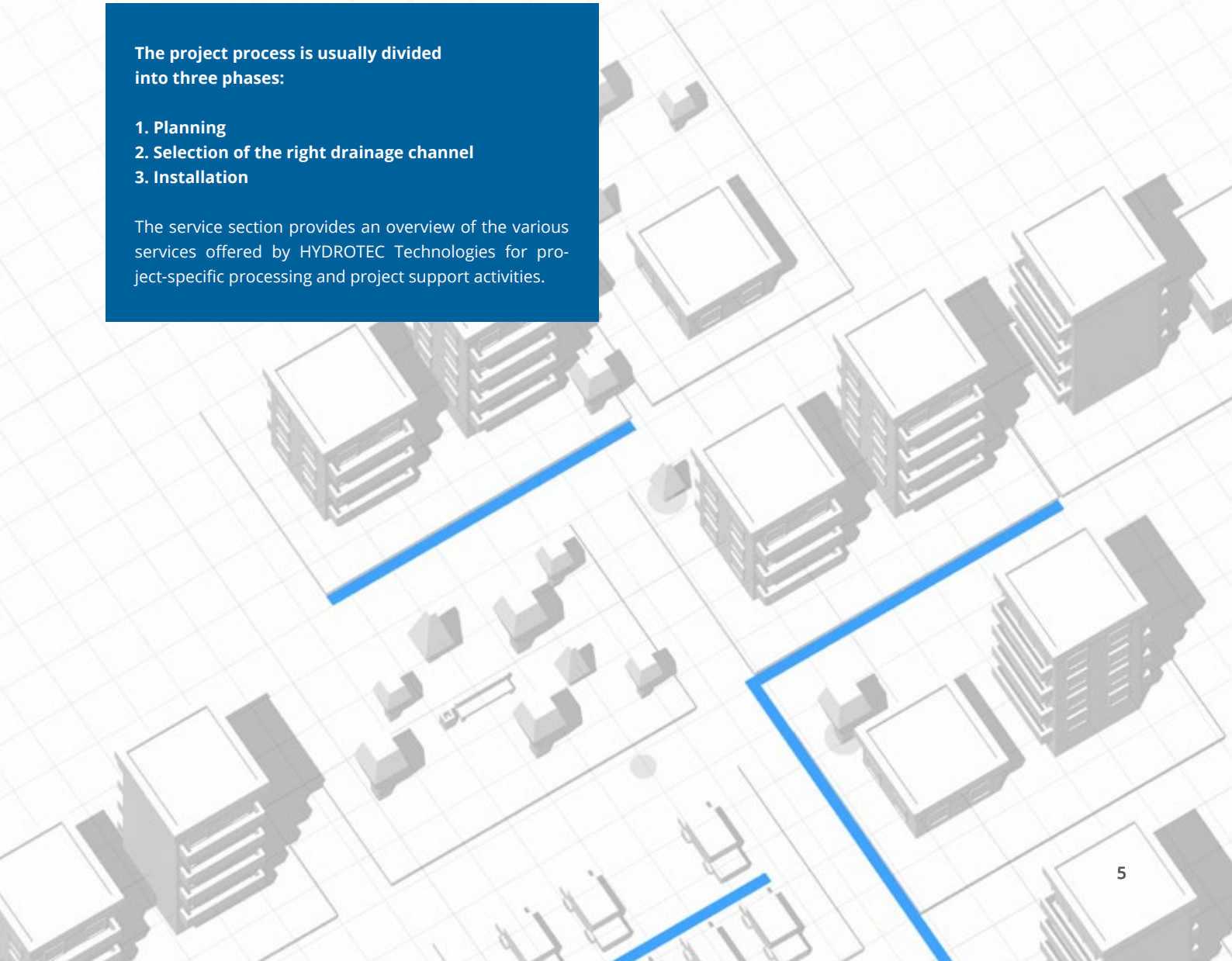
Already in the planning phase of the construction project, the environmental conditions such as rainfall intensity and surface permeability should be evaluated and included in the dimensioning of the drainage system.
Attention must also be paid to the planned traffic in the area of the drainage channel. If there is more heavy traffic or very high axle loads, such as for forklifts, a higher load class must be selected than, for example, in the pedestrian area.

This manual is intended as a guide for planning a drainage channel system from dimensioning to implementation.

The project process is usually divided into three phases:

1. Planning
2. Selection of the right drainage channel
3. Installation

The service section provides an overview of the various services offered by HYDROTEC Technologies for project-specific processing and project support activities.



HYDROTEC

STEP 1

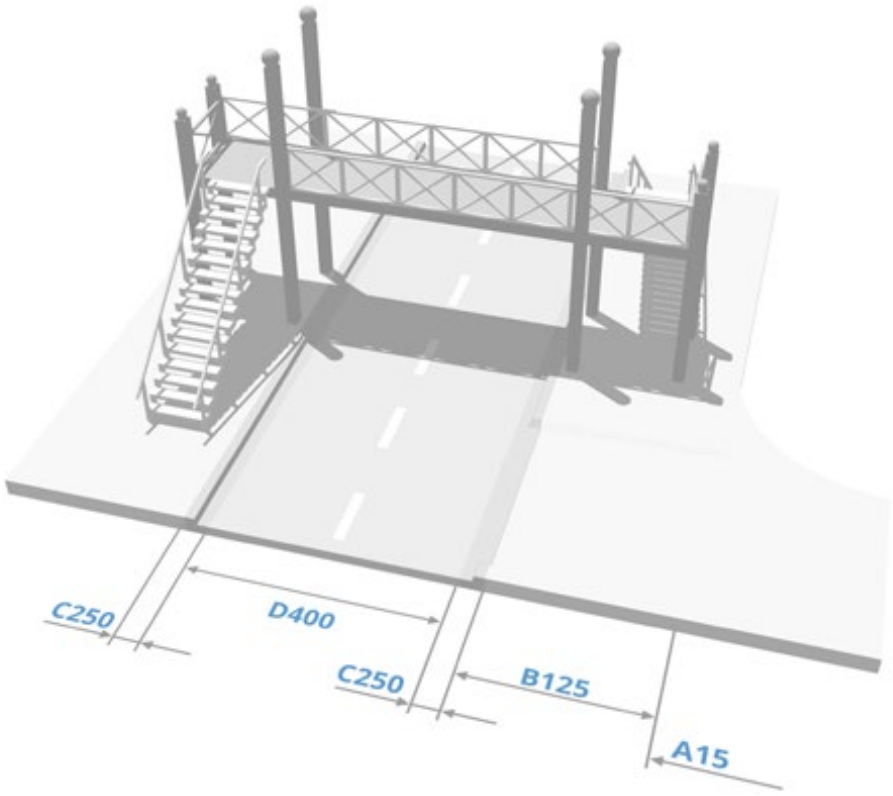
PLANNING THE DRAINAGE CHANNEL

The first step should always be the determination of the load class.

SELECTION OF A SUITABLE LOAD CLASS
DIN EN 1433

What is a load class?

In the DIN EN 1433 standard, a basic distinction is made between the 6 installation areas listed below. These are assigned different load classes, i.e. minimum requirements for the mechanical load capacity. The designation of the class is made up of a continuous letter (A-F) and a number that indicates the test load in kN during a test according to DIN EN 1433. This means that a drainage channel used in an installation area of class D 400 must withstand a load of 400 kN (equivalent to 40 t) during the test.



Recommendation

In an unclear situation we recommend always selecting the higher class for the application examples listed. Please also note: Pedestrian areas are only used for supply and disposal purposes and in emergencies! Pedestrian streets are subject to double use, i.e. driving is only prohibited at certain times, e.g. during business hours only pedestrian traffic, outside these times normal traffic can drive on this street! For all areas with special use (flight operation areas, docks, etc.) drainage channels of class F 900 according to DIN EN 124 are to be used!

Class A 15

Walkways, cycling paths, green areas

Class B 125

Walkways, pedestrian zones, car parking areas

Class C 250

Kerb areas, emergency lanes, car parking areas

Class D 400

Road surfaces, pedestrian streets

Class E 600

Industry, military, heavy wheel loads

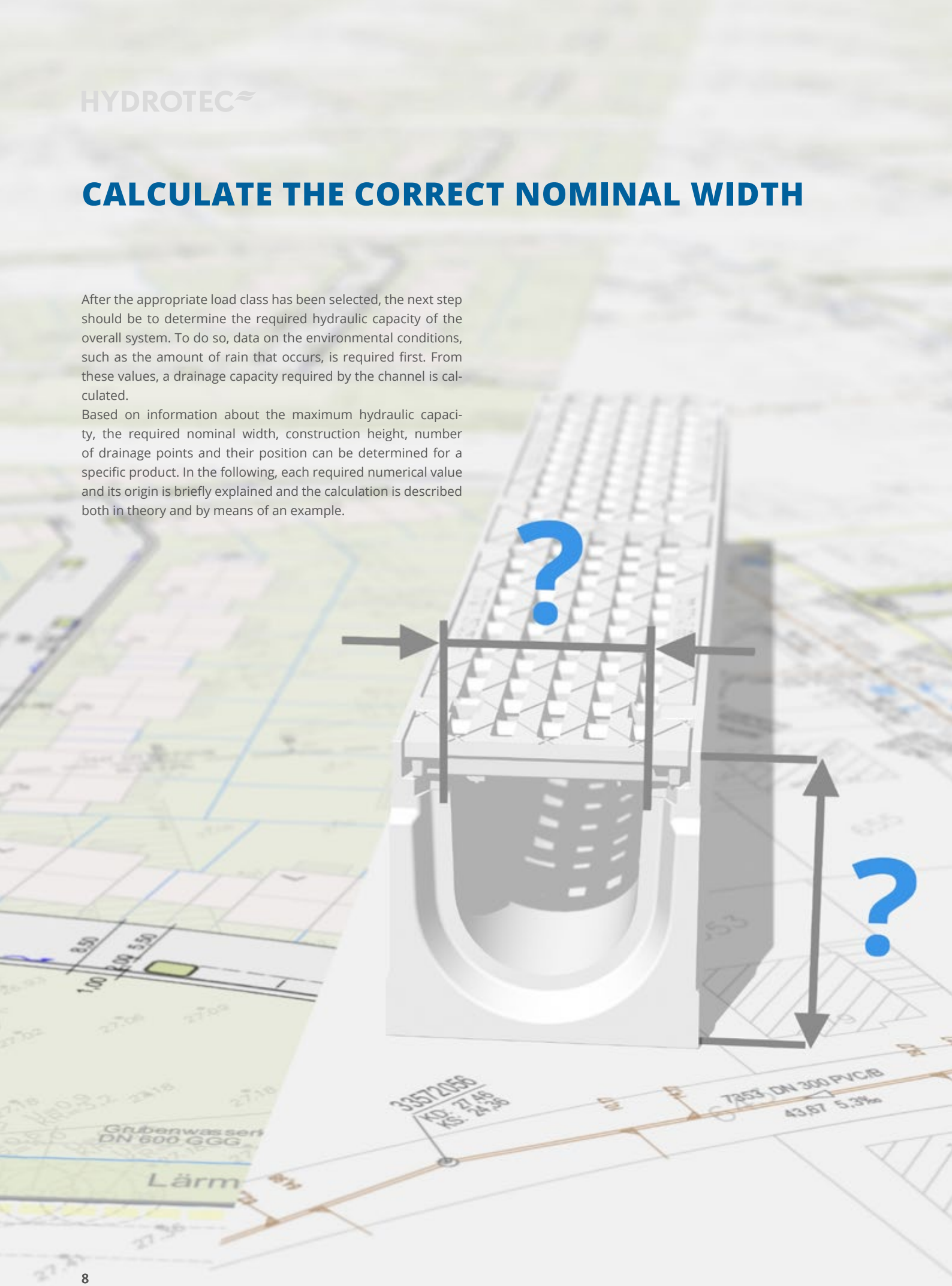
Class F 900

Airport surfaces, docks, heavy wheel loads

CALCULATE THE CORRECT NOMINAL WIDTH

After the appropriate load class has been selected, the next step should be to determine the required hydraulic capacity of the overall system. To do so, data on the environmental conditions, such as the amount of rain that occurs, is required first. From these values, a drainage capacity required by the channel is calculated.

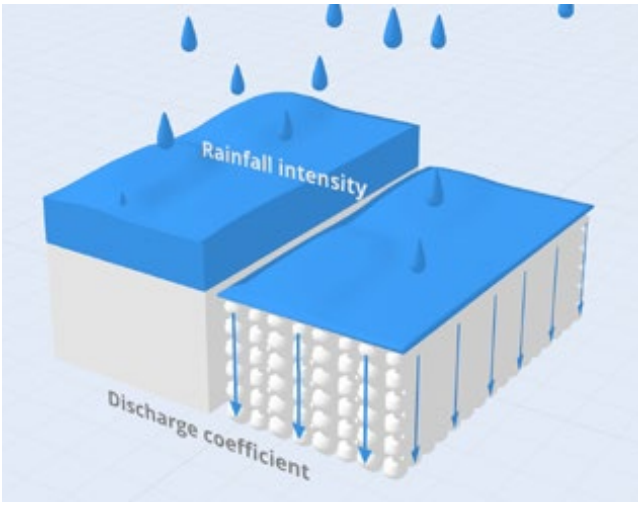
Based on information about the maximum hydraulic capacity, the required nominal width, construction height, number of drainage points and their position can be determined for a specific product. In the following, each required numerical value and its origin is briefly explained and the calculation is described both in theory and by means of an example.



CALCULATE THE CORRECT NOMINAL WIDTH

Rainfall intensity

The most important numerical value for calculating the required nominal size is the local rainfall intensity. It describes a rain event that is exceeded in the period (n) for a certain duration (T). It is a statistically calculated value based on continuous empirical studies.
Depending on local conditions or specifications of the city or municipality, different return periods and durations may be involved. For Germany, the local precipitation (in mm), depending on the return period (in years) and the event duration (in min), can be taken from the KOSTRA data sets (recorded and published by the German Weather Service). The precipitation in mm is then converted into a rainfall intensity in l/s*ha for the dimensioning of the drainage channel.

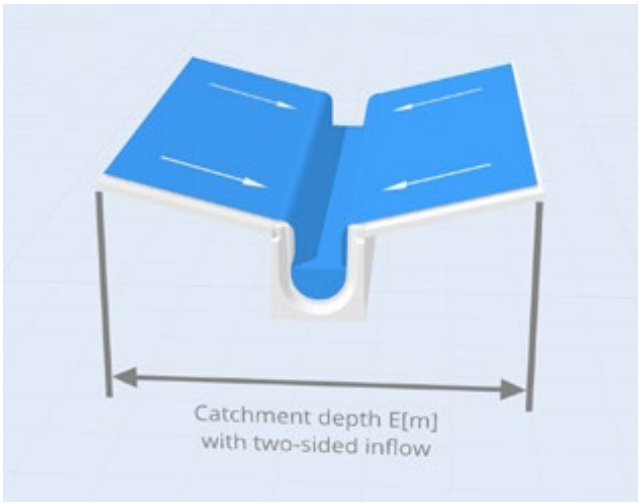


$r_{15}(n=1)$

Is the rainfall occuring once a year (recurrence period n=1) for a duration of T = 15min

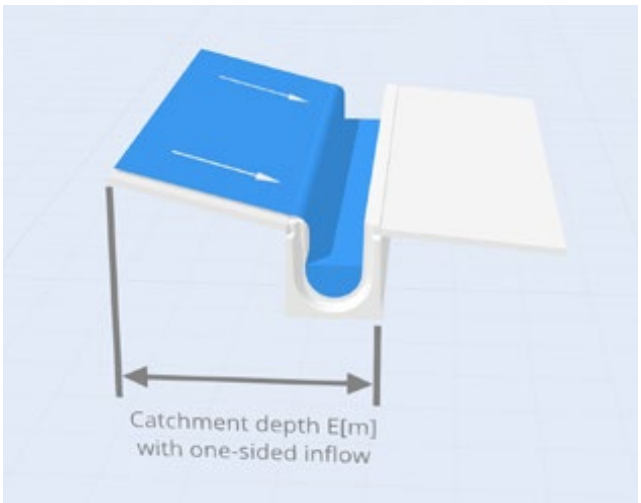
Discharge coefficient

Depending on the surface permeability, not the entire rain volume is discharged into the drainage channel. Therefore, the design rainfall intensity is multiplied by the discharge coefficient. It describes the permeability of the surface material as a quotient of the volume passed on and the total rainfall volume. In the literature, it is often represented with the formula symbol ψ.



Catchment depth

Only one dimension is now required to dimension a channel. The catchment depth results from the size of the terrain to be drained and the formation of the slope. It describes the entire width over which the surface water is discharged into the channel.



CALCULATE THE CORRECT NOMINAL WIDTH

Calculation

Based on the rainfall intensity, terrain size and discharge coefficient, the discharge volume of the total area can be determined using the formula shown (see right).

$$Q = \frac{r_{15}(n=1) * \psi * A}{10.000}$$

Q = Discharge volume of the area to be drained [l/s].
$r\_15(n=1)$ = Rainfall intensity for duration stage 15 min and recurrence period of 1 year [l/s*ha].
ψ = Discharge coefficient [no unit]
A = Surface area to be drained [m²]

Channel selection

According to DIN EN 1433, every manufacturer of a drainage channel is obliged to provide data on the maximum discharge capacity (Qmax) of the system. This will be compared with the occurring discharge volume (Q).

For $Q<Q_{max}$

The occurring discharge volume is smaller than the maximum discharge volume. The channel can be designed with a single discharge point at the end of the channel run. If necessary, check whether a smaller nominal width is sufficient.

For $Q>Q_{max}$

The occurring discharge volume is greater than the maximum discharge volume. Several drainage points must be provided.

Channel type	Nominal width b (mm)	Height H (mm)	Clear height h (mm)	Outflow cross section A (cm²)	Reduction factor µ	Q_{max} outflow capacity liter/s
MINI class A	100	120	80	69	0,8	**2,19**
MINI class B	100	120	60	49	0,8	**1,34**
MINI class C	100	120	75	62	0,8	**1,90**
TOP/ MAXI	100	160	90	79	0,8	**2,66**
	100	185	115	104	0,8	**3,95**
	100	210	140	129	0,8	**5,41**
	100	235	165	154	0,8	**7,01**
	100	260	190	183	0,8	**8,94**
TOP/MAXI	150	210	115	181	0,8	**6,88**
	150	235	140	186	0,8	**7,80**
	150	260	165	223	0,8	**10,15**
	150	310	215	298	0,8	**15,48**
TOP/MAXI	200	310	205	367	0,8	**18,62**
MAXI F1	300	400	300	802	0,8	**49,22**
	400	400	335	1242	0,8	**80,55**
HYDRO*block*	100	100	100	78	0,9	**3,11**
	150	150	188	176	0,9	**9,62**
	200	200	200	313	0,9	**17,65**
	300	300	300	700	0,9	**48,33**

CALCULATE THE CORRECT NOMINAL WIDTH

Determine the number of discharge points

In order to determine the number of discharge points needed in the planned channel run, the channel inlet (q_R) must be determined. Perhaps better understood as: It indicates how much water per second flows into one metre of channel.

$$q_R = \frac{r_{15}(n=1) * \psi * E}{10.000}$$

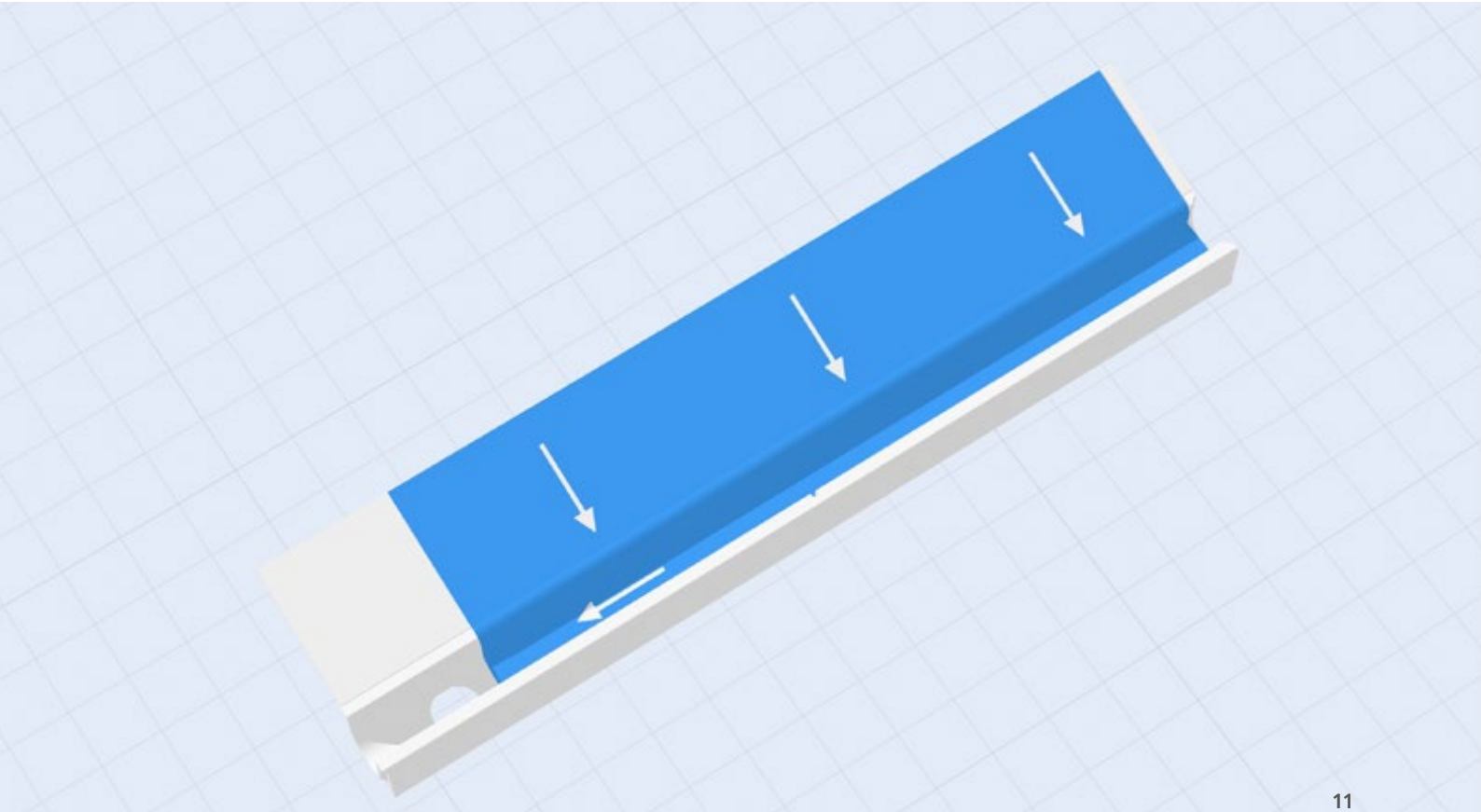
q_R = Channel inflow [l/s*m]
$r_{15(n=1)}$ = Rainfall intensity for duration stage 15 min and recurrence period of 1 year [l/s*ha].
ψ = Discharge coefficient [no unit]
E = Catchment depth [m]

The volume of water to be discharged adds up over the length of the channel. The maximum discharge capacity of the channel must not be exceeded up to the first discharge point. A maximum channel length can be determined from the given max. discharge volume and channel inflow per metre.

The number of feed boxes required is obtained by dividing the planned channel length of the total run by the max. channel length. The result must be rounded up to a whole number.

$$L_{max} = \frac{Q_{max}}{q_R}$$

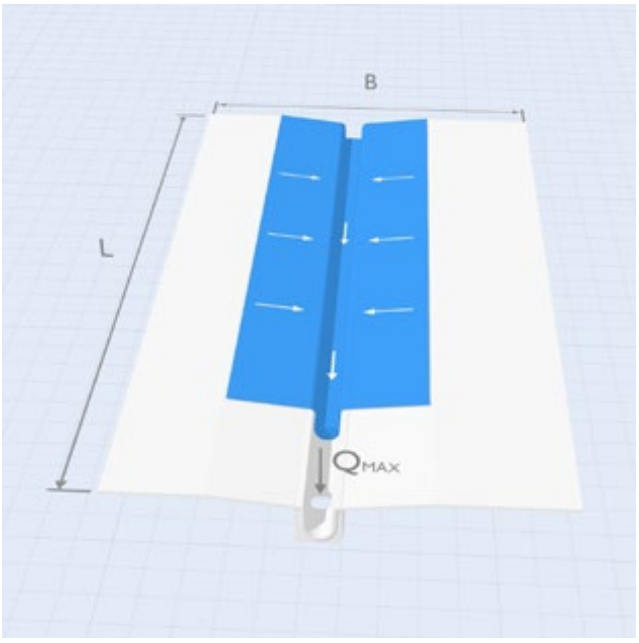
L_{max} = Maximum channel length [m]
Q_{max} = Maximum discharge capacity of the channel [l/s]
q_R = Channel inflow [l/s*m]



CALCULATION EXAMPLE

The premises of a logistics company in Hanover are to be expanded. An area of 100 m x 50 m (L x W) is to be newly developed. The area will have a longitudinal slope of 2 % and a transverse slope of 2.5 % and will be paved. The discharge coefficient is 0.9. A single channel run is to be laid in the centre of the area. The dimensioning basis should be the once-a-year heavy rain event with a duration of 15 min ($r_{15(n=1)}$). The number of discharge points required in the channel line is now to be determined.

The position of the channel and the slope determine the effective catchment depth and must therefore also be taken into account.



Given numbers:

Terrain length:	L = 100 m
Terrain width:	B = 50 m
Discharge coefficient:	ψ = 1

Searched numbers:

Rainfall intensity for Hannover:	$r_{15(n=1)}$ = ?
Surface area:	A = ?
Number of discharge points:	?

Calculation

First, the design rainfall intensity $r_{15(n=1)}$ is determined using the Kostra data sets of the German Weather Service (DWD). All the data required for this are made freely available on the DWD website. The result is:

$$r_{15(n=1)} = 116{,}67 \frac{l}{s*ha}$$

With the help of the rain dispenser, the channel can now be dimensioned. The process is divided into 4 steps:

1. Determine the discharge volume of the total area (Q) as follows.

$$Q = \frac{r_{15}(n=1) * \psi * A}{10.000}$$

$$\text{mit } A = L * B$$

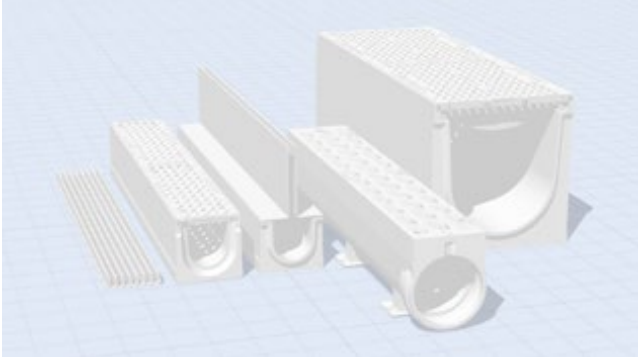
$$Q = \frac{116{,}67 \frac{l}{s*ha} * 0{,}9 * 100\ m * 50\ m}{10.000}$$

$$Q = 52{,}50 \frac{l}{s}$$

CALCULATION EXAMPLE

2. Selection of a drainage channel

Due to the increased volume of heavy goods traffic in the logistics yard and a possible cross-traffic in the drainage channel, the HYDRO*block* channel was chosen. The structural environmental conditions permit the installation of a channel with a maximum nominal width of 200 mm.



3. Calculation of the maximum channel length (L_{max})

First, the channel inlet q_R is determined. Since a slope from both sides to the drainage channel is planned, the catchment depth is equal to the width of the terrain. With E = B, the result is:

$$q_R = \frac{r_{15}(n=1) * \psi * E}{10.000}$$

$$q_R = \frac{116{,}67 \frac{l}{s*ha} * 0{,}9 * 50\ m}{10.000}$$

$$q_R = 0{,}53 \frac{l}{s*m}$$

The maximum discharge volume of the HYDRO*block* 200 channel is Q_{max} = 17.65 l/s. This results in the maximum channel length of:

$$L_{max} = \frac{Q_{max}}{q_R} \qquad L_{max} = \frac{17{,}65 \frac{l}{s}}{0{,}53 \frac{l}{s*m}}$$

$$L_{max} = 33{,}30\ m$$

4. Determining the number of discharge points required

For this purpose, the planned total length of the drainage channel (L_{ges}) is divided by the maximum channel length just calculated (L_{max}). Since the channel is to be laid over the entire length of the yard, L_{ges} = L. This results in:

Info: If there is an odd number of payoff points, round up to a whole number.

$$\text{Number of discharge points} = \frac{L_{ges}}{L_{max}}$$

$$\text{Number of discharge points} = \frac{100\ m}{33{,}30\ m}$$

$$\text{Number of discharge points} = 3$$

We will be pleased to help you plan your drainage channel and provide you with hydraulic calculations as well as installation plans for your specific construction project.

DRAINAGE CHANNELS
TYPES OF SLOPE

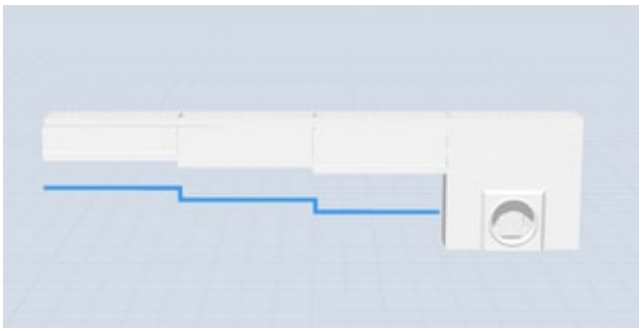
After the correct nominal width has been determined, the appropriate type of installation must now be determined depending on the surrounding slope and the drainage volume. Basically, the following 4 types of slope are distinguished:

Channels without slope

The drainage channels are laid horizontally and follows the terrain. Drainage is ensured by the slope of the terrain and the water level gradient that forms. The channels can be connected to the sewer system via a feed box or an open end piece.

Channels without slope (stepped slope)

By connecting channel elements in different construction heights, a constant discharge is made possible. The channels can be connected to the sewer system via a feed box or an open end piece.



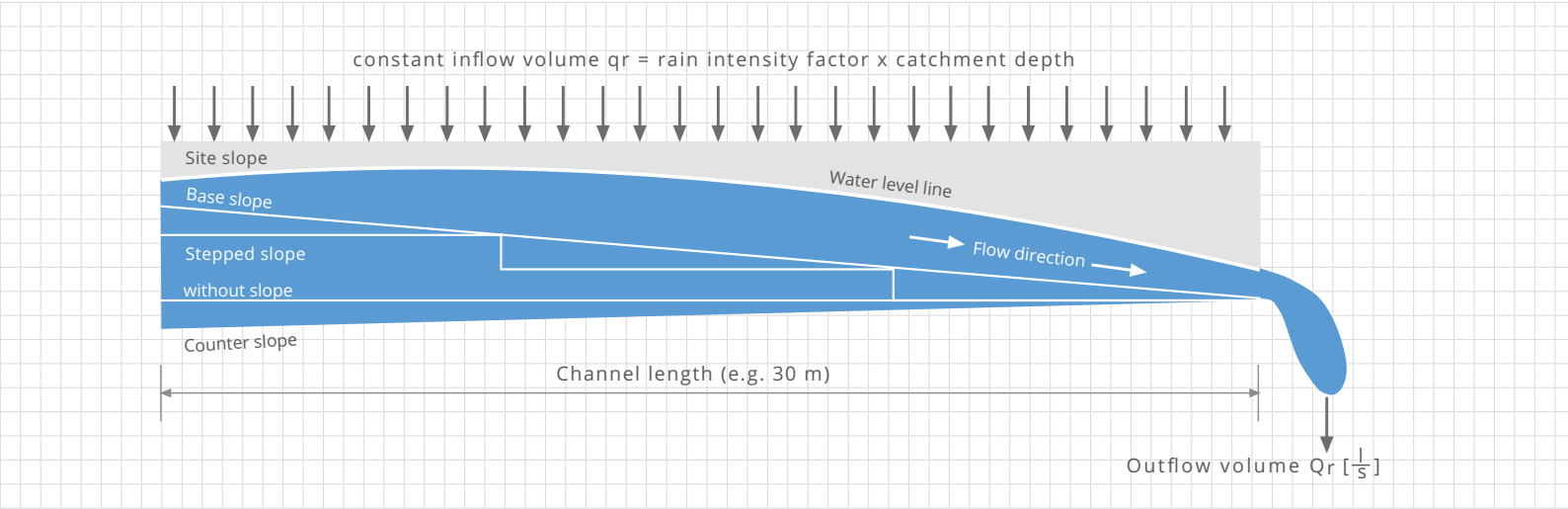
Channels with slope

In this case, the channel bottom has a slope, while the grating is horizontal. This ensures continuous drainage as the water volume rises towards the outlet. The channels can be connected to the sewer system via a feed box or an open end piece.

Channels with slope (counter-slope)

In this case, the drainage takes place through a continuous inherent slope, which is broken in the middle of the channel line. If channel elements are laid in two directions, two elements must be joined together in opposite directions when they meet. We recommend the use of an end piece for this to avoid the formation of a gap.

DRAINAGE CHANNELS
TYPES OF SLOPE



Our recommendation

We recommend drainage without slope due to lower costs during installation! The drainage capacity remains unaffected!

The channel bottom with or without slope has no effect on the discharge rate of the channel line. The water level line always builds up in the same way. The discharge rate is determined exclusively by the channel cross-section at the end of the line, the slope has no effect.

The cost of installing drainage channels with its own slope is enormously high. Compared to a channel with a straight channel bottom, the construction site costs increase immensely as a result. This is mainly due to the fact that the correct sequence of installation must be strictly adhered to. Due to the slope, the channel elements have a height difference of 0.5 cm (0.5 % inherent slope) or 1 cm (1 % inherent slope) on the discharge side. In order to be able to lay them properly on the construction site, they are numbered by the manufacturer. This sequence must be strictly adhered to and the slope of the foundation must be adjusted. This is an additional work effort that is not required for a channel without a slope.

Result:
Less effort without a slope.

Why are there drainage channels with slope?

A slope in the channel can still be useful for specific projects. To understand this, one must visualise the application: A channel is to be laid parallel to a road in the edge area (C250). The cross slope of the road (height difference between the right and left side of the road) is therefore aligned accordingly in the desired drainage direction and thus towards the channel. The channel is to run parallel to the road over a length of 100 metres. There should only be one discharge point (connection to the ground pipe). If it rains, the water on the road surface is drained off to the side into the drainage channels. At the highest point of the channel line (i.e. at metre „0“), all the surface water is immediately drained off and only a small amount of water can form. Over the entire length of the line, more and more water flows into the drainage channels and the existing water is diverted. The water volume becomes greater and greater in the process. If the depth of the channel bottom remains the same, the channel runs the risk of overflowing. The channel size or height must therefore be increased. In order to perfectly adjust the channel depth to the height of the water column, the slope can be used.

STEP 2

SELECTION OF THE RIGHT DRAINAGE CHANNEL

The next step is to select a suitable drainage channel. On the market, a large number of manufacturers offer sometimes very different channels. The biggest difference is often the material. Each of them, with its special properties, is differently suitable for different building projects.

MATERIALS
FIBRE REINFORCED CONCRETE

Composition

The building material concrete is composed of aggregate, water and the binding agent cement. The cement hardens into hardened cement paste through a chemical reaction with water. The enclosed aggregate increases the strength of the composite structure. By adding various chemical additives, e.g. air entraining agents, superplasticisers, the workability and/or subsequent properties of the material can be precisely adapted to the requirements. In the case of fibre-reinforced concrete, additional fibres are added to the mixture to increase the tensile strength of the material and minimize shrinkage cracks in the end product.

Characteristics

Compressive strength is one of the most important properties of concrete. To assess the compressive strength, a test specimen in the form of a cube (15 cm edge length) or cylinder (30 cm long, 15 cm diameter) is produced in accordance with DIN EN 206. After 28 days, this can be tested in a compression test and assigned a strength class. It indicates the maximum compressive strength of the test specimen depending on the shape.

HYDROTEC channels are tested to at least compressive strength class C35/45 in accordance with DIN EN 206.

Frost and de-icing salt resistance is important in order to make an assessment of the durability of the channel. Weather conditions should not have any influence on the material. According to DIN EN 1433, there are three different standards for describing frost and de-icing salt resistance:

N	Not tested
W	Water absorption tested in mass-%
+R	Mass loss in kg/m² tested at 28 freeze-thaw cycles

HYDROTEC channels are resistant to frost and de-icing salt in accordance with DIN EN 1433 Class +R.

Compressive strength	$f_{ck,cyl}$* [N/mm²]	$f_{ck,cube}$** [N/mm²]
C8/10	8	10
C12/15	12	15
C16/20	16	20
C20/25	20	25
C25/30	25	30
C30/37	30	37
C35/45	**35**	**45**
C40/50	40	50
C45/55	45	55
C50/60	50	60
C55/67	55	67
C60/75	60	75
C70/85	70	85
C80/95	80	95
C90/105***	90	105
C100/115***	100	115

* $f_{ck,cyl}$ = characteristic strength of cylinders, diameter 150 mm, length 300 mm, age 28 days

** $f_{ck,cube}$ = Characteristic strength of cubes, edge length 150 mm, age 28 days

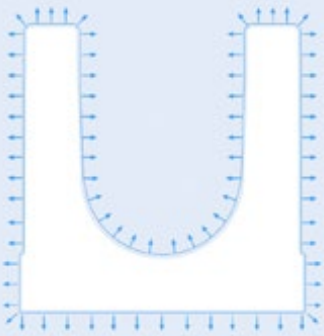
*** General building authority approval or consent required in individual cases

MATERIALS
FIBRE REINFORCED CONCRETE

According to DIN 4102, concrete falls into fire protection class A2: non-combustible, combustible components (plastic fibres), no smoke development and no burning drip.

Building material class	Designation by building authorities	Examples
A (non-flammable substances)		
A1	-	concrete, cast iron, mortar
A2	-	concrete with synthetic fibres, glass wool
B (flammable substances)		
B1	heavy flammable	polymer concrete, synthetic resin plasters
B2	normal flammable	silicone, wood, textiles
B3	easy flammable	paper

The **coefficient of thermal expansion** of normal concrete is 1 x 10-6 per Kelvin. This means that a 10 m long concrete part expands by 10,000 x 20 x 1 x 10-6 = 2 mm when the temperature increases by 20 K. Since the surrounding foundation concrete has the same thermal expansion, stress cracks due to thermal stress can be avoided. For polymer concrete, for example, the value is 18 x 10-6. Polymer concrete would thus expand by 1.8 times the surrounding foundation concrete. If expansion joints are not arranged correctly, this can lead to stress cracks and thus to component failure.



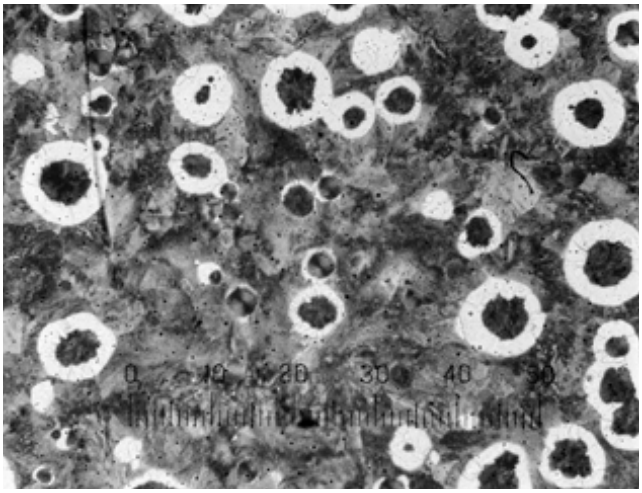
The **maximum water penetration depth** of our concrete is 8 mm. Due to the wall thickness of the channel of > 29 mm, the requirements of DIN EN 1433 for water tightness are fulfilled.

Due to its natural components, concrete is also **100 % recyclable**.

MATERIALS
DUCTILE CAST IRON

Composition

Cast iron is an iron-carbon alloy with a carbon content of > 2.06 %. The letter S in the designation GJS stands for spherically embedded graphite (spherical).



Source: https://commons.wikimedia.org/w/index.php?curid=45350399

Characteristics

In contrast to grey cast iron (GJL), spheroidal graphite cast iron has a significantly higher elongation at break. In concrete terms, this means that the material deforms plastically before it breaks. In materials science and design, this behaviour is often referred to as fail-safe behaviour, as it indicates impermissibly high loads before complete component failure occurs and thus enables countermeasures to be initiated if necessary.

When driving over the channel, the grating is subjected to bending. The bending is a composite load consisting of compressive and tensile forces in the respective edge fibres of the stressed component. Therefore, the material of the grating must be able to absorb not only compressive but also tensile forces.

The **compressive strength** of cast iron is more than 800 N/mm². The **tensile strength** is about 500 N/mm².

Due to the composition of the material, cast iron is both 100% **UV-resistant and weatherproof**. Due to the small pores, no water can penetrate into the structure, which can break the bond at temperatures below freezing point (freeze-thaw cycles).

Colour retention: On contact with oxygen, cast iron develops a so-called „patina“. Surface oxidation creates a protective layer, mainly based on graphite and perlite formation, which is basically comparable to the so-called „passive layer“ in aluminium and protects the underlying material. This makes a coating of cast iron surfaces technically obsolete.
During the production of cast-iron products, very fine iron dust often accumulates on the surface of the components. If this comes into contact with oxygen and an electrolyte (e.g. water), the dust begins to oxidise. This produces characteristic red-brown streaks on the surface. However, the grating itself is not affected by this at all. If the cast product is in a driven surface, this dust is removed after a short time and only the passive layer remains, which protects the component from rust.

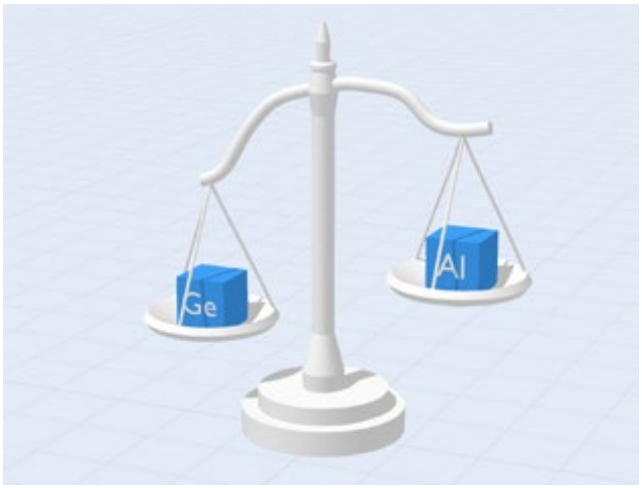
MATERIALS
ALUMINIUM

Composition

Aluminium is used as an alloy in most technical cases. By alloying various elements with pure aluminium (99.5 % aluminium), the properties of the material, such as strength, can be strongly influenced and adapted to the intended use. The most important alloying elements are manganese (Mn), magnesium (Mg), copper (Cu), silicon (Si) and zinc (Zn).

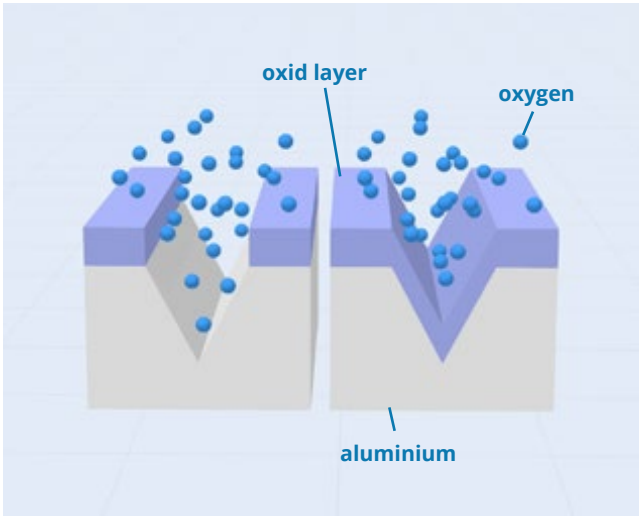
Characteristics

One of the most important technical properties of aluminium alloys is their **low density**. With a density of 2.7 kg/dm³, it has about 1/3 of the weight of cast iron. The result is low product weights and the frequent use of Al alloys in lightweight construction.



On contact with oxygen (for example from the ambient air), aluminium also forms a thin **oxide layer** (also: passive layer) on the surface. This adheres firmly to the surface and protects the underlying material from corrosion. If the surface is destroyed by scratching, for example, a new oxide layer forms immediately. The passive layer gives aluminium its characteristic, dull, silver-grey colour.

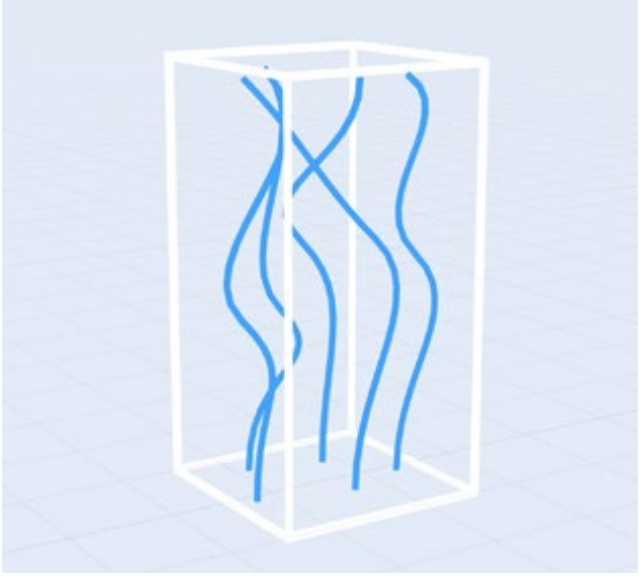
By alloying it with the above-mentioned elements, aluminium can be machined very well in different ways. Basically, a distinction is made here between the groups EN AW (wrought alloys) and EN AC (cast alloys). Wrought alloys are particularly suitable for forming and machining. Casting alloys, as the name suggests, are optimally suited for cast products.



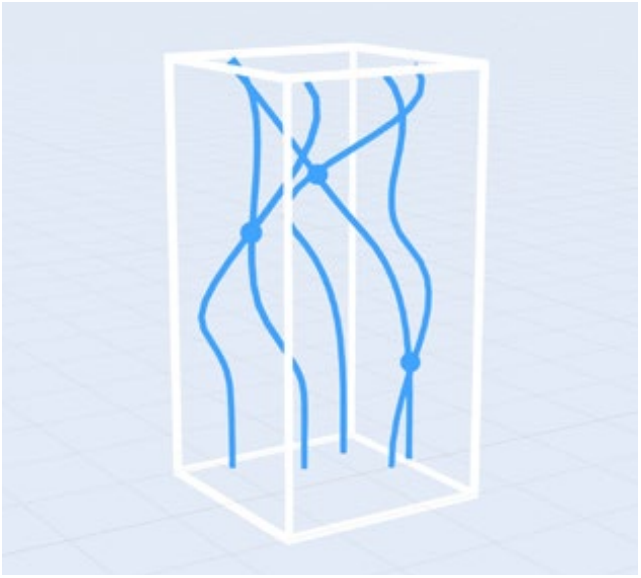
MATERIALS
PLASTICS (PA & PUR)

Composition

Polyamide (PA) is a plastic from the group of thermoplastics. This means that it consists of individual monomers that are only coupled to their mechanical entanglements by weak physical bonds. Polyurethane, on the other hand, belongs to the main group of elastomers. This means that the monomers here are cross-linked by covalent bonds. Since both PA and PUR are group names for various, sometimes very different plastics, their composition also differs greatly depending on the application.



Thermoplastics: filamentous macromolecules



Elastomers: filamentous, cross-linked macromolecules

Characteristics

Polyamide

In general, thermoplastics can be easily thermoformed, welded, bonded and machined.

Since the monomers in thermoplastics are only connected by weak physical bonds, they can be recycled by melting.

Polyamide is characterised by its good strength and abrasion resistance. This leads to low wear on the component.

The material used by HYDROTEC also contains glass fibres. This increases the tensile strength and dimensional stability of the component.

The maximum permissible temperature up to 10 min. is 200 °C and the maximum long-term temperature is 130 °C. The softening temperature is 220 °C (1mm² / 50N).

Polyurethane

Elastomers are characterised above all by their high elastic deformability.

They are also very wear-resistant (due to good force balance).

Due to the combination of elasticity and wear resistance, they are also frequently used as toothed belts, seals or couplings.

They can also be used well as noise and vibration damping elements due to their high force absorption capacity.

You need more information?

On the following pages you will find a brief overview of our drainage channels.
You can find more detailed information on **www.hydrotec.com**.

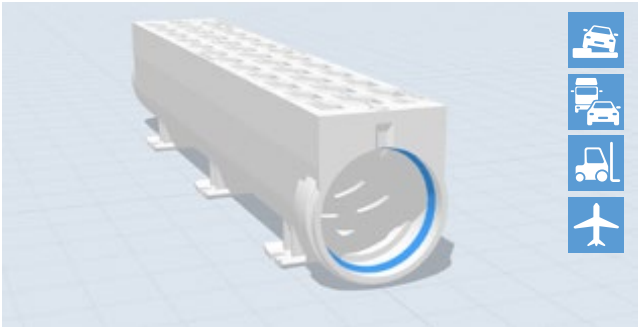
DRAINAGE CHANNELS
SELECTION

System HYDRO*block*

Monolithic drainage channel made of ductile cast iron

Load class: F 900 (90 t)
Nominal width: 100 - 300 mm
Height: 180 - 420 mm

Particularly suitable for
Highways, industrial areas, airports, petrol stations

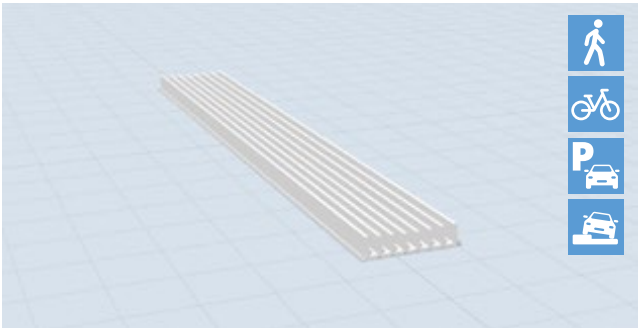


System HYDRO*line* PRO

Flat drainage channel made of aluminium

Load class: F 900 (90 t)
Nominal width: 135 mm
Height: 30 mm

Particulary suitable for
Balconies, gardening and landscaping, terraces, car parks

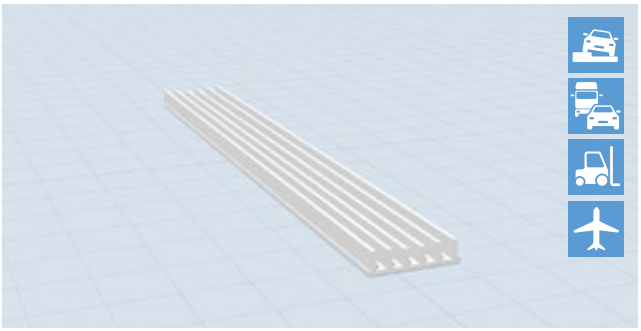


System HYDRO*line*

Flat drainage channel made of cast iron

Load class: F 900 (90 t)
Nominal width: 120 mm
Height: 31 mm

Particulary suitable for
Car parks, industrial areas, underground car parks, subways

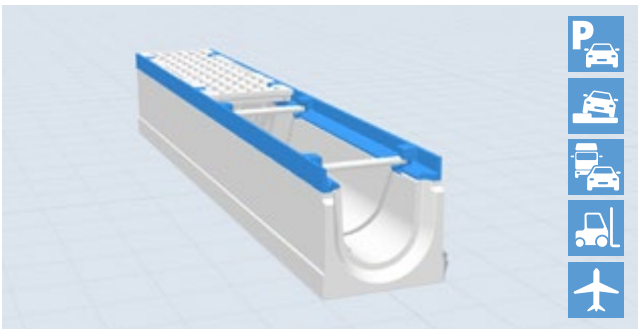


System MAXI

Drainage channel with cast iron edge protection and screwless locking

Load class: C 250 - F 900 (25 bis 90 t)
Nominal width: 100 - 200 mm
Height: 160 - 260 mm

Particulary suitable for
Railway areas, industrial areas, car parks, roads, petrol stations



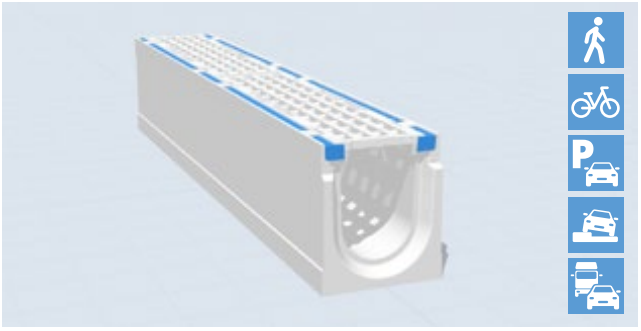
DRAINAGE CHANNELS
SELECTION

System MAXI*pur*

Drainage channel with damping insert

Load class: D 400 (40 t)
Nominal width: 100 - 200 mm
Height: 185 - 310 mm

Particulary suitable for
Railway areas, pedestrian areas, car parking areas, roads

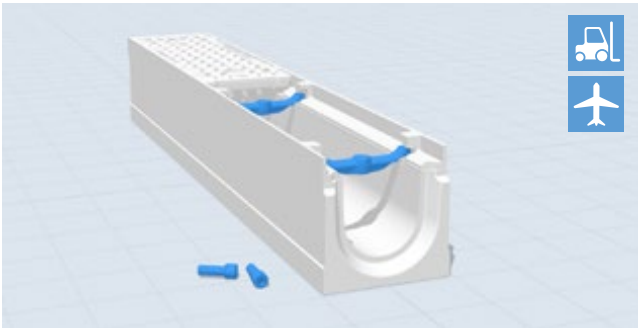


System MAXI F1

Drainage channel with special locking system

Load class: F 900 (90 t)
Nominal width: 100 - 200 mm
Height: 185 - 310 mm

Particulary suitable for
Ports, industrial areas, race tracks, roads, supermarket entrances

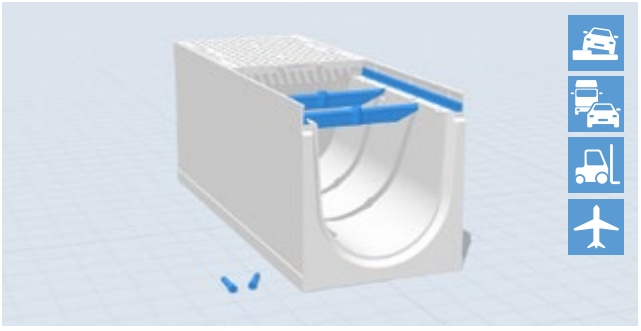


System MAXI PRO

Drainage channel with insert for larger water volumes

Load class: E 600 - F 900 (60 to 90 t)
Nominal width: 300 - 400 mm
Height: 400 mm

Particulary suitable for
Ports, industrial areas, petrol stations, large amounts of water

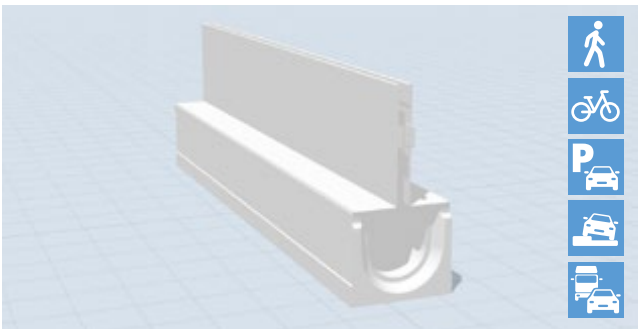


System Slot Channel

Discreet drainage with slotted attachments made of steel or stainless steel

Load class: C 250 - D 400 (25 to 40 t)
Nominal width: 100 mm
Height: 320 - 370 mm

Particulary suitable for
Gardening and landscaping, pedestrian areas, car parks



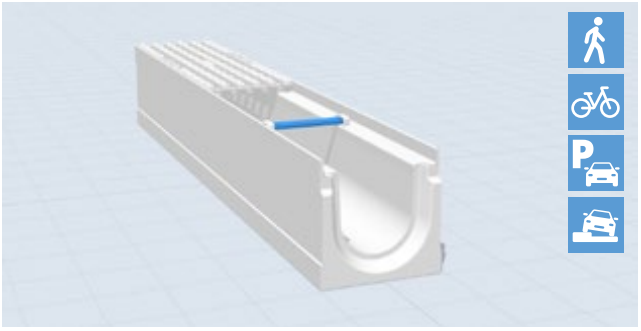
DRAINAGE CHANNELS
SELECTION

System TOP

Drainage channel with edge protection made of galvanised steel and screwless locking

Load class: A 15 - C 250
Nominal width: 100 - 200 mm
Height: 160 - 310 mm

Particulary suitable for
Pedestrian areas, landscaping, car parking spaces

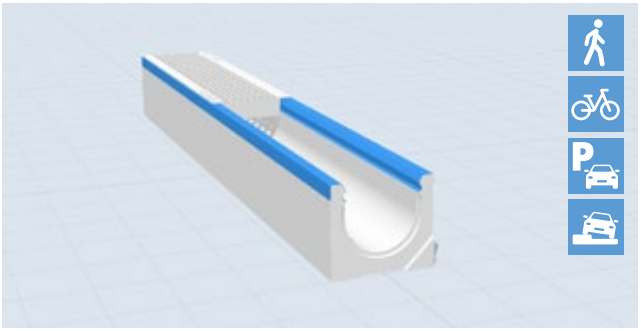


System MINI

Drainage channel with click-locking

Load class: A 15 - C 250
Nominal width: 100 mm
Height: 120 mm

Particulary suitable for
Garages, gardening and landscaping, house driveways



More detailed information about our drainage channels on **www.hydrotec.com**.

STEP 3

INSTALLATION OF A DRAINAGE CHANNEL

Last but not least, the correct installation of the channel is also decisive for permanent drainage. A basic distinction is made between the two types of installation, Type I and Type M, in accordance with DIN EN 1433. Furthermore, the method of installation may vary depending on the channel.

INSTALLATION
DRAINAGE CHANNEL TYPE M

Type M

According to DIN EN 1433 drainage channels are devided into two groups depending on the installation situation: Type M and Type I.

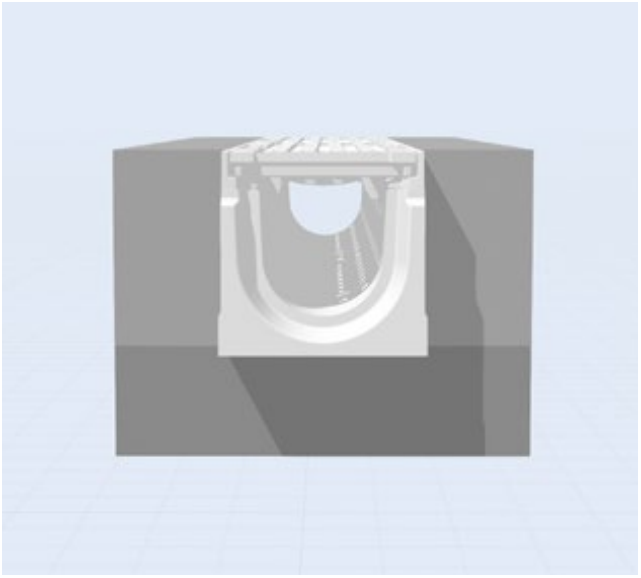
A Type M drainage channel requires a concrete foundation as well as an concrete encasement in order to be able to transfer horizontal and vertical loads into the foundation.

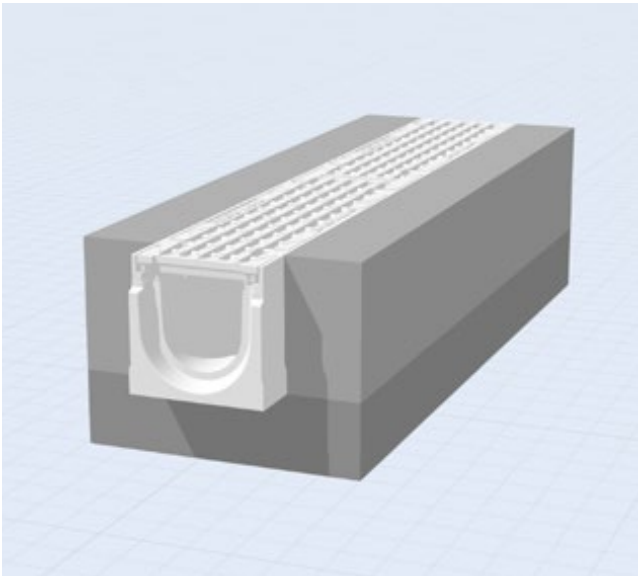
Technical background

Typical Type M channels consist of a concrete body combined with an removable grate. If horizontal loads were to occur, the side walls (without encasement) would be subjected to bending. Bending is a combined load case consisting of compressive and tensile forces on the extreme fibres of a the side wall.
Due to the lower tensile strength of concrete (approx. 10 % of the max. compressive strength) the drainage channel could withstand low forces. A concrete encasement allows the transfer of the occuring horinzotal loads via a compressive load case into the concrete foundation, thus allowing significantly higher load classes.

Therefore the available load class of a Type M drainage channel depends primarily on the concrete foundation and encasement.

The drainage systems TOP and MAXI from HYDROTEC are installed according to DIN EN 1433 Type M with the above explained foundation and encasement. For detailled information about the installation of the Type M please see our Installation instructions.





concrete foundation concrete encasement

INSTALLATION
DRAINAGE CHANNEL TYPE I

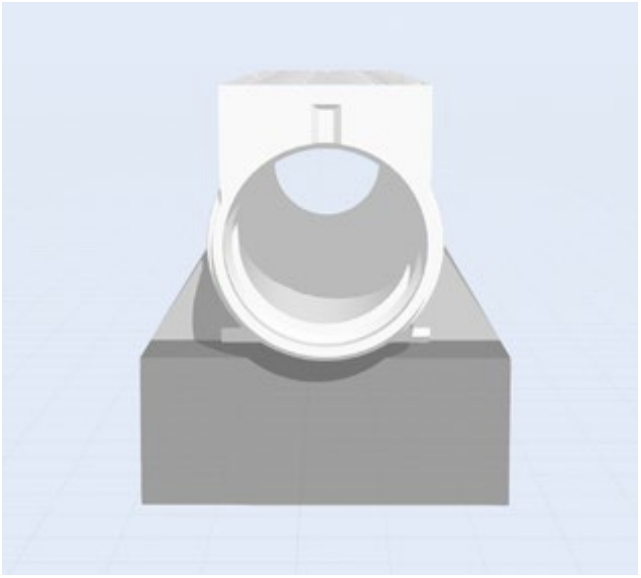
Type I

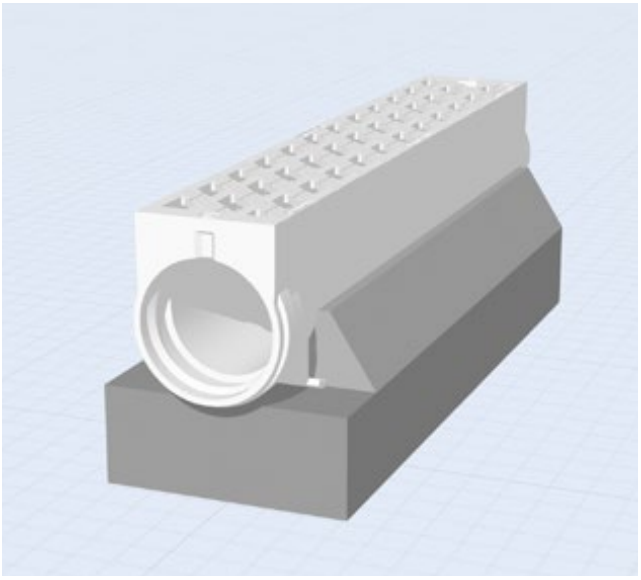
The TYPE I drainage channel does nor require a concrete encasement for load transfer. Only a concrete foundation is required, to transfer the occuring horizontal and vertikal loads.

Technical background

Type I drainage channels are, either due to their specific material properties (e.g. for cast iron) or the design, capable of absorbing and transferring all occuring loads.
Horizontal as well as vertical loads have to be transferred. In addition to compressive strength, the most important factors here are tensile strength and flexural strength.
A clever design can also make a channel a Type I channel. For example a low construction height reduces the level length with which the loads act on the channel, thus allowing the use of materials less resistant to flexural strength (see concrete channel system MINI).

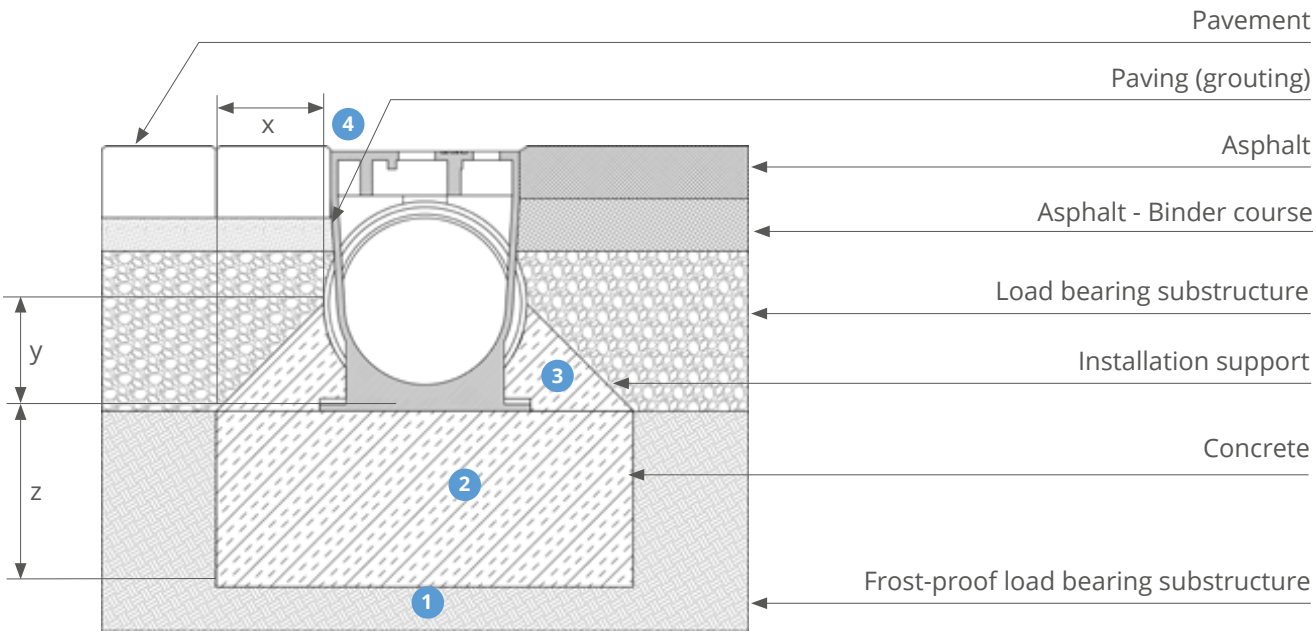
The drainage systems HYDRO*block*, HYDRO*line* and MINI are installed according to DIN EN 1433 Type I and do not require concrete encasement. For detailled information about the installation of the Type I please see our Installation instructions.





concrete foundation installation support

SYSTEM HYDRO*block*
INSTALLATION INSTRUCTION ASPHALT / PAVEMENT



z (according to calculation)	
D 400 E 600 / F 900	20 cm concrete C25/30 25 cm concrete C25/30

x y (according to calculation)	
D 400 E 600 / F 900	15 cm concrete C25/30 20 cm concrete C25/30

1

Before starting the installation works, the frost resistance and load-bearing capacity of the substructure habe to be ensured. The substructure must therefore be properly compacted (depending on the load class), in order to prevent the channel run from sagging. In general this has to be determined by the structural engineer or planner responsible for the project.

2

2. When installing the HYDRO*block* system a load-bearing foundation made of concrete C25/30 with a minimum height of 20 cm for class D 400 and 25 cm for the classes E600 - F900 is required.

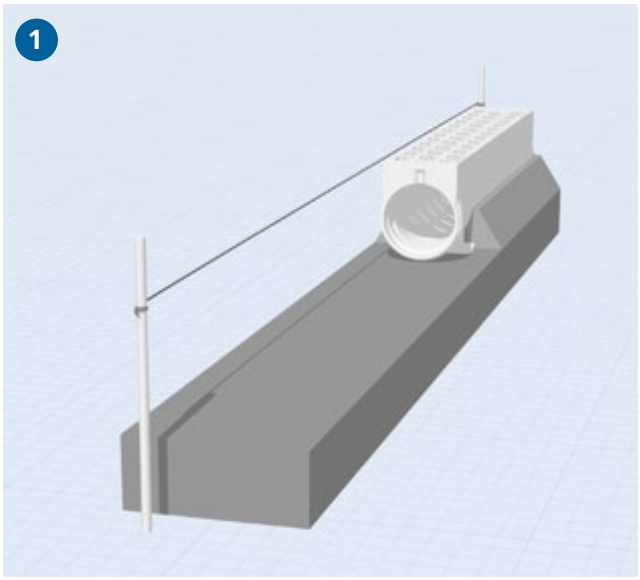
3

It is recommended to secure the channel element in place with a installation support made of concrete C25/30. Optionally the system can also be secured with concrete achors fastened at the pedestal.

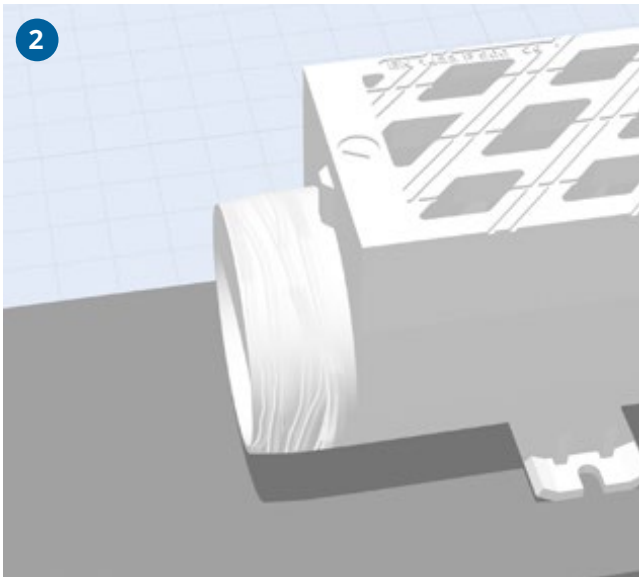
4

Depending on the adjoining surface a joint tape is necessary. The necessity of a joint tape is to be determined by the responsible planning engineer for respective construction project. The Top of the drainage channel must be permanently seated approx. 3 mm lower than the adjoining surface.

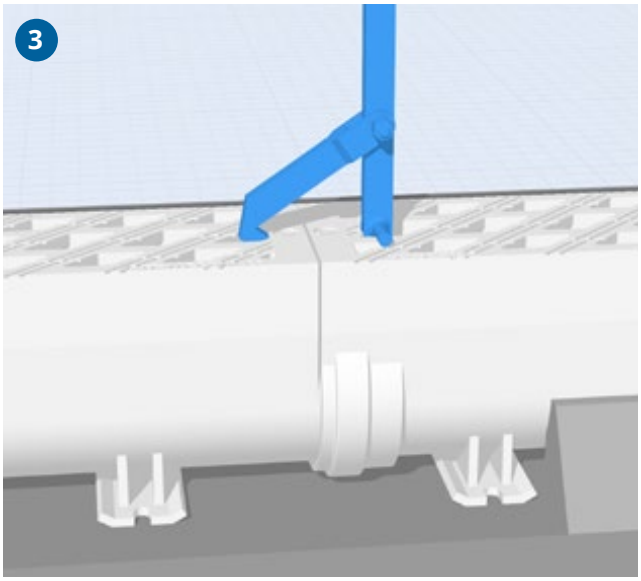
SYSTEM HYDRO*block*
INSTALLATION INSTRUCTION



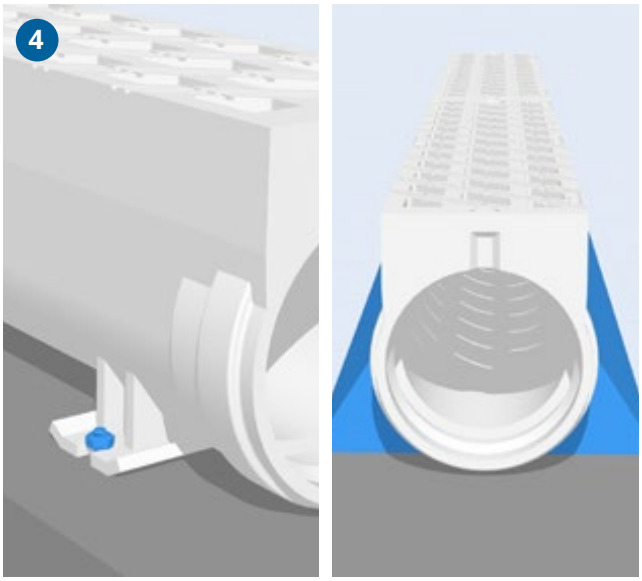
The concrete foundation is created according to the required load class in order to install the HYDROblock (see installation instructions).



Before the elements can be joined, apply lubricant to the spigot end.

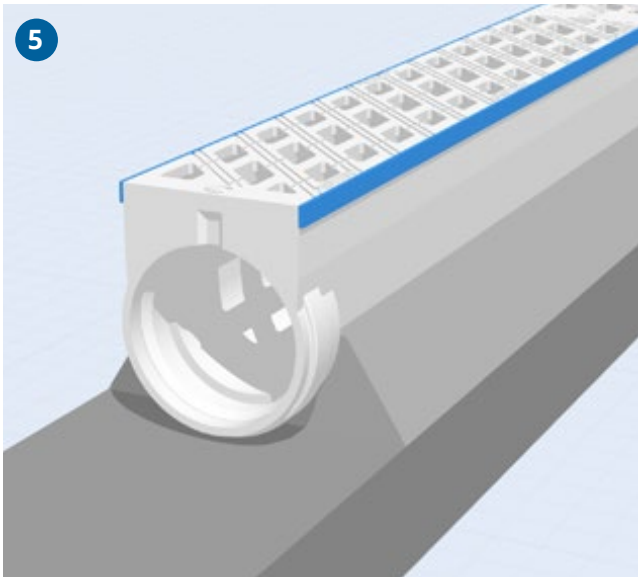


Then pull the channel elements together with the HYDRO*block* installation aid. Use a rubber mallet to bring the elements to the height of the string.

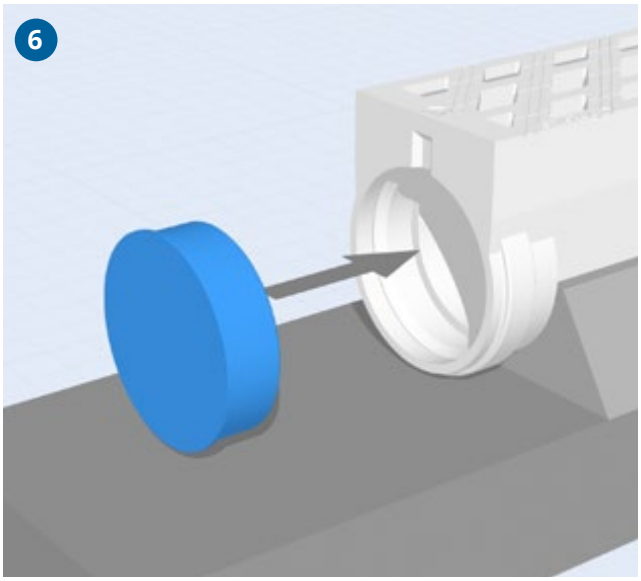


In order to avoid movement of the drainage channel when paving, it is recommended to bolt them into the foundation with concrete screw anchors or to secure them with a concrete mounting support on the sides.

SYSTEM HYDRO*block*
INSTALLATION INSTRUCTION

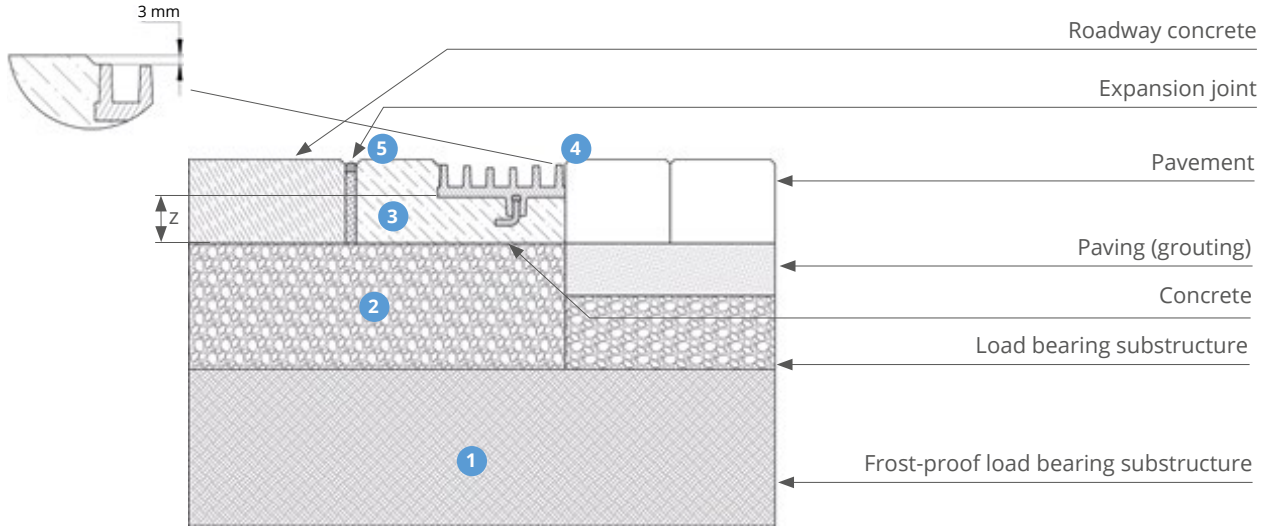


Apply a sealing tape according to ZTV Fug - Stb 15 to the long sides of the HYDROblock elements. It compensates transverse expansion.



Place the matching end pieces at the ends of the drainage channel line.

SYSTEM HYDRO*line*
INSTALLATION INSTRUCTION



The top of the drainage channel must be permanently seated approx. 3 mm lower than the adjoining surface.

z (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

1

Before starting the installation works, the frost resistance and load-bearing capacity of the substructure habe to be ensured. The substructure must therefore be properly compacted (depending on the load class), in order to prevent the channel run from sagging. In general this has to be determined by the structural engineer or planner responsible for the project.

2

When installing the HYDRO*line* a load bearing substructure is required. The dimensions or thickness of the substructure is based on the statics of the respective building project as well as the required load class.

3

If the requirements of points 1 and 2 are met, the HYDRO*line* channel can be installed using a C25/30 concrete. A concrete bed with a height of at least 15 cm (C25/30) is recommended for load class C 250 (see dimension z). Concrete anchors and longitudinal ribs have to be covered carefully to ensure an ideal bond with the foundation.

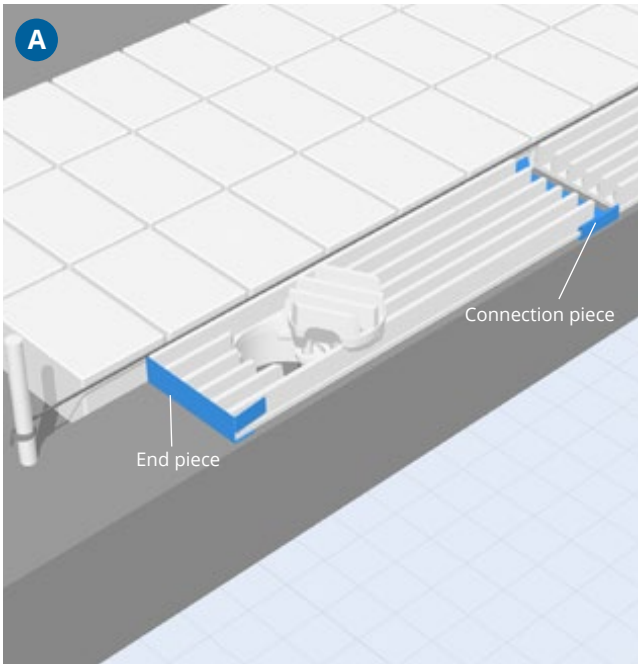
4

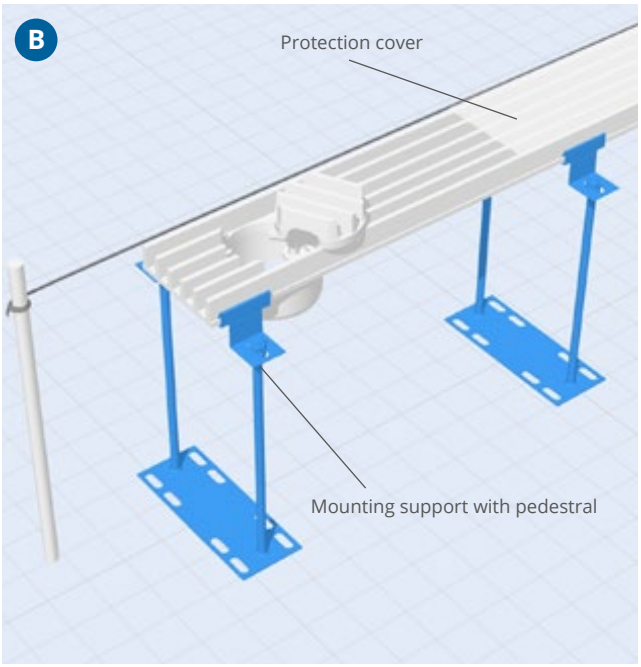
The top of the drainage channel must be permanently seated approx. 3 mm lower than the adjoining surface.

5

It is recommended to create an expansion joint approximately 20 cm from the outer edge of the drainage channel, since the concrete can expand and conctract due to temperature changes.

SYSTEM HYDRO*line*
INSTALLATION INSTRUCTION





The HYDRO*line* channel is suitable for installation into an existing recess (e.g. for renovation) or for installation into a monolithic concrete bed with the help of the mounting supports with pedestal. Depending on the required load class the existing load bearing substructure has to be checked and approved by the responsible architect / planning engineer.

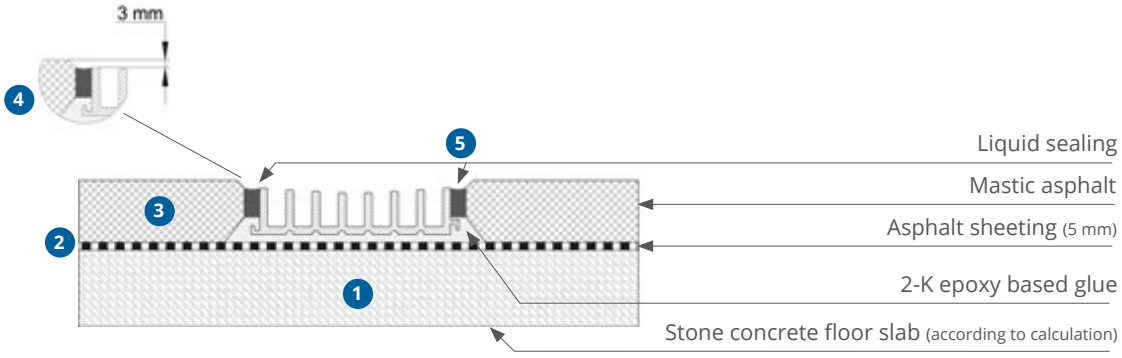
Installation Type A (existing recess)

Fill the existing recess with fresh earth-moist concrete and insert the HYDRO*line* channel with the help of a guiding cord. Furthermore end pieces have to be installed at the ends of the channel run. When installing start with the outlet element of the run. The individual elements are connected via connection pieces. The channel easily snaps into the connection element. The top of the channel has to be permanently seated approx. 3 mm lower than the adjoining surface.

Installation Type B (installation in monolithic concrete)

When installating the HYDRO*line* in monolithic concrete we recommend to use the mounting supports with pedestal by HYDROTEC. Those allow a precise installation at the desired height with the ideal process flow. The mounting supports are to be placed at the joints of two individual HYDRO*line* elements. Here it is also recommended to install end pieces at the ends of the run. Before pouring the concrete the channel run should be covered to avoid material from flowing into the channel. The top of the drainage channel to be permanently seated approx. 3 mm lower than the adjoining surface.

SYSTEM HYDRO*line* PRO
INSTALLATION INSTRUCTION



The top of the drainage channel must be permanently seated approx. 3 mm lower than the adjoining surface.

Concrete according to calculation of the respective load class.

1

When installing the HYDRO*line* PRO an existing concrete floor slab according to calculation is required. The dimensions or thickness of the floor slab depends on the statics of the respective building project and the required load class.

2

First an asphalt sheeting is applied onto the concrete floor slab.

3

The mastic asphalt is applied onto the asphalt sheeting. Afterwards a recess for the HYDRO*line* PRO is milled into the mastic asphalt. The channel can now be glued into the recess using a 2-K epoxy based glue.

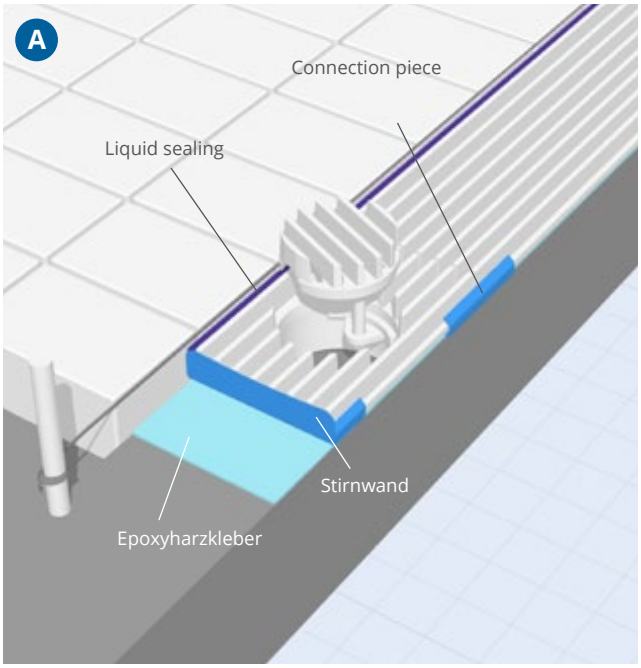
4

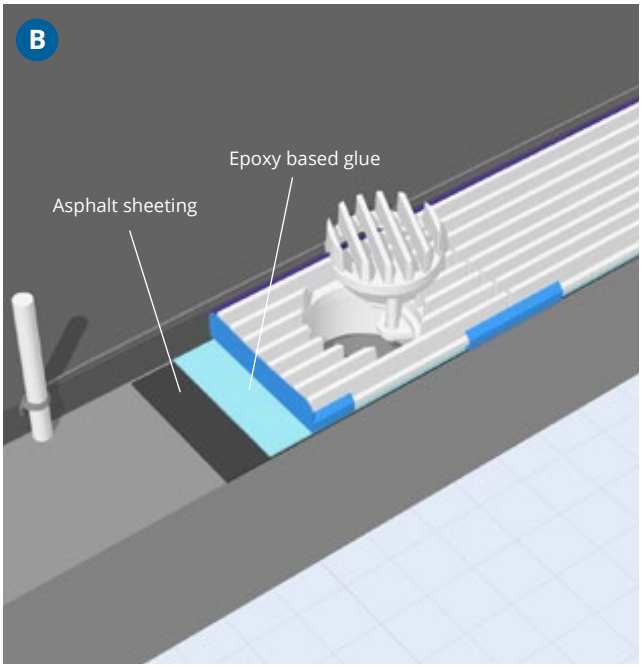
The top of the drainage channel must be permanently seated approx. 3 mm lower than the adjoining surface.

5

It is recommended to seal the channel at the outer edges with liquid sealing.

SYSTEM HYDRO*line* PRO
INSTALLATION INSTRUCTION





The HYDRO*line* PRO channel is designed for the installation in an existing recess for new construction projects (e.g. in mastic asphalt) as well as renovation projects. Depending on the required load class the load bearing substructure (e.g. a floor slab) has to be approved by the responsible architect / planning engineer.

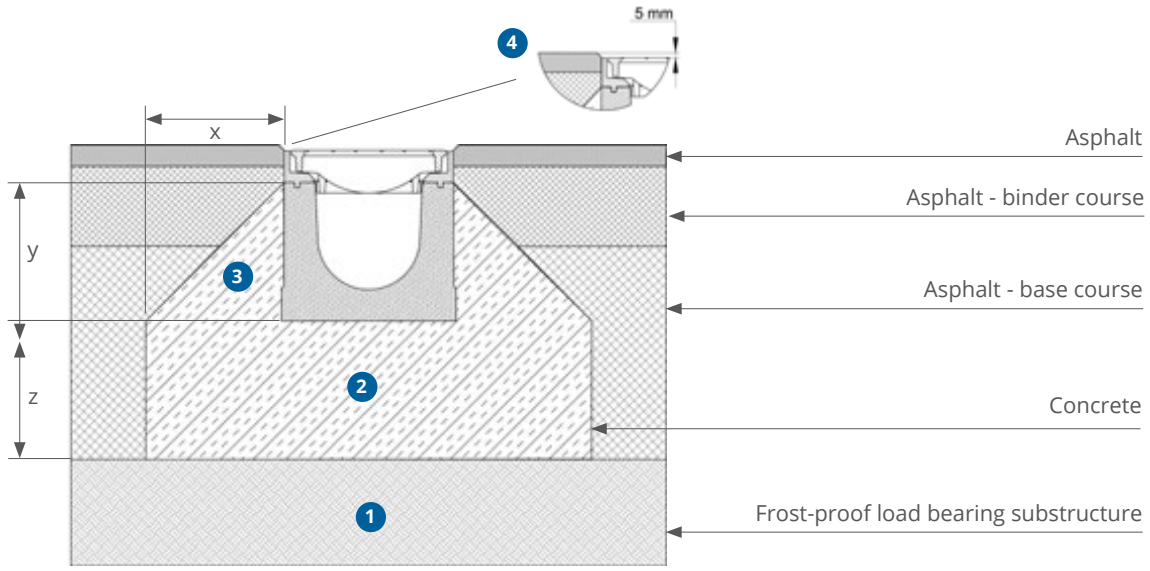
Installation Type A (existing recess)

Clean the existing recess from dirt and remove oil and grease from the channel elements to ensure proper adhesion.
Mix the 2-K-epoxy adhesive according to manufacturer's instructions and spread evenly inside the recess. Now place the first channel Element and livel it with the helf of a sprit level and/or guiding cord. Start the channel run with the outlet element. The channel run has to be permanently seated approx. 3 mm lower than the adjoining surface. The individual channel elements can be connected using connnection pieces. The HYDRO*line* PRO easily snaps into the connection pieces. Furthermore end pieces are installed at the ends of the run. It is recommended to seal the channel sides using a liquid sealant.

Installation Type B (mastic asphalt)

When installing the HYDRO*line* PRO an existing floor slab according to calculation is necessary.
On top of the floor slab a asphalt sheeting is applied. Afterwards the mastic asphalt can be applied onto the aspahlt sheeting. Nos a recess i being milles for the HYDRO*line* PRO.
Before glueing the channel into the recess remove asphalt resudie and dirt as well as oil and grease from the channel element to ensure ideal adhesion.
Mix the 2-K epoxy adhesive according to manufacturer's instructions and spread it evenly in the recess. Now place the frist channel element and level it with the help of a spirit level and/or guiding chord. Start the installation with the ourlet element. The channel run has to be permanently seated appro. 3 mm lower than the adjoining surface. the individual channel elements are connected via connection pieces. The channel easily snaps into the connection piesces. Furthermore end walls are installes at the ends of the run. It is recommended to seal the channel run using a liquid sealant.

SYSTEM MAXI
INSTALLATION INSTRUCTION ASPHALT (A 15 - F 900)



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

x y z (according to calculation)	
A 15	10 cm concrete C25/30
B 125 / C 250	15 cm concrete C25/30
D 400*	20 cm concrete C25/30
E 600* / F 900*	25 cm concrete C25/30

*Not suitable for cross drainage on high-frequenzy ranges!

1

Before starting the installation works, the frost resistance and load-bearing capacity of the substructure habe to be ensured. The substructure must therefore be properly compacted (depending on the load class), in order to prevent the channel run from sagging. In general this has to be determined by the structural engineer or planner responsible for the project.

2

When installing the TOP/MAXI System a concrete foundation according to load class (A 15 / F 900) is required. For the installation according to class A 15 it is recommended to install the channel on a 10 cm thick concrrete bed. For the classes B 125 and C 250 a concrete foundation with a thickness of 15 cm for the class D 400 20 cm and for the classes E 600 and F900 25 cm is recommended.

3

When the channel body is placed on the concrete foundation, it then has to be protected from horizontal loads. Therefore a concrete encasement up to the edge protector is recommended, which can then be sloped 45° downwards (see dimensions x and y).

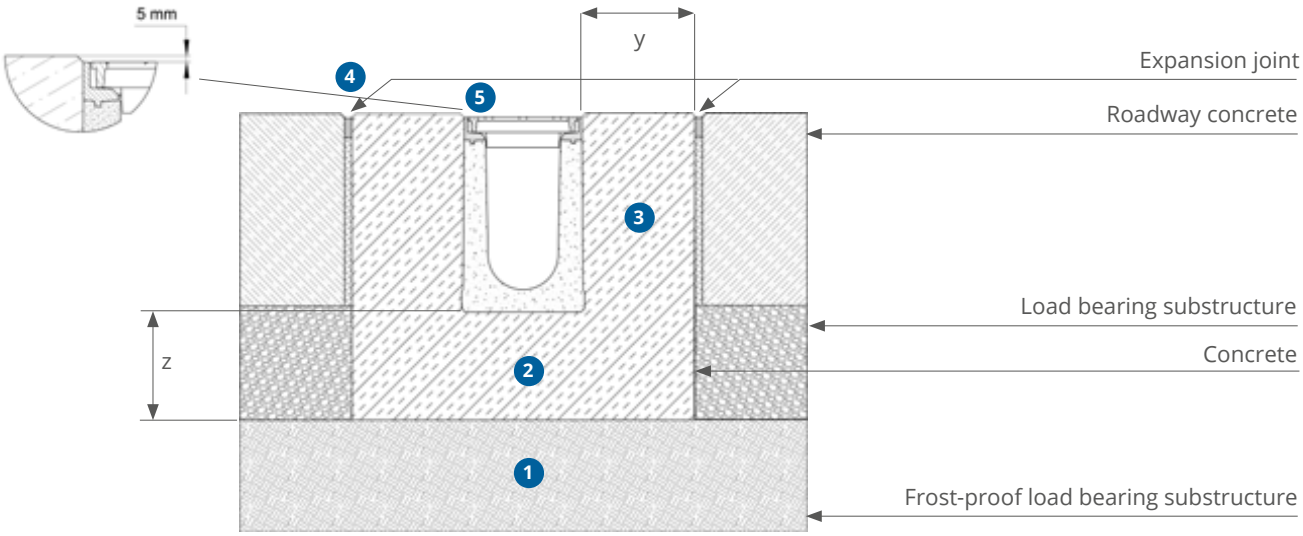
4

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

5

The adjoining surface (asphalt) has to be installed in such a way that no horizontal forced affect the channel sides.

SYSTEM MAXI
INSTALLATION INSTRUCTION ROADWAY CONCRETE (D 400 - F 900)



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

y z (according to calculation)	
D 400* E 600* / F 900*	20 cm concrete C25/30 25 cm concrete C25/30

*Not suitable for cross drainage on high-frequenzy ranges!

1

Before starting the installation works, the frost resistance and load-bearing capacity of the substructure habe to be ensured. The substructure must therefore be properly compacted (depending on the load class), in order to prevent the channel run from sagging. In general this has to be determined by the structural engineer or planner responsible for the project.

2

When installing the TOP/MAXI System a concrete foundation according to load class (A 15 / F 900) is required. For the installation according to class A 15 it is recommended to install the channel on a 10 cm thick concrrete bed. For the classes B 125 and C 250 a concrete foundation with a thickness of 15 cm for the class D 400 20 cm and for the classes E 600 and F900 25 cm is recommended.

3

When the channel body is placed on the concrete foundation, it then has to be protected from horizontal loads. When installing the MAXI in an area with roadway concrete therefore a concrete encasement is installed up to the top of the channel body.

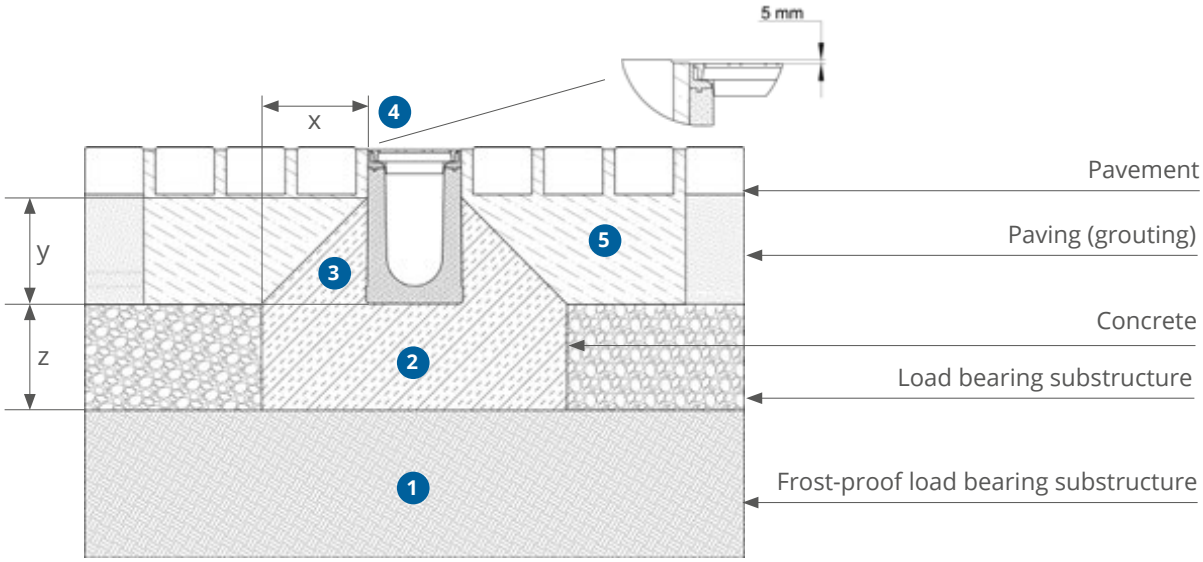
4

It is recommended to create an expansion joint approx. 20 - 25 cm (dependant on the load class) from the outer edge of the channel body, as the concrete expands and contracts due to temperature differences. The thickness of the expansion joint depends on the site conditions.

5

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

SYSTEM MAXI
INSTALLATION INSTRUCTION PAVEMENT (D 400 - F 900)



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

The paving must be installed in such a way that dynamic shearing forces do not affect the channel sides. This is achieved by a force-fit bond between paving and concrete encasement.

x y z (according to calculation)

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

*Not suitable for cross drainage on high frequenzy ranges!

1

Before starting the installation works, the frost resistance and load-bearing capacity of the substructure habe to be ensured. The substructure must therefore be properly compacted (depending on the load class), in order to prevent the channel run from sagging. In general this has to be determined by the structural engineer or planner responsible for the project.

2

When installing the MAXI System a concrete foundation according to load class (D400 - F900) is required. For installation according to class D400 it is recommended to install the channel body on a 20 cm thick concrete bed (C25/30). Systems of class E600 - F900 require at least a height of 25 cm. In very high stressed installation areas (E600 / F900) concrete reinforcement is recommended.

3

When the channel body is placed on the concrete foundation, it then has to be protected from horizontal loads. Therefore a concrete encasement up to the edge protector is recommended, which can then be sloped 45° downwards (see dimensions x and y). In very high stressed installation areas (E600 / F900) concrete reinforcement is recommended.

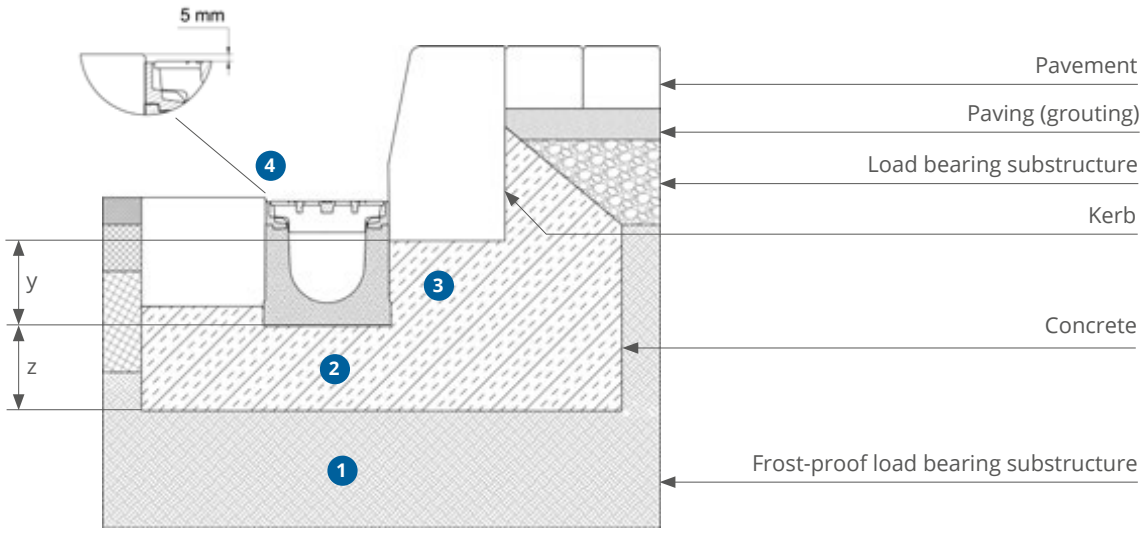
4

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

5

From class C250 the pavement has to be installed in such a way that horizontal forces do not affect the channel sides. Therefore for example the first three paving stones can be placed in fresh concrete and afterwards grouted with grouting mortar.

SYSTEM TOP / MAXI
INSTALLATION INSTRUCTION ASPHALT/STRETCHER/KERB (A 15 - C 250)



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

z y (according to calculation)	
A 15	10 cm concrete C25/30
B 125 / C 250	15 cm concrete C25/30

1

Vor Beginn der Einbauarbeiten müssen die Frostsicherheit und die Tragfähigkeit des Unterbaus gewährleistet sein. Der Unterbau muss demnach ordnungsgemäß (je nach Belastungsklasse) verdichtet werden, um so ein „Absinken" des Rinnenstranges auszuschließen. In der Regel wird dies vom projektverantwortlichen Statiker bzw. Planer bestimmt.

2

When installing the MAXI System a concrete foundation according to load class (A 15 - C 250) is required. For installation according to class A15 it is recommended to install the channel body on a 10 cm thick concrete bed (C25/30). Systems of class B 125 - C 250 require at least a height of 15 cm.

3

When the channel body is placed on the concrete foundation, it then has to be protected from horizontal loads. Therefore a concrete encasement up to the edge protector is recommended, which can then be sloped 45° downwards.

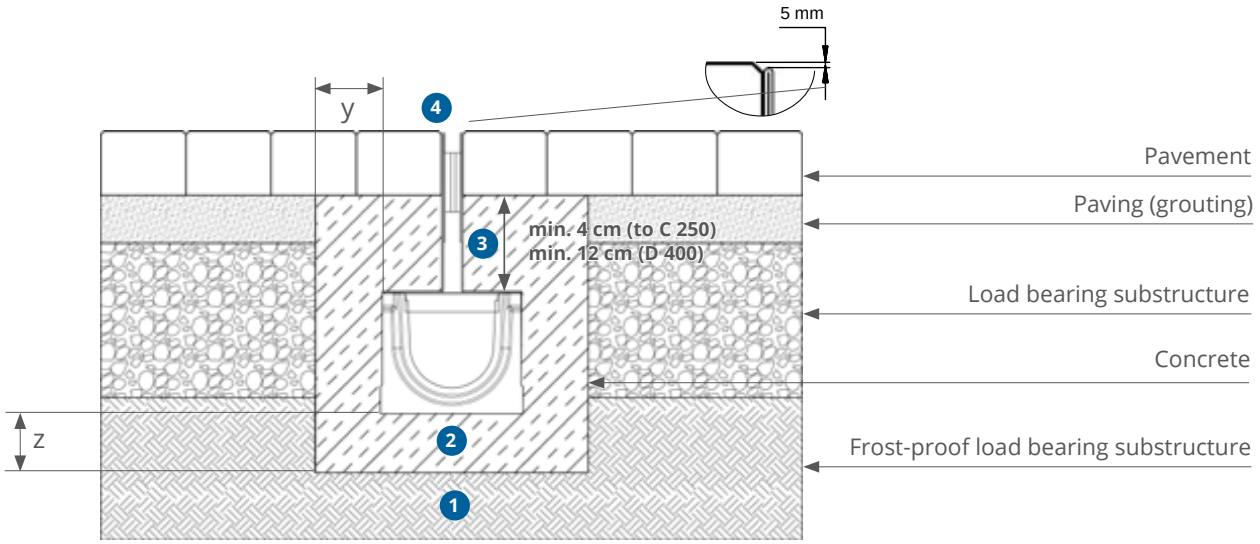
4

The adjoining surface has to be installed in such a way that horizontal forces can not affect the channel sides.

5

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

SYSTEM SLOT CHANNEL CENTRIC
INSTALLATION INSTRUCTION PAVEMENT (C 250 - D 400)



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

The paving must be installed in such a way that dynamic shearing forces do not affect the channel sides. This is achieved by a force-fit bond between paving and concrete encasement.

z (according to calculation)	
A 15	10 cm concrete C25/30
B 125 / C 250	15 cm concrete C25/30
D 400	20 cm concrete C25/30

1

Before starting the installation works, the frost resistance and load-bearing capacity of the substructure habe to be ensured. The substructure must therefore be properly compacted (depending on the load class), in order to prevent the channel run from sagging. In general this has to be determined by the structural engineer or planner responsible for the project.

2

When installing the slot channel systen a concrete foundation according to load class (A15 - C250) is required. For installation according to class A15 it is recommended to install the channel body on a 10 cm thick concrete bed (C25/30). Systems of class B125 - C250 require at least a height of 15 cm.

3

When the channel body is placed on the concrete foundation and the slot channel element is mounted on top, it then has to be protected from horinzontal loads. Therefore a concrete encasement of at least 4 cm thickness from the top of the channel body is recommended.

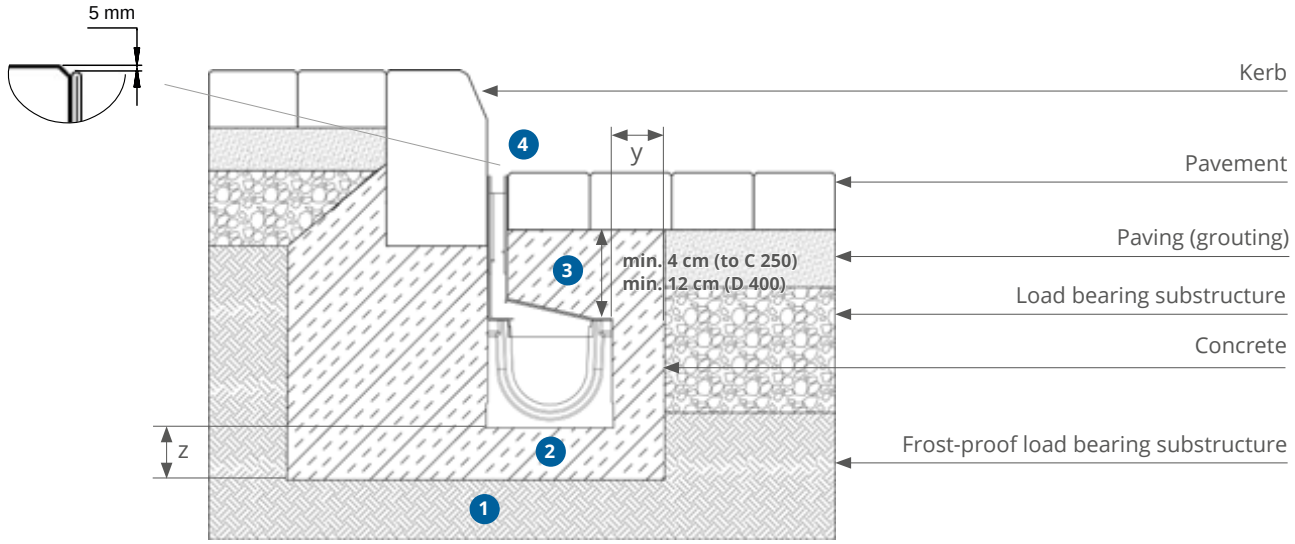
4

The top of the slot channel element must be permanently seated approx. 5 mm lower than the adjoining surface.

5

The adjoining surface has to be installed in such a way that horizontal forces can not affect the channel sides.

SYSTEM SLOT CHANNEL ECCENTRIC
INSTALLATION INSTRUCTION PAVEMENT (C 250 - D 400)



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

The paving must be installed in such a way that dynamic shearing forces do not affect the channel sides. This is achieved by a force-fit bond between paving and concrete encasement.

y z (according to calculation)	
A 15 B 125 / C 250 D 400	10 cm concrete C25/30 15 cm concrete C25/30 20 cm concrete C25/30

1

Before starting the installation works, the frost resistance and load-bearing capacity of the substructure habe to be ensured. The substructure must therefore be properly compacted (depending on the load class), in order to prevent the channel run from sagging. In general this has to be determined by the structural engineer or planner responsible for the project.

2

When installing the slot channel systen a concrete foundation according to load class (A 15 - C 250) is required. For installation according to class A15 it is recommended to install the channel body on a 10 cm thick concrete bed (C25/30). Systems of class B 125 - C 250 require at least a height of 15 cm.

3

When the channel body is placed on the concrete foundation and the slot channel element is mounted on top, it then has to be protected from horinzontal loads. Therefore a concrete encasement of at least 4 cm thickness from the top of the channel body is recommended.

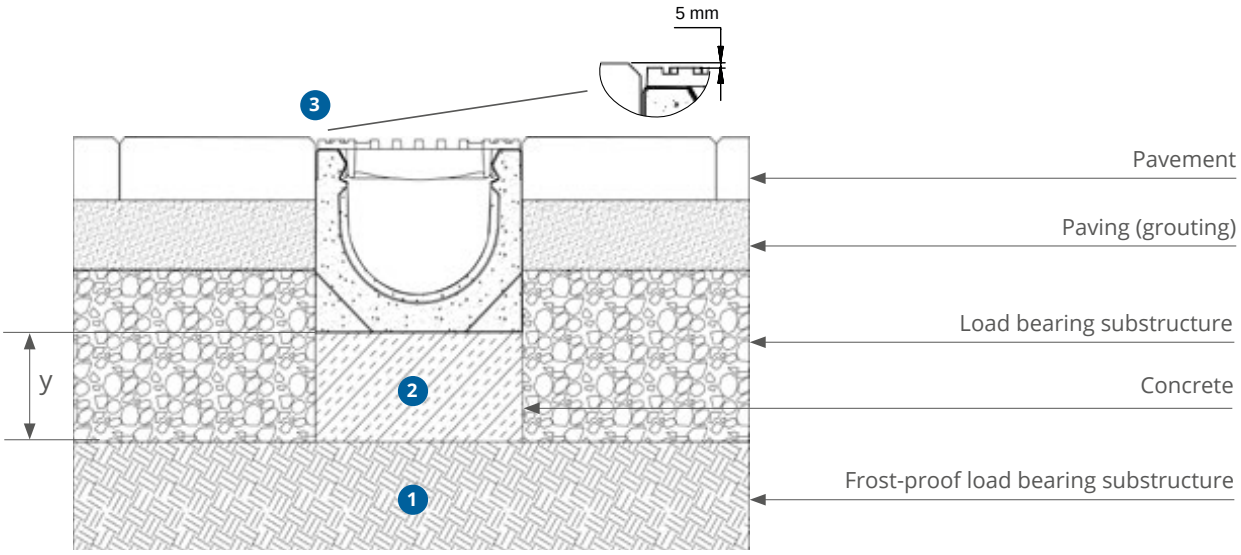
4

The top of the slot channel element must be permanently seated approx. 5 mm lower than the adjoining surface.

5

The adjoining surface has to be installed in such a way that horizontal forces can not affect the channel sides.

SYSTEM MINI
INSTALLATION INSTRUCTION PAVEMENT (A 15 - C 250)



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

The paving must be installed in such a way that dynamic shearing forces do not affect the channel sides. This is achieved by a force-fit bond between paving and concrete encasement.

y (according to calculation)	
A 15 B 125 / C 250	10 cm concrete C25/30 15 cm concrete C25/30

1

Before starting the installation works, the frost resistance and load-bearing capacity of the substructure habe to be ensured. The substructure must therefore be properly compacted (depending on the load class), in order to prevent the channel run from sagging. In general this has to be determined by the structural engineer or planner responsible for the project.

2

When installing the MINI system a concrete foundation according to load class (A 15 - C 250) is required. For installation according to class A15 it is recommended to install the channel body on a 10 cm thick concrete bed (C25/30). Systems of class B 125 - C250 require at least a height of 15 cm.

3

The top of the slot channel element must be permanently seated approx. 5 mm lower than the adjoining surface.

4

The stretchers on the sides of the channel body are to be laid in fresh concrete for class C250 and afterwarts grouted e.g. with grounting mortar.

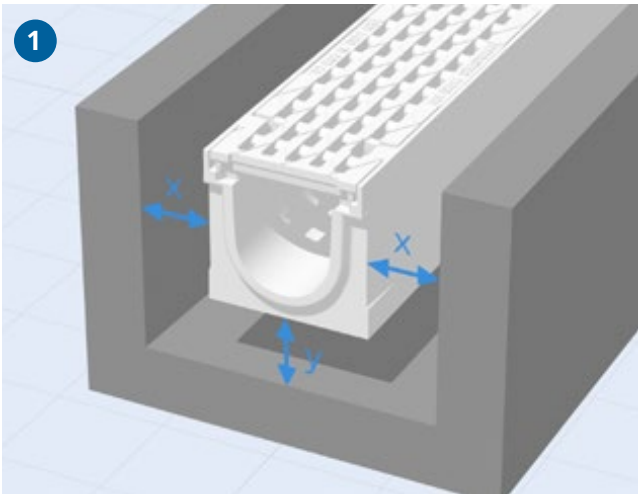
INSTALLATION INSTRUCTION
CONCRETE DRAINAGE CHANNELS

1)
Prior to installation the required load class according to DIN EN 1433 has to be defined.

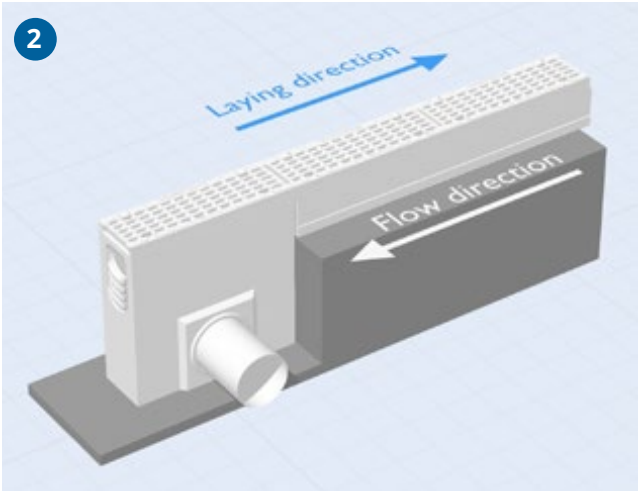
Dig a trench of appropriate height and depth. The thickness of the concrete encasement varies depending on installation situation and load class.

The width of the trench results from the channel body width + 2x Concrete encasement thickness (dimension x). the depth should be equal to height of the drainage channel plus thickness of the concrete foundation plus 5 mm.

The dimensions can be found in the individual installation instructions from page 29 following.

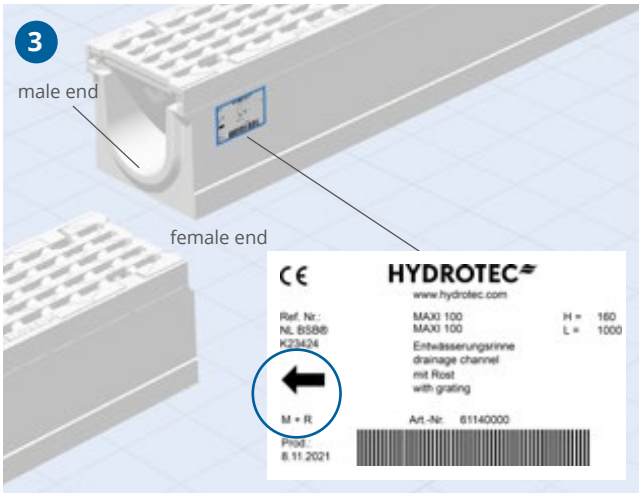


2)
Prior to installing the channel elements the required thickness of the concrete bed has to be ensured (e.g. C250 = min. 15 cm). The channel elementsare laid on earth moist concrete. The grates can be removed. The installation starts with the outlet element and follows against the flow direction. Catch basins are installed correspondingly similar to the channel elements.



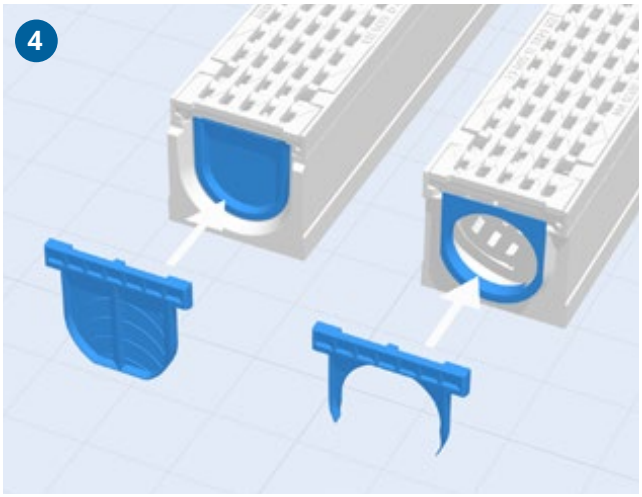
3)
The channel elements are marked with arrows indicating the flow direction (from female to male end). Connect the individual channel elements with the help of female and male end. Sloped channel elements are additionally marked with a numbering to lay out the run in chronilogical order. The numbering starts with the highest number and descends against flow direction. The marking „M +R“ on the label stand for the necessity of a concrete encasement (M) and highest freeze-thaw resistance (+R)

During installation, special care must be taken to ensure that the top edge of the drainage channel is permanently 3-5 mm lower than the adjoining surface.



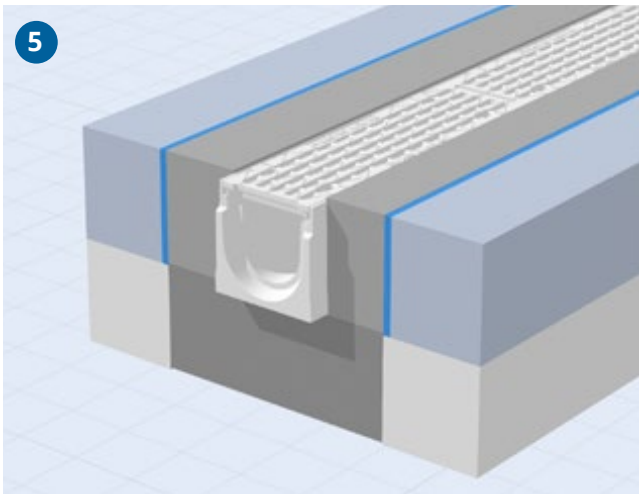
INSTALLATION INSTRUCTION
CONCRETE DRAINAGE CHANNELS

4)
After the channel run is layed out, end pieces are installed on both ends of the run. If the ground pipe is to be connected using an end wall the appropirate end piece has to be used.



5)
Now the channel run can be encased accoring to installation instructions. Therefore the grates are inserted into the channel body ro ensure a minimum stability against horizontal loads. When installing the channel into a roadway concrete expansion joints have to be created. The arrangement of expansion joints is to be determined by the responible planning engineer. Existing expansio joints are continued through the channel run.

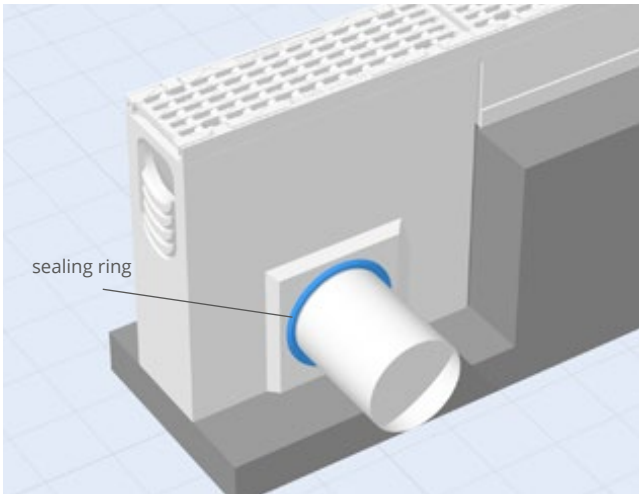
For specific information about the arrangement of expansion joints see page 46.

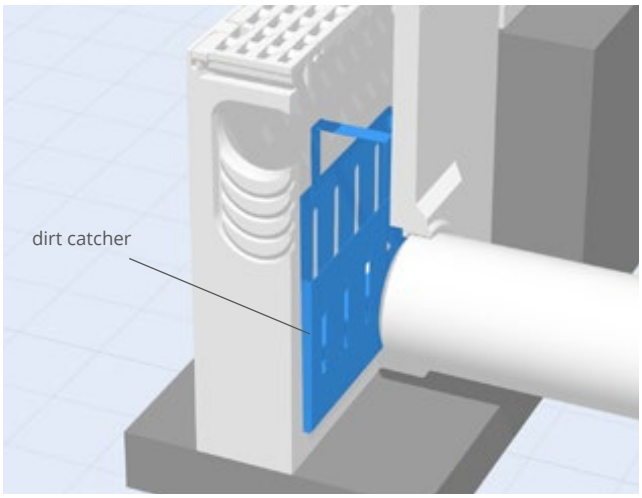


FEED BOX

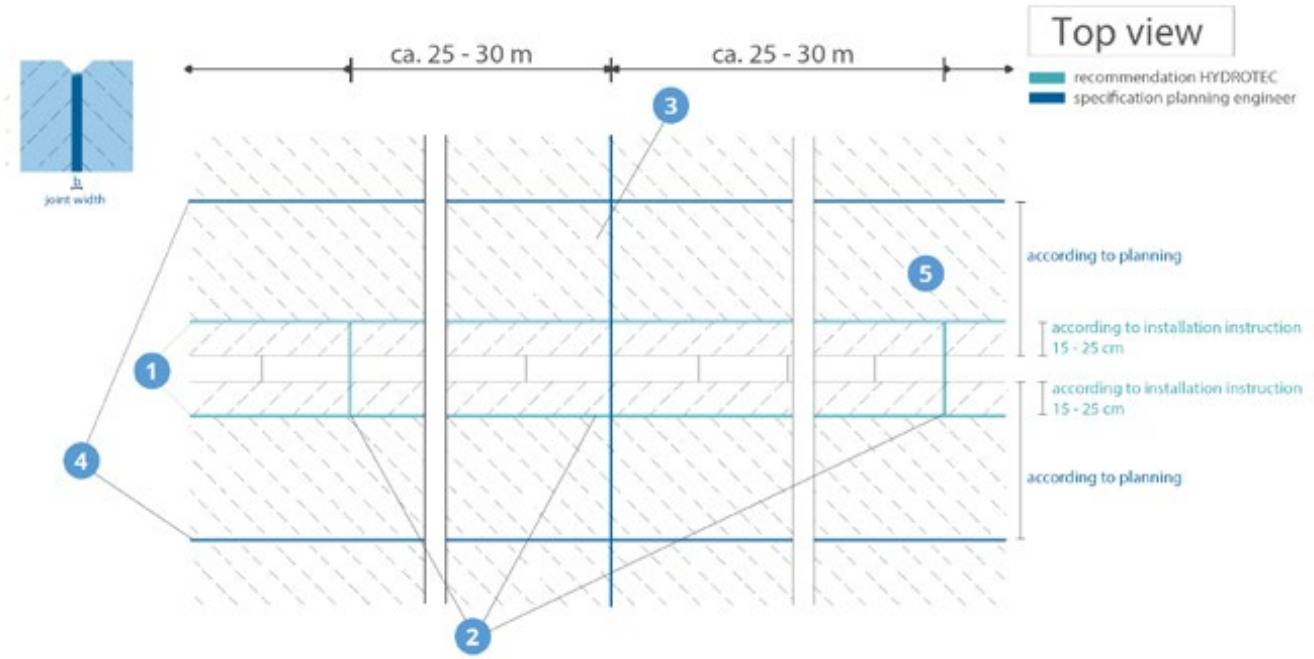
A feed box is installed in the channel run to protect the ground pipe from dirt contamination (e.g. sand or leaves). The feed box contains a removable dirt catcher that is collecting particles. During the regular cleaning the grate is removed, the dirt catcher extracted and cleaned. At the bottom of the catch basin the ground pipe can be connected horizontally into a rubber socket sealing.

Tip: Chamfer the end of the sewer base pipe, for example with an with an angle grinder and apply a little lubricant to facilitate the insertion into the rubber socket seal.





ARRANGEMENT OF EXPANSION JOINTS



If there are no guidelines available from the responsible planning engineer or architect we recommend the arrangement of expansion joint as shown in the drawing.

1

The arrangement of expansion joints is dependant on the channel type used in the respective construction project. We recommend to place the expansion joint in line with the outer edge of the concrete encasement.

2

Expansion joints are in general placed perpendicular to the channel run within the concrete encasment. Therefore we recommend a distance of approx. 25 - 30 m inbetween. The joint width is to be determined by the responsible planning engineer. In general guidelines of the planning engineer have to be followed.

3

For the arrangement of expansion joints within the roadway concrete only the guidelines of the responsible planning engineer or architect are to be followed.

4

Furthermore additional expansion joints have to be placed parallel to the channel run. Therefore the specifications for parallel to the channel run placed expansion joints have to be requested from the versponsible planning engineer. Expansion joints must not be placed between channel element and adjoining concrete encasement.

5

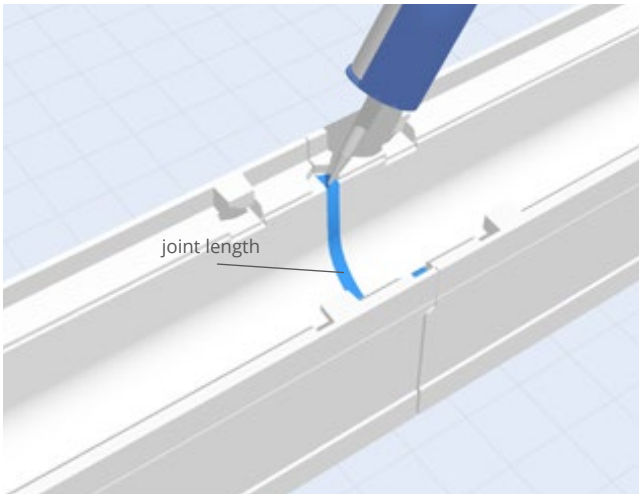
Roadway concrete

JOINT SEALING

To seal the HYDROTEC drainage channel systems we recommend using a joint sealant. For example the following products are needed:

e.g. Sika Primer 3 (bonding emulsion)
(1 liter/container) corresponds to approx. 100 joints MAXI 100
e.g. Sikaflex PRO3 WF (sealant)
(310 ml/container) correspons to aprrox. 10 joints MAXI 100

Prior to sealing the joints the surfaces (at female and male end) have to be cleaned properly. The adhesion surfaces have to be free from durst and loose particle. Then the bonding emulsion (Sika Primer 3) is applied to create the basis for applying the sealant (Sikaflex PRO3 WF).
The table below helps to determine the joint sealant requirements. Notice that 100 ml sealant can seal approx. 100 cm joint length.



Joint length

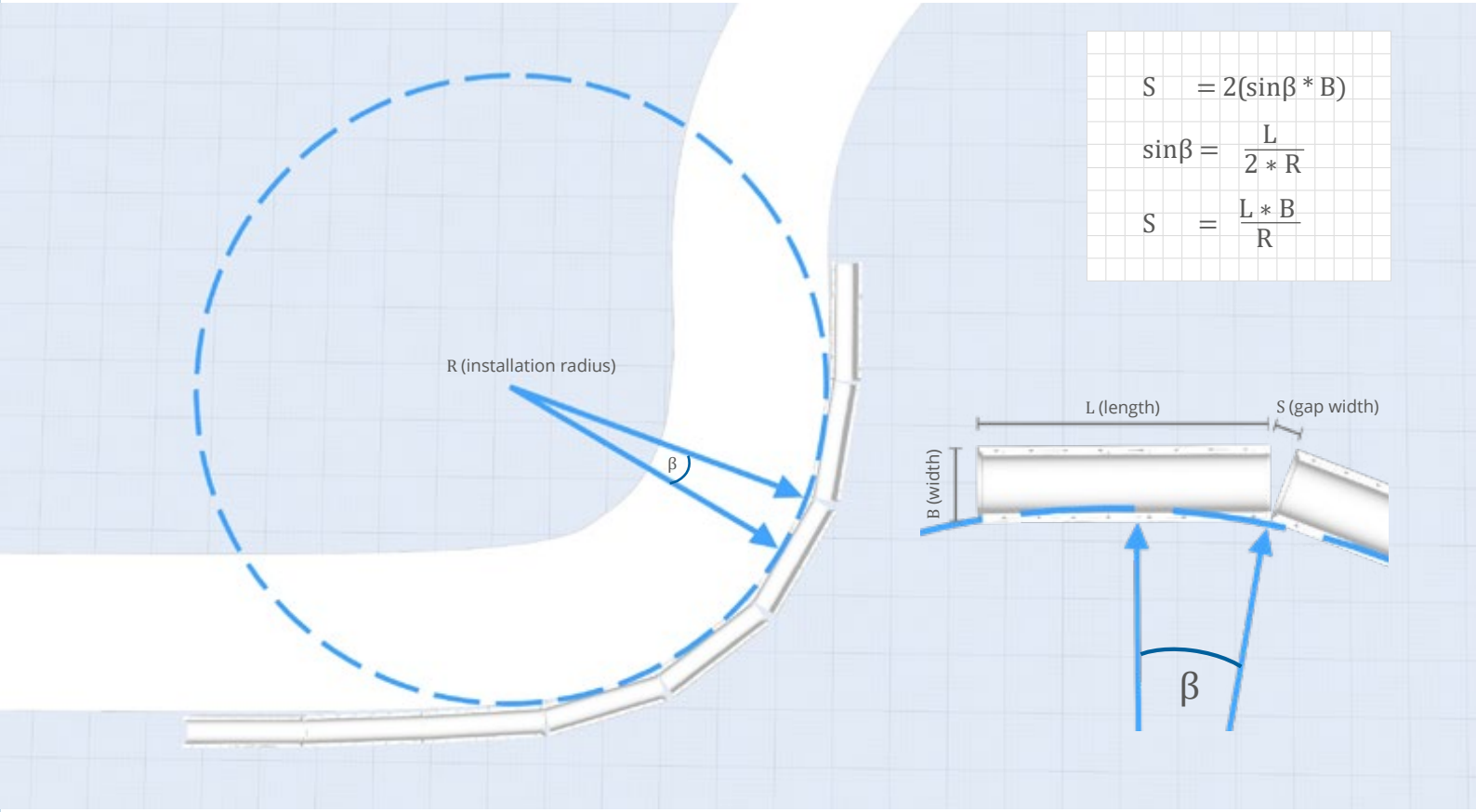
MAXI/ TOP Nominal width 100 mm	MAXI / TOP Nominal width 150 mm	MAXI / TOP Nominal width 200 mm	MAXI PRO Nominal width 300 mm	MAXI PRO Nominal width 400 mm
27 cm (H 160 mm)	**40 cm** (H 210 mm)	**61 cm** (H 310 mm)	**81 cm** (H 400 mm)	**92 cm** (H 400 mm)
32 cm (H 185 mm)	**50 cm** (H 260 mm)	-	-	-
37 cm (H 210 mm)	**60 cm** (H 310 mm)	-	-	-
42 cm (H 235 mm)	-			
47 cm (H 260 mm)	-			
27 cm (H 160/165 mm)*	**40 cm** (H 210/220 mm)*	-	-	-
28 cm (H 165/170 mm)*	**42 cm** (H 220/230 mm)*	-	-	-
29 cm (H 170/175 mm)*	**44 cm** (H 230/240 mm)*	-	-	-
30 cm (H 175/180 mm)*	**46 cm** (H 240/250 mm)*	-	-	-
31 cm (H 180/185 mm)*	**48 cm** (H 250/260 mm)*	-	-	-
32 cm (H 185/190 mm)*	**50 cm** (H 260/270 mm)*	-	-	-
33 cm (H 190/195 mm)*	**52 cm** (H 270/280 mm)*	-	-	-
34 cm (H 195/200 mm)*	**54 cm** (H 280/290 mm)*	-	-	-
35 cm (H 200/205 mm)*	**56 cm** (H 290/300 mm)*	-	-	-
36 cm (H 205/210 mm)*	**58 cm** (H 300/310 mm)*	-	-	-

*Elements with slope

SERVICE / PROJECT SPECIFIC INFORMATION

No project is just like the other and that's why sometimes special solutions and therefore special parts are required. Our experts will be happy to advise you on project-specific requirements and our options, to adapt a product to them.

INSTALLATION IN A RADIUS



$$S = 2(\sin\beta * B)$$

$$\sin\beta = \frac{L}{2 * R}$$

$$S = \frac{L * B}{R}$$

Length L (mm)	500	1000	500	1000	500	1000	500	1000	500	1000
Installation radius 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**		
	Nominal width 100 mm		Nominal width 150 mm		Nominal width 200 mm		Nominal width 300 mm		Nominal width 400 mm	

Max gap width exceeded Max. permitted Optimum

PROJECT SPECIFIC PROCESSING

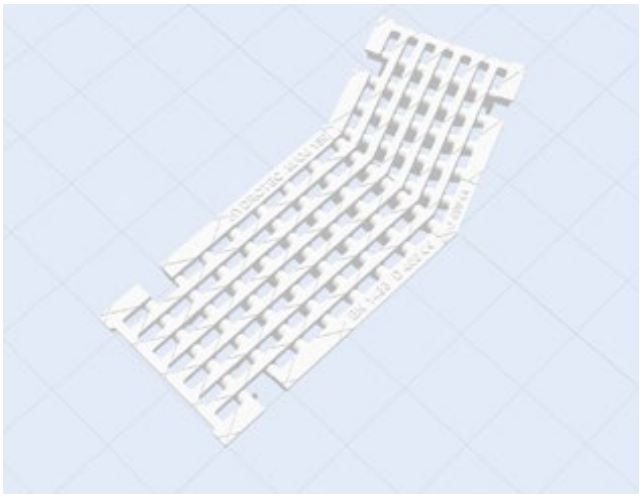
With our cut-service the channel elements can be adapted to the requirements with rectengular cuts, slope cuts or mitre cuts.

We gladly assist you determining the required data such as angles etc. That way the channel elements can be installed easier and faster.

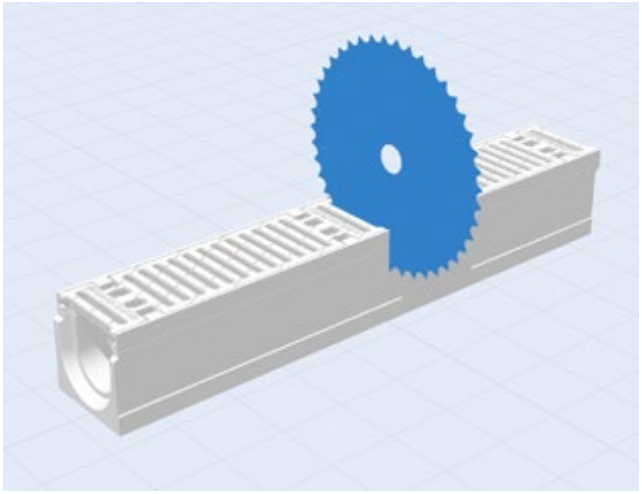
You as customer benefit from the possibility of working efficient and cost effective.

We support you with hydraulic claculations so you can determine as fast as possible which one is the right drainage system for you.

We offer additional help with the positioning of drainage systems and together create layout plans to reach the optimal drainage.



Miter cut welded



Separation cut channel element incl. grate cover

HYDRAULIC DATA
OUTFLOW CAPACITY DRAINAGE CHANNELS

Channel type	Nominal width b (mm)	Height H (mm)	Clear height h (mm)	Outflow cross section A (cm²)	Reduction factor µ	max. outflow capacity liter/s
MINI class A	100	120	80	69	0,8	**2,19**
MINI class B	100	120	60	49	0,8	**1,34**
MINI class C	100	120	75	62	0,8	**1,90**
TOP/ MAXI	100	160	90	79	0,8	**2,66**
	100	185	115	104	0,8	**3,95**
	100	210	140	129	0,8	**5,41**
	100	235	165	154	0,8	**7,01**
	100	260	190	183	0,8	**8,94**
TOP/MAXI	150	210	115	181	0,8	**6,88**
	150	235	140	186	0,8	**7,80**
	150	260	165	223	0,8	**10,15**
	150	310	215	298	0,8	**15,48**
TOP/MAXI	200	310	205	367	0,8	**18,62**
MAXI F1	300	400	300	802	0,8	**49,22**
	400	400	335	1242	0,8	**80,55**
HYDRO*block*	100	100	100	78	0,9	**3,11**
	150	150	188	176	0,9	**9,62**
	200	200	200	313	0,9	**17,65**
	300	300	300	700	0,9	**48,33**

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