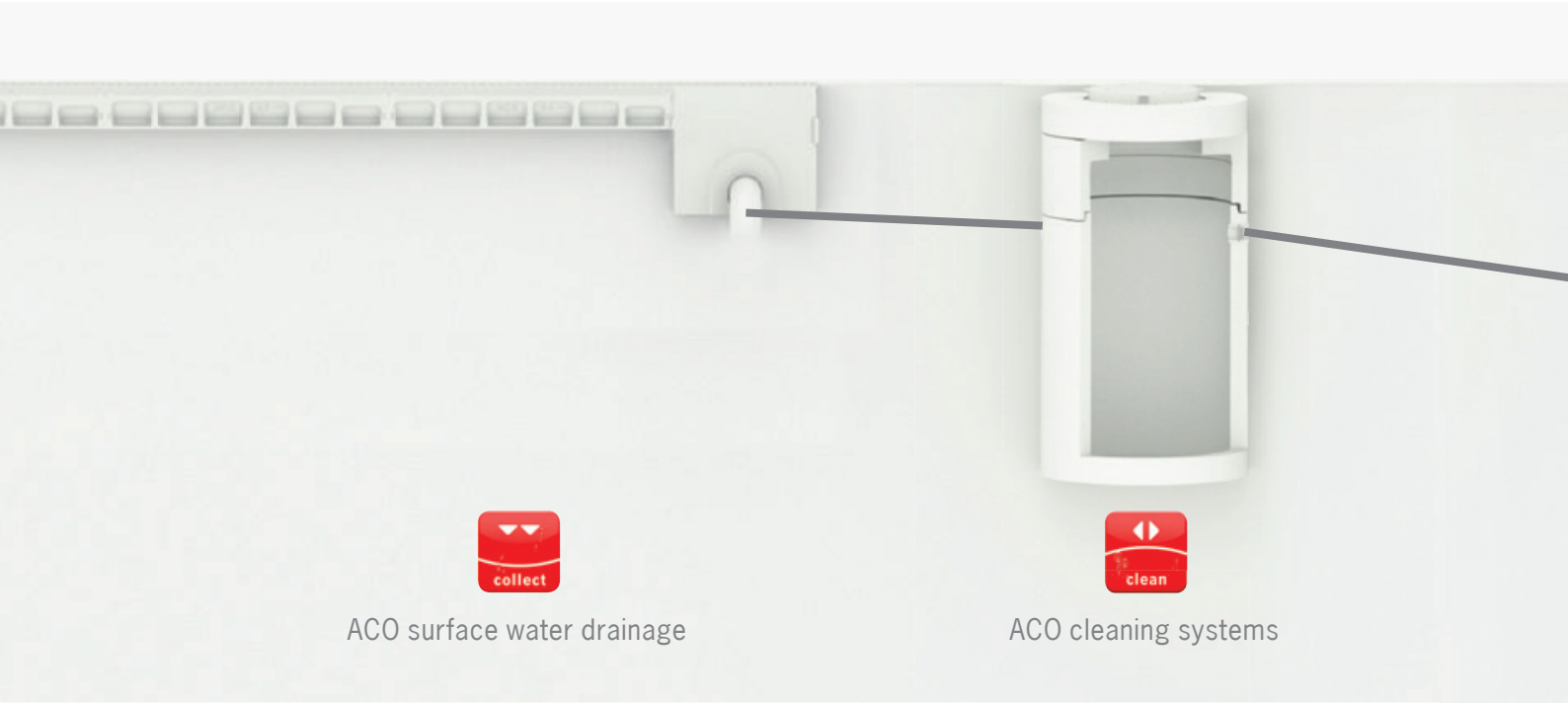
How to reduce surface runoff to a natural level?



ACO surface water drainage

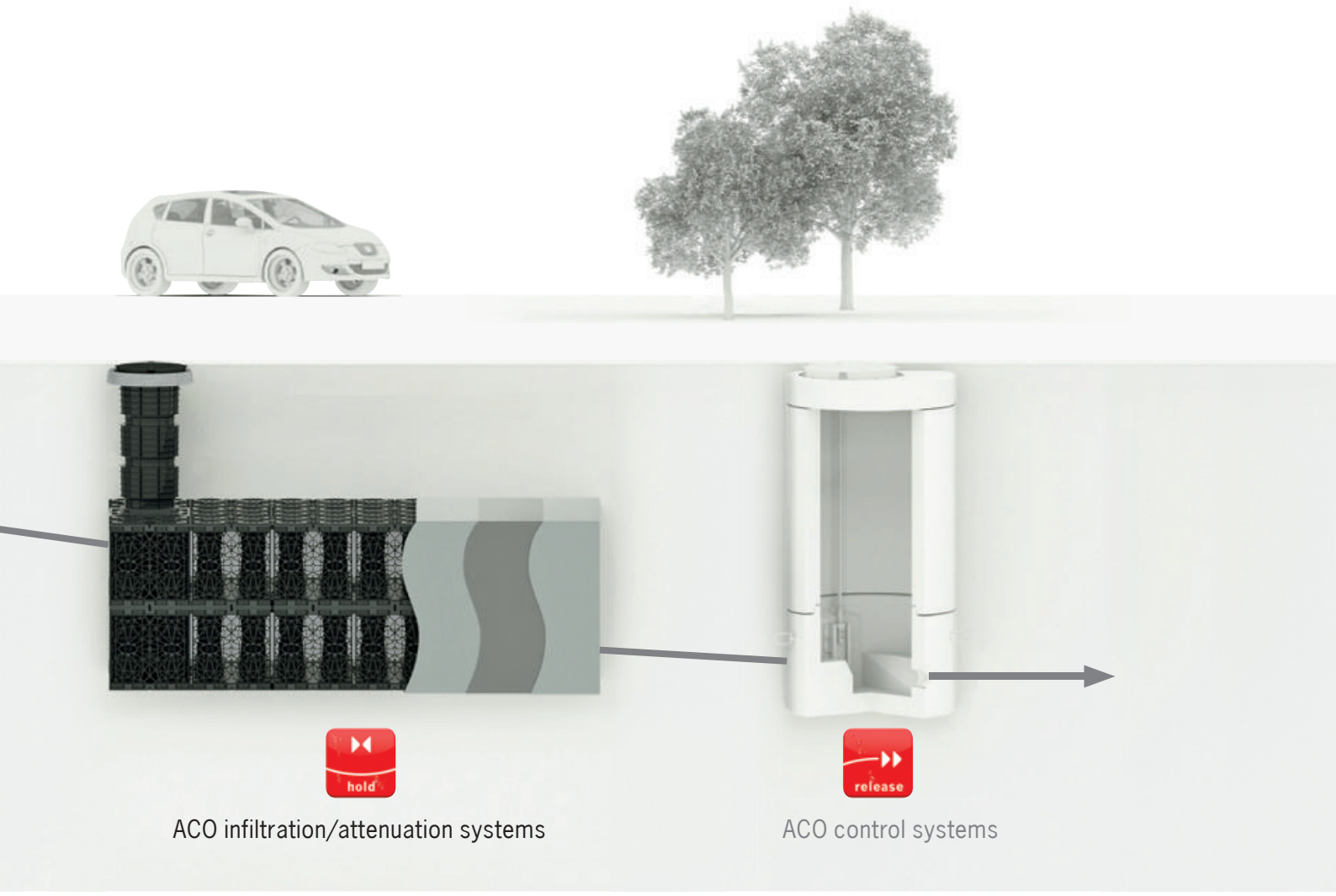
ACO cleaning systems

ACO infiltration/attenuation systems

Groundwater recharge and the retention and controlled discharge of stormwater into the receiving water are two central topics of surface water management.
Classically, retention basins or storage channels are used here. The ACO Stormbrixx block infiltration drain system provides an additional innovative and optimal solution:
In infiltration the previously collected and treated surface water is collected in the ACO Stormbrixx infiltration drain system. From there it is gradually discharged into the in situ soil and promotes groundwater recharge.
Encased in a waterproofing sheet (geomembrane), a type of tank is formed, in which the previously collected and cleaned surface water is collected, and is then discharged into the receiving water in a controlled way and with a time delay.
The controlled discharge of surface water into sewers or the receiving water is becoming increasingly important, especially in case of heavy rainfall events. In this way, the peak runoff of the surface water of a storm is spread over a longer period and is therefore reduced.

What the ACO Stormbrixx block infiltration system provides:

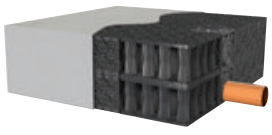
- Safe and reliably system stability through structural calculations
- Optimised logistics and easy handling
- Simple inspection and cleaning
- Hydraulic design to DWA-A 138
- ACO Stormbrixx SD has been tested by MFPA Leipzig GmbH
- ACO Stormbrixx HD is DIBt certified



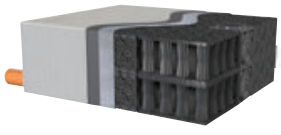
ACO infiltration/attenuation systems

ACO control systems

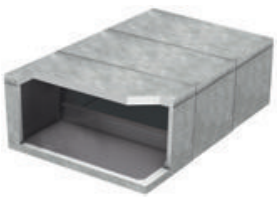
ACO Stormbrixx
Modular (SUDS) infiltration system



ACO Stormbrixx as
surface water infiltration

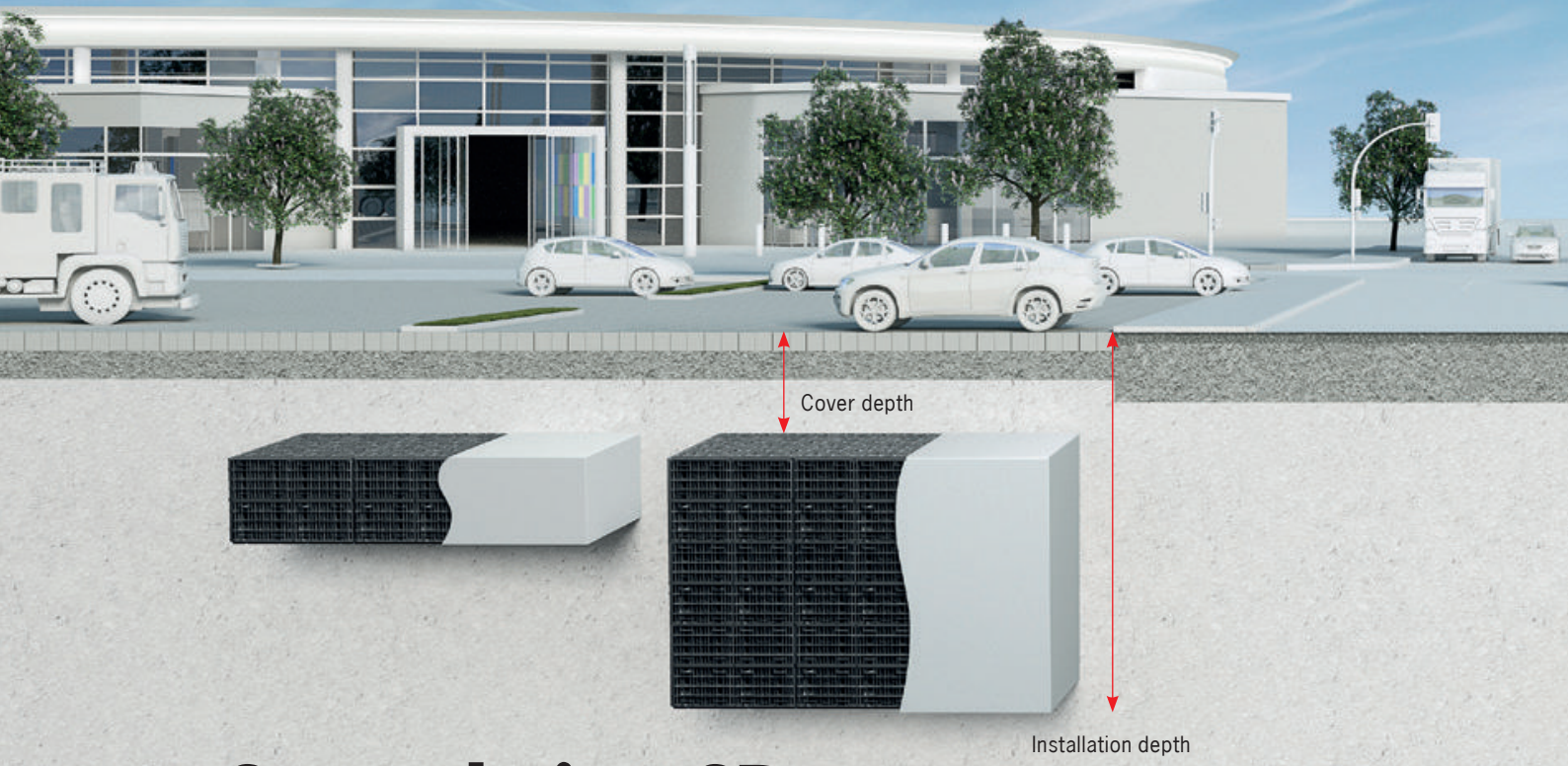


ACO Stormbrixx as
surface water retention



ACO Retention basin
made of concrete

Application overview –
Find the appropriate Stormbrixx construction



NEW Stormbrixx SD

Suitable for car traffic and emergency services

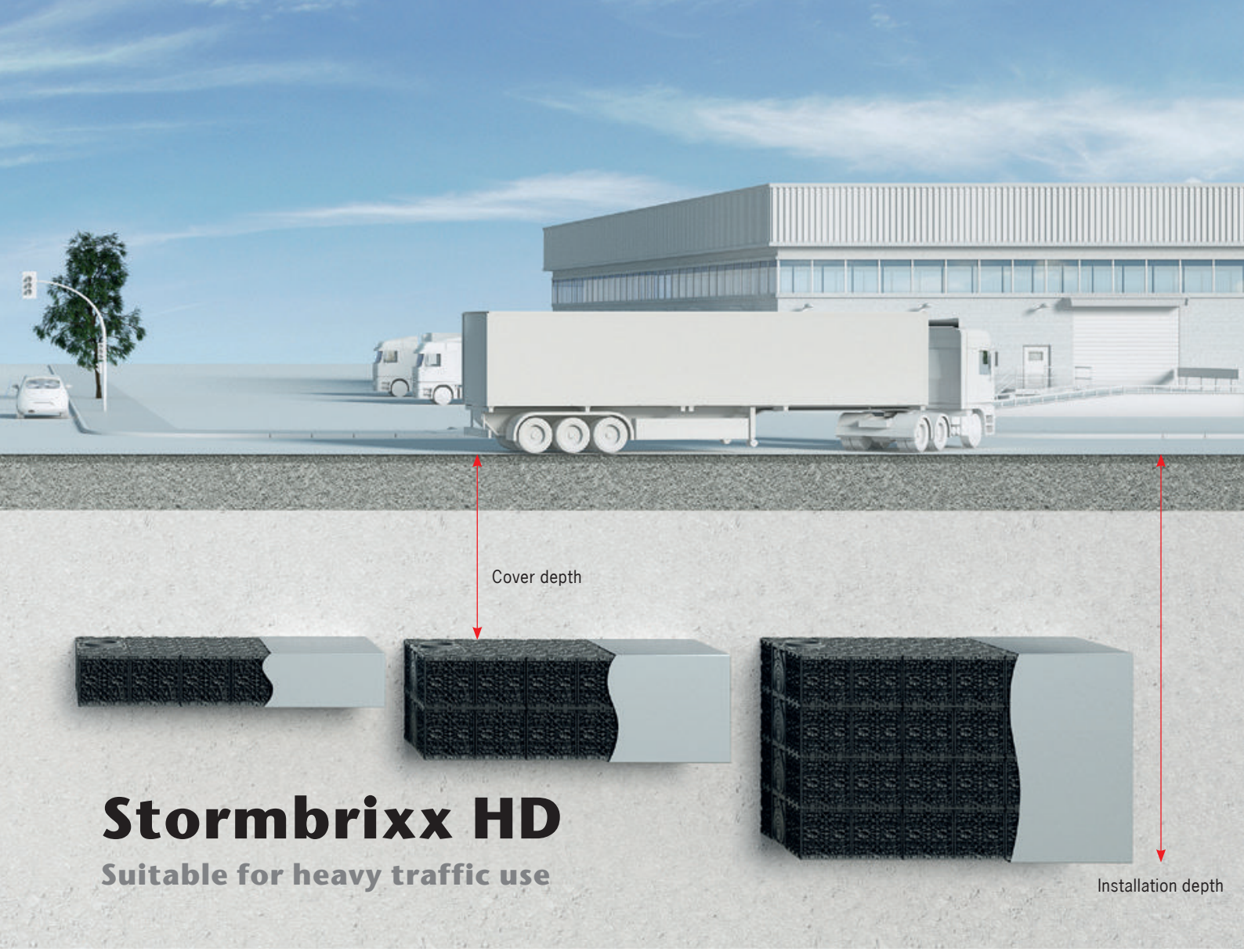
Application category
frost-free installation depth,
at least 80 cm deep (DIN 1054),
without groundwater influence:

- Landscaped areas, no vehicles
- Landscaped areas, driven by mowers
- Pedestrian areas, protected by obstacles (bord, bollards) from driving
- Driveways to carparks, crossing of emergency vehicles possible
- Carparks, crossing of emergency vehicles possible
- Access roads for residential property with scheduled crossings by special vehicles (refuse or tank vehicles) as well as operating service vehicles

Layers	Walkable			Trafficable		
	Cover depth		Installation depth	Cover depth		Installation depth
	minimal [mm]	maximal [mm]	maximal [mm]	minimal [mm]	maximal [mm]	maximal [mm]
1	800	2000	2914	800*	2000	2914
2	800	2000	3828	800*	2000	3828
3	Please contact ACO Application engineering in your country					

*Please consider the required road construction

Service
ACO Application engineering advises you.
Please contact them in your country.



Stormbrixx HD

Suitable for heavy traffic use

Application category
frost-free installation depth,
without groundwater influence:

- Landscaped areas, no vehicles
- Landscaped areas, driven by mowers
- pedestrian areas, protected by obstacles (bord, bollards) from driving
- driveways to carparks, crossing of emergency vehicles possible
- carparks, crossing of emergency vehicles possible
- Access roads for residential property with scheduled crossings by special vehicles (refuse or tank vehicles) as well as operating service vehicles
- Storage areas and secondary facilities of traffic routes which are not constantly used by heavy traffic (mainly stationary traffic, no traffic lane. Connection between storage areas)
- Traffic routes with heavy traffic: only in consultation with ACO Application engineering

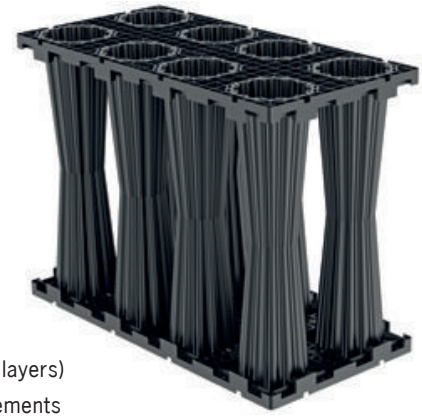
Layers	Walkable and trafficable			Trafficable with heavy traffic		
	Cover depth		Installation depth	Cover depth		Installation depth
	minimal [mm]	maximal [mm]	maximal [mm]	minimal [mm]	maximal [mm]	maximal [mm]
1	800*	3400	4010	1000	3400	4010
2	800*	3400	4620	1000	3400	4620
3	800*	3400	5230	1000	3400	5230
4	Please contact ACO Application engineering in your country					

*Please consider the required road construction

NEW ACO Stormbrixx SD

Standard duty

ACO Stormbrixx SD was tested in 2017 by the Gesellschaft für Materialforschung und Prüfungsanstalt für das Bauwesen Leipzig mbH (MFPA Leipzig).



Special features

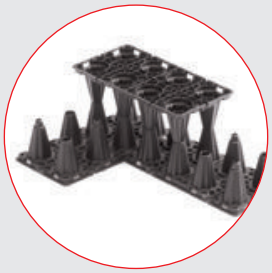
- Height of 1 layer: 914 mm
- Basic elements/m³: 3
- Volume/basic element: 319 l
- Storage coefficient: 97 %
- Min. cover depth: 0.8 m
- Max. cover depth: 2.0 m
- Tested by MFPA Leipzig (Installation up to 2 layers)

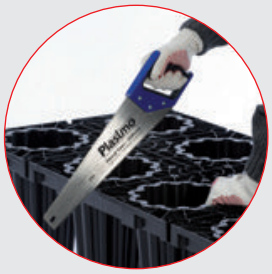
Example: 10 m³ = 10,000 l/319 = 32 basic elements

General features

FEEL SAFE WITH US 50 YEARS

Recycable polypropylene material provides a robust and corrosion-resistant basis for a long-lasting infiltration system. The basic elements form a loadable structure.





Basic elements can be cut in half to allow integration into the overall system.

Functional design combined with an intelligent snap-lock system make for problem-free handling and rapid installation.

ACO Stormbrixx HD

Heavy duty

Z-42.1-500

Deutsches Institut für Bautechnik DIBt

ACO Stormbrixx HD was awarded the general official approval Z-42.1-500 by the German Institute for Building Technology (DIBt) as an additional level of certainty.

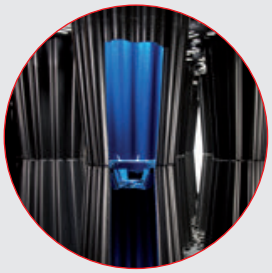
Special features

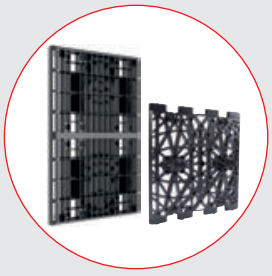
- Height of 1 layer: 610 mm
- Basic elements/m³: 4.5
- Volume/basic element: 209 l
- Storage coefficient: 95 %
- Min. cover depth: 1.0 m
- Max. cover depth: 3.40 m
- DIBt certified (Installation up to 3 layers)

Example: 10 m³ = 10,000 l/209 = 48 basic elements

Basic elements are layed and connected together in pattern in order to create structural rigidity in the overall system.

The pillars are also filled with storm water. Small openings at the base of the pillars optimise water treatment in the product.





Side panel perimeters for the entire system offer a sound base for laying the geotextile wrapper.

Thanks to the open structure of ACO Stormbrixx, inspection cameras and cleaning devices can have free passage through the system.

Practical
Stackable

Double pallet with basic ACO Stormbrixx elements

Stormbrixx benefit 1

Optimised logistics and reduced handling

Both the basic elements and the side panels, as well as the covers for the ACO Stormbrixx infiltration system stack perfectly for ease of transport. The building blocks fit into each other precisely, thus reducing the volume to be transported compared to traditional systems, resulting in substantially lower transport costs and CO_2 emissions.

ACO Stormbrixx makes it possible to transport required product units on a truck.

- Stormbrixx SD: 347 m^3 storage capacity
- Stormbrixx HD: 309 m^3 storage capacity

For conventional infiltration systems, up to four vehicles would be needed. Stacking the basic Stormbrixx elements therefore reduces transport costs.

Optimised transport

The modular ACO Stormbrixx infiltration system reduces transport costs and therefore more than halves CO_2 consumption and the storage space required in storerooms and on the construction site compared to other systems

Short paths to the pallets increase the installation speed

Stormbrixx benefit 2

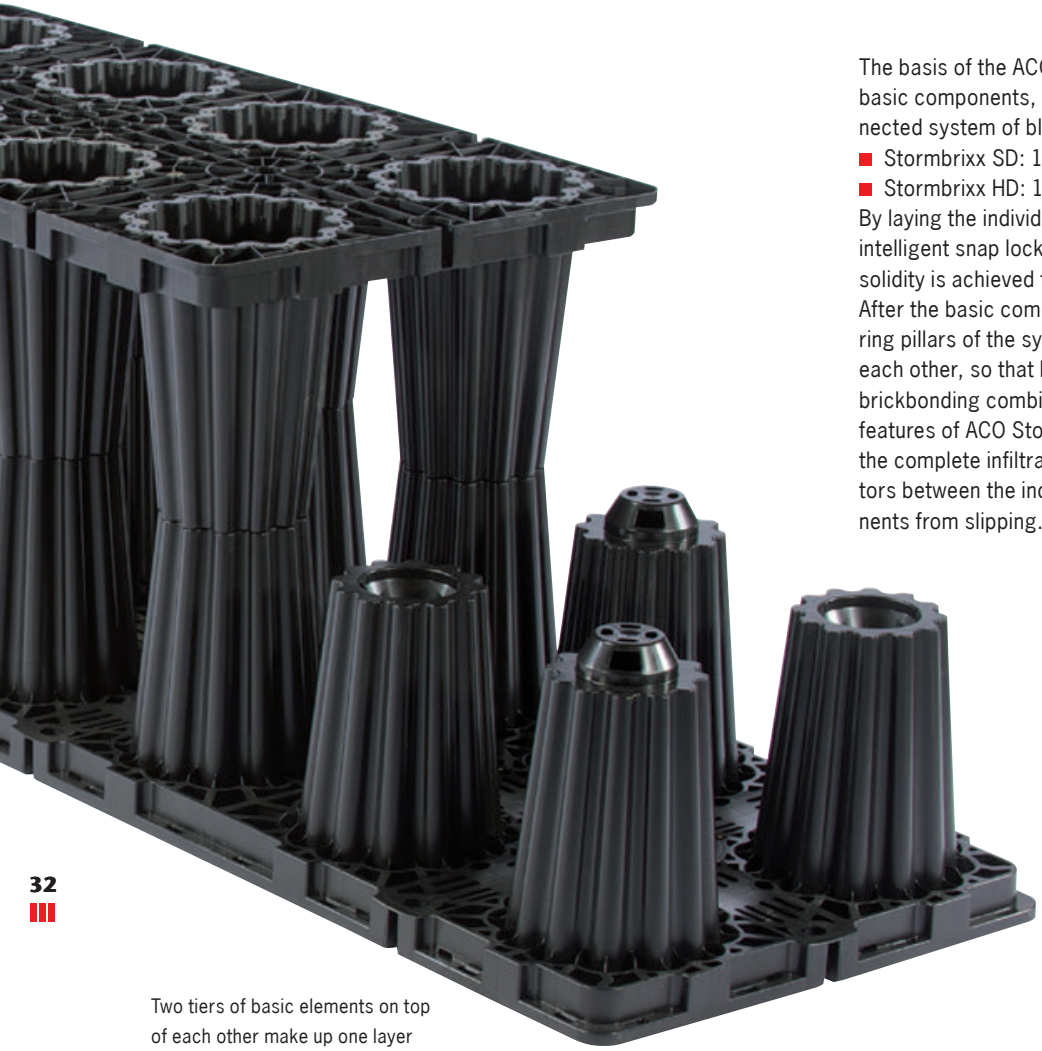
Stability thanks to brickbonding

The basis of the ACO Stormbrixx system is provided by the basic components, which are combined on site into an interconnected system of blocks.

- Stormbrixx SD: 1200 x 600 x 457 mm
- Stormbrixx HD: 1205 x 602 x 305 mm

By laying the individual components in patterns and using an intelligent snap lock system, an exceptional level of structural solidity is achieved for the overall system.

After the basic components have been assembled, the load-bearing pillars of the system are precisely vertically aligned above each other, so that loads are distributed downwards evenly. The brickbonding combination of the components is one of the key features of ACO Stormbrixx. It provides a stable construction for the complete infiltration system. All that is required are connectors between the individual layers to prevent the basic components from slipping.

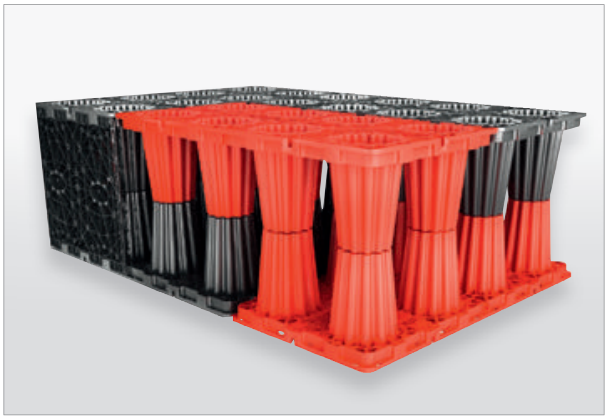


Two tiers of basic elements on top of each other make up one layer

Robust

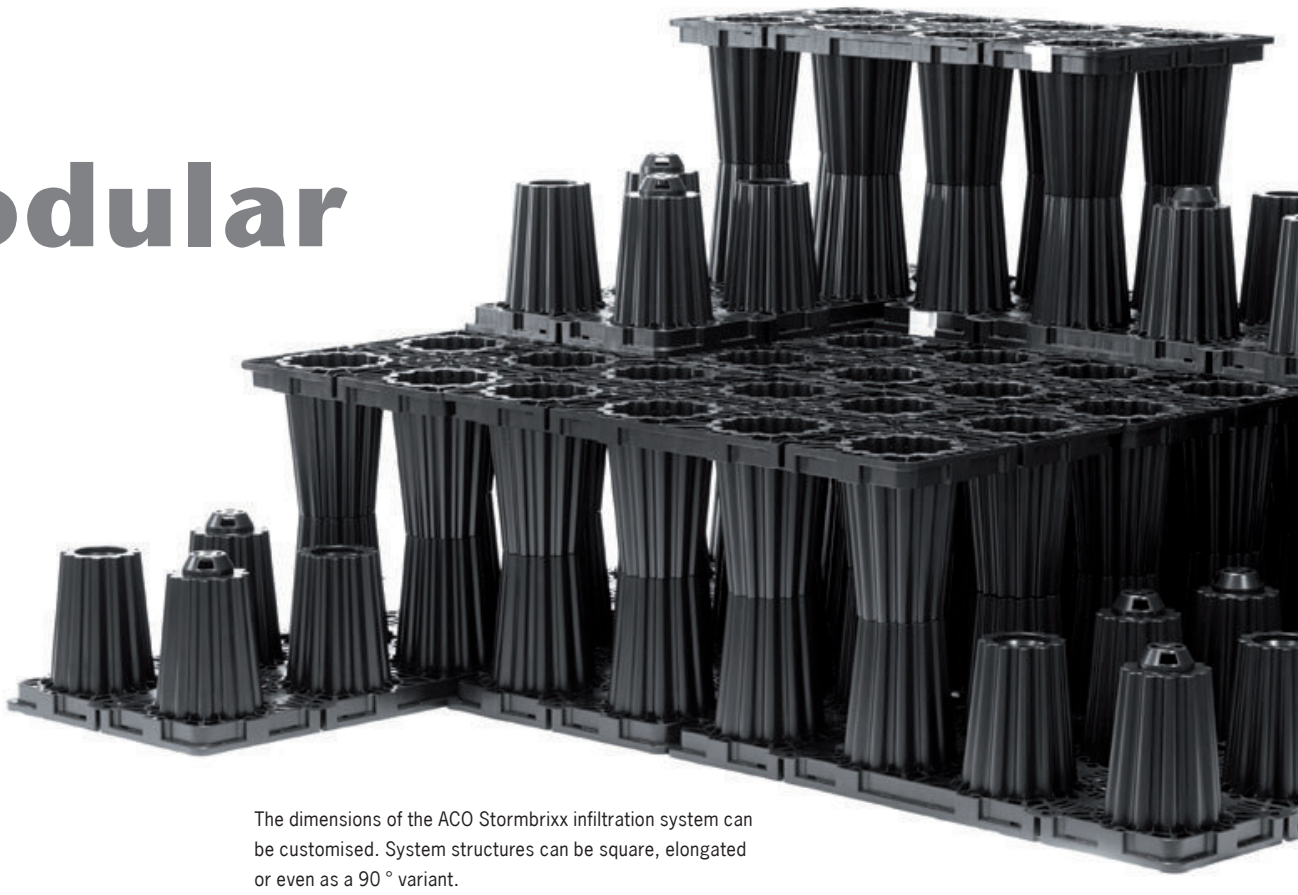
High integral strength

Male and female connectors audibly lock into place during assembly



The basic elements are installed in interlocking patterns to ensure the stability of the entire infiltration system in addition

Modular

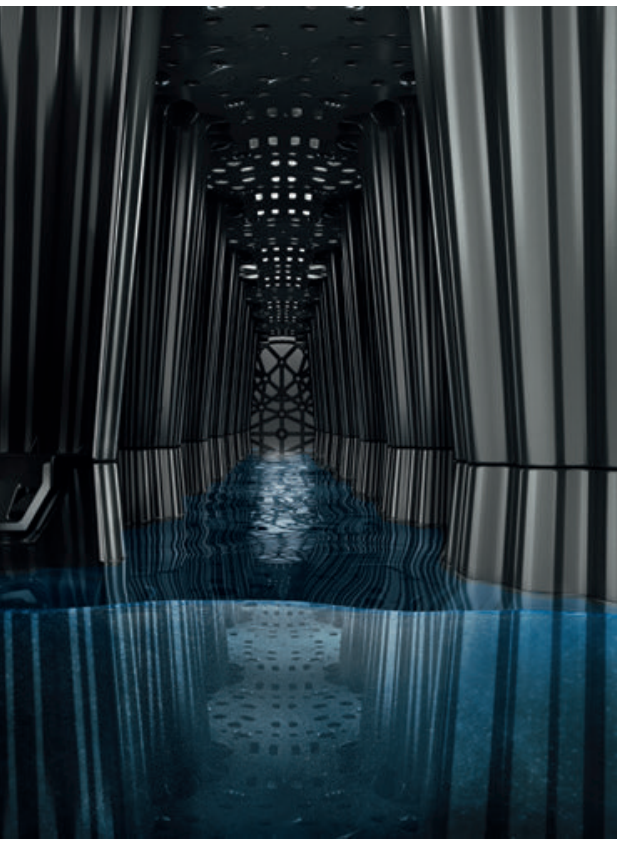


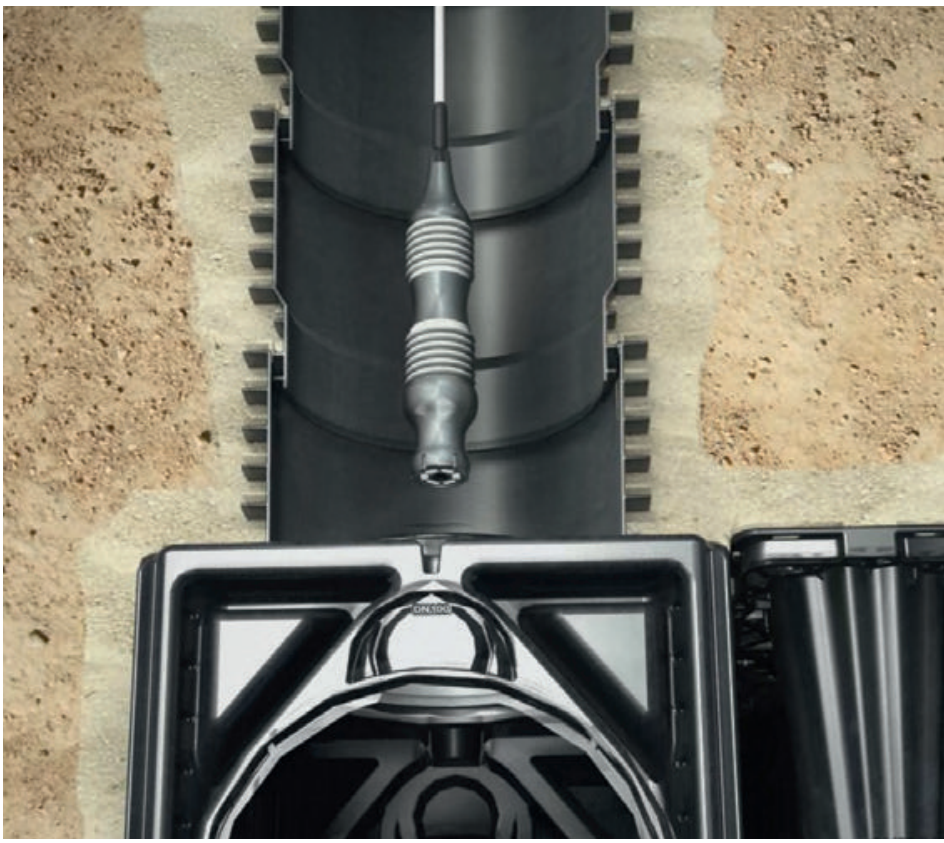
The dimensions of the ACO Stormbrixx infiltration system can be customised. System structures can be square, elongated or even as a 90 ° variant.

Stormbrixx benefit 3

Open system for user-friendly inspection and cleaning

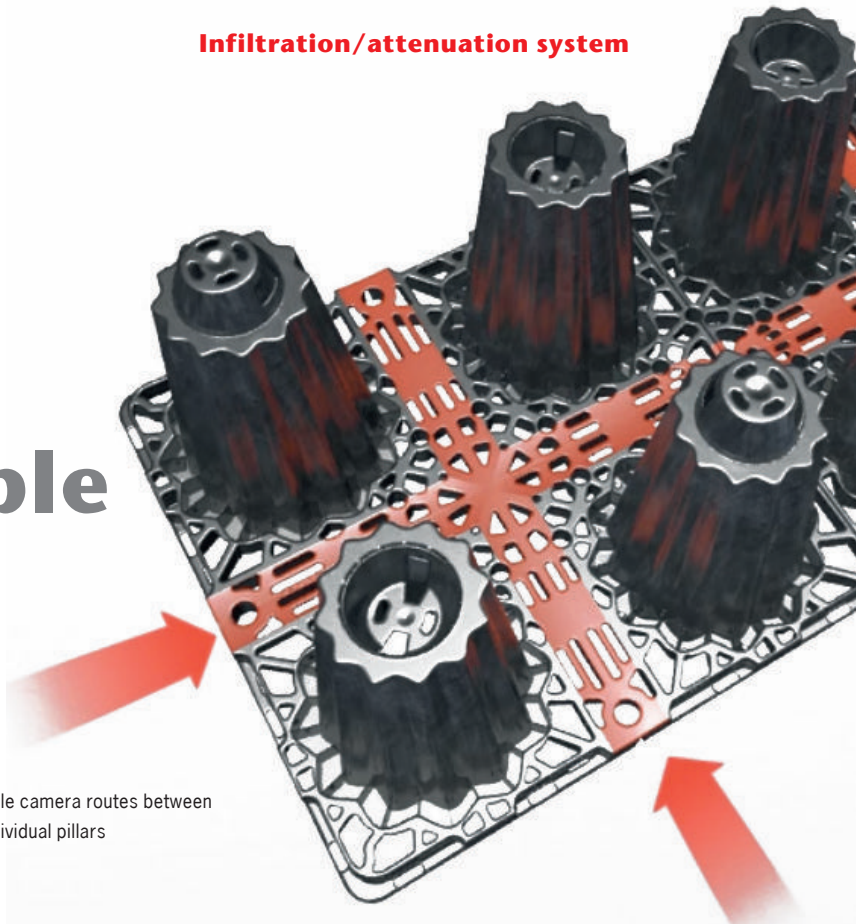
Inspection cameras or sewer flushing nozzles pass through the shaft openings into the ACO Stormbrixx block infiltration drain system.
The inspection camera or flushing nozzle is inserted vertically into the infiltration drain system. The special design of the ACO Stormbrixx enables camera inspection and flushing in all directions: Optimum maintenance and inspection of the system is possible, not only in the longitudinal direction, but also in the transverse direction. The open structure of ACO Stormbrixx significantly reduces the number of access shafts compared to other infiltration drain systems. The ACO Stormbrixx infiltration drain system is accessed via the LW 400 shaft cover. This opening also enables simultaneous flushing and extraction of the soiled water.



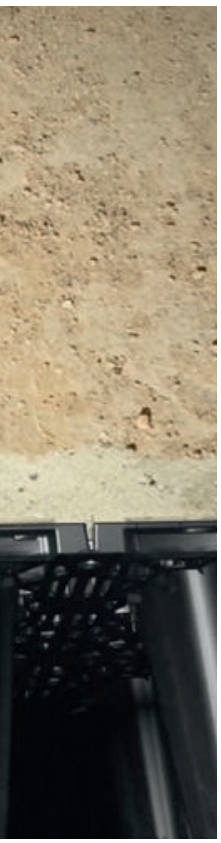


The inspection camera is introduced vertically into the infiltration system via ACO Stormbrixx upper parts and intermediate/bottom shaft sections

Fully inspectable and accessible



Possible camera routes between the individual pillars

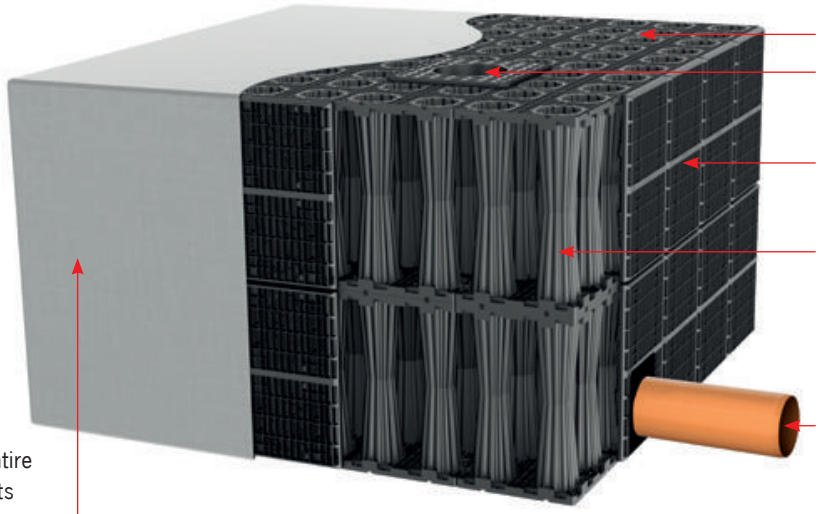


Slide inspection cameras can be easily used in the ACO Stormbrixx system

Cleaning equipment with a rinsing head. Any deposits that may be in the system can be pressure-rinsed and suctioned at the same time.

Effective replenishment of groundwater – infiltration of storm water

As a SUDS infiltration system, the ACO Stormbrixx offers a dual effect ecological solution: treated surface water is collected underground in the block infiltration system. It thus stores the surface water initially in case of heavy rainfall. The water then gradually seeps into the soil and in doing so helps to recharge the groundwater.
The legal basis for infiltration is provided by the state water law, the DWA (Association for Water, Wastewater and Waste) standard A 138 “Planning, Construction and Operation of Facilities for the infiltration of Storm Water”, and the DWA advisory leaflet M 153 “Recommended Actions for Dealing with Storm Water”.
The subsoil must be capable of infiltration water and there must not be an underground impermeable layer.
No harmful substances may penetrate the ground or the groundwater via infiltration.



Geotextile as protective layer for the entire infiltration system prevents soil penetration

Infiltration

The system is constructed of basic elements that are laid in interlocking patterns

ACO Application Technology creates a corresponding installation plan for every building project.
Reference project: Heider Marktpassage, Heide: ACO Stormbrixx HD as an infiltration system underneath car parking areas.

The protective geotextile is then laid around the infiltration system so that it is completely covered

Inlet from ACO Sedised-C via a KG pipe with ACO adapter for pipe connection in the infiltration system

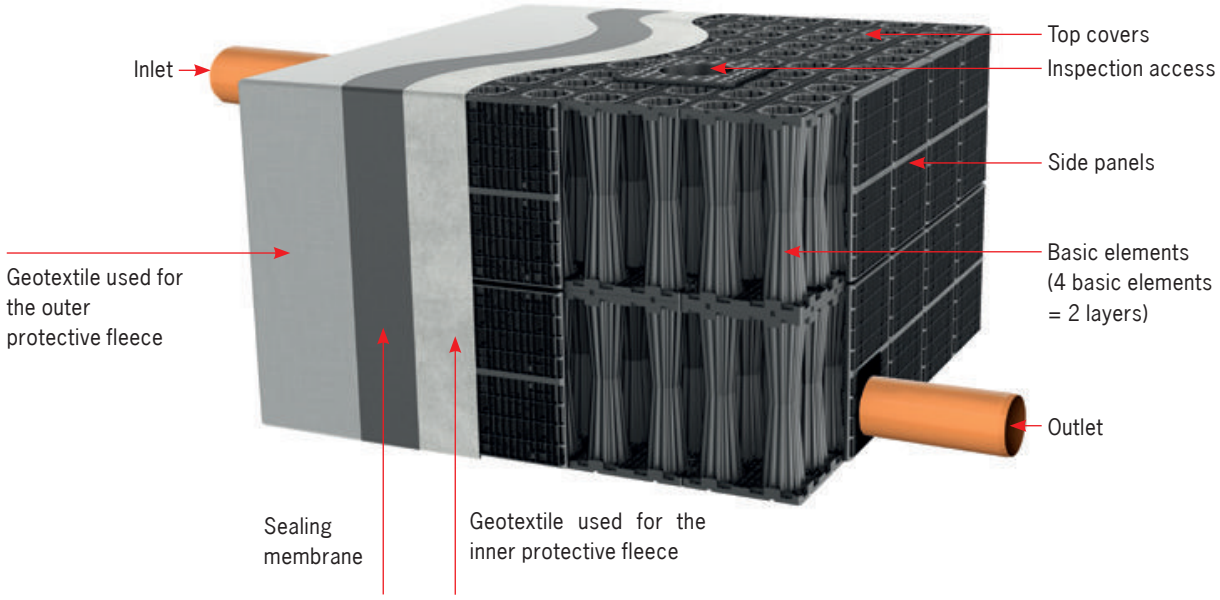
Filling the infiltration system

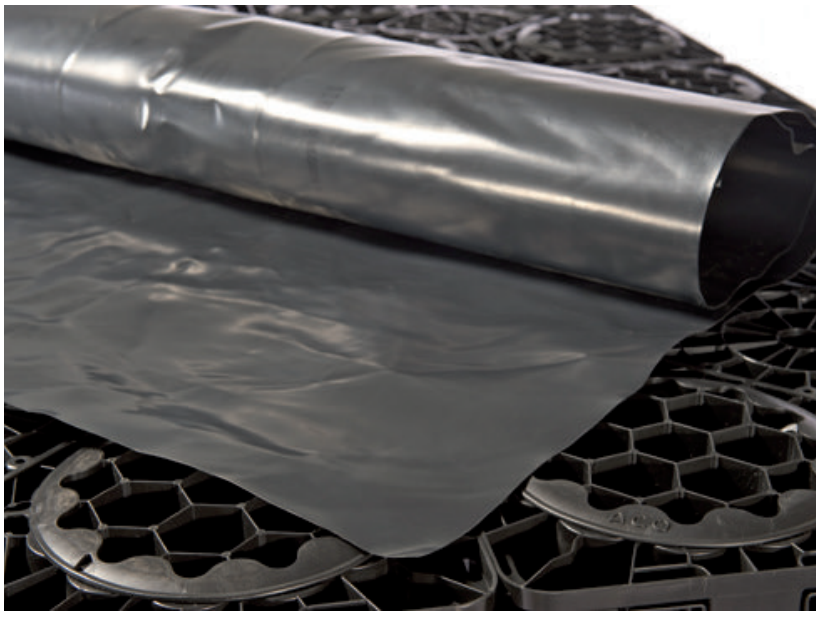
Controlled release – attenuation of storm water

As a bulk store below driveways, public areas or on private grounds, the ACO Stormbrixx infiltration system stores the previously collected rainwater and releases it in a time-delayed fashion into the watercourse or sewage system. The drainage channels are thereby relieved during heavy rainfall. Each application must consider the respective soil and traffic loads.

ACO Stormbrixx has a restricted application in areas where groundwater is present. Separate calculations must be carried out on a case-by-case basis.

Attenuation





Sealing membrane

The bulk storage system is wrapped with an inner protective fleece and a sealing membrane

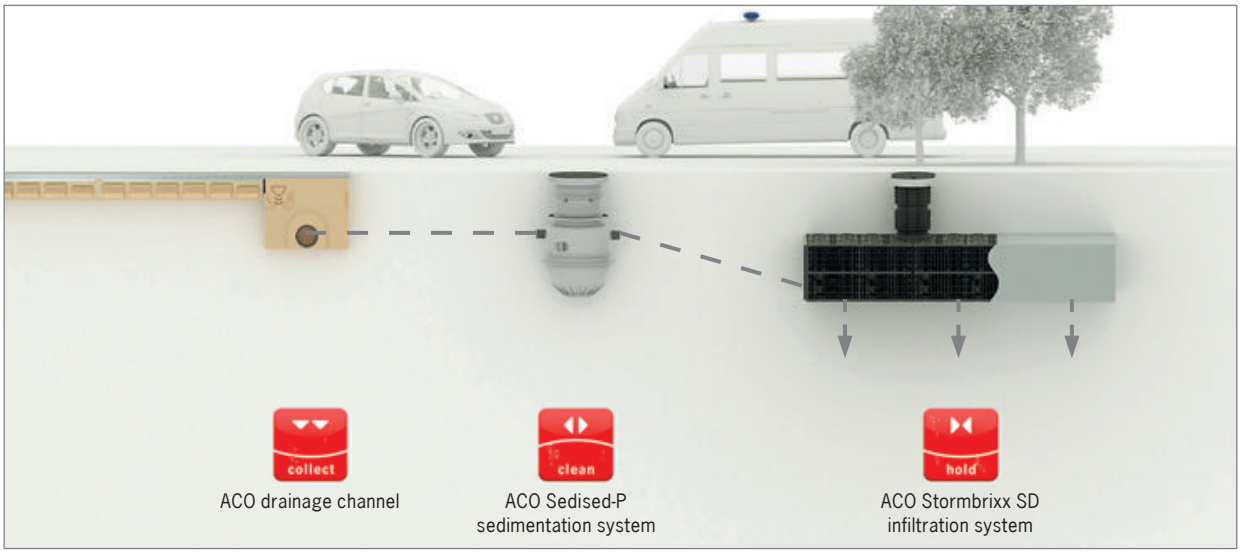
The sealing membrane is then welded

Reference Albert-Schweitzer-Gemeinschaftss-chule school, Schwentinental:
The surface water of the small multifunctional pitch, the sand (volleyball) court and the track for school, club and leisure sports within the school's grounds is collected via ACO channels and is stored temporarily and retained in the ACO Stormbrixx block infiltration system, from where it is then discharged into the outfall after a time delay through controlled discharge by means of a flow restriction element.

The outer protective fleece is applied once the sealing membrane is complete

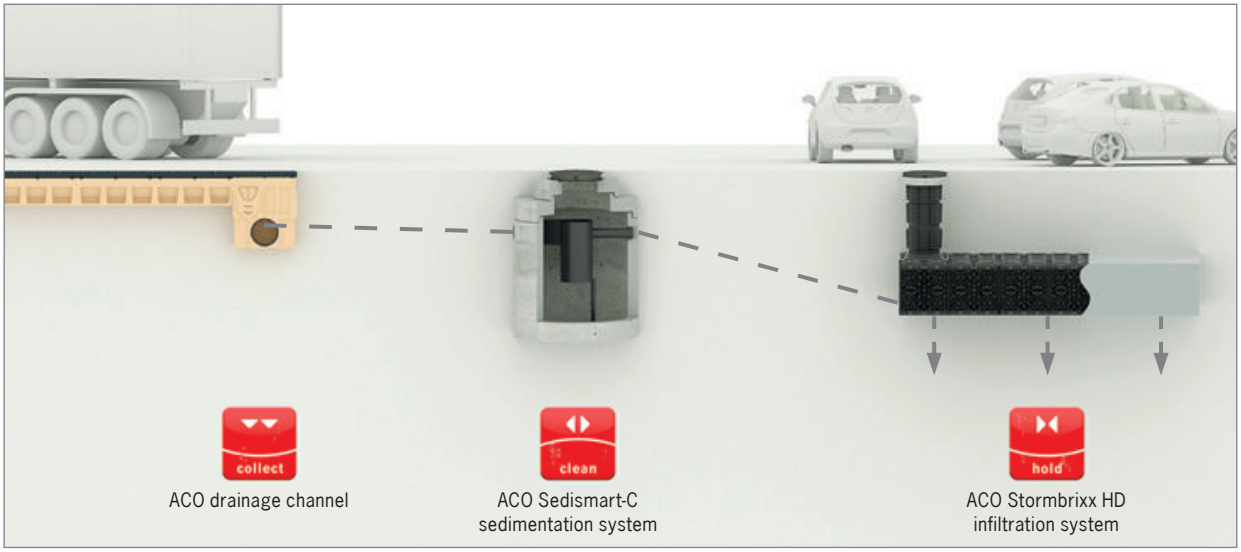
Application examples – Infiltration

Public areas, roads and parking areas



Application example of ACO system chain for rainwater infiltration with ACO Stormbrixx

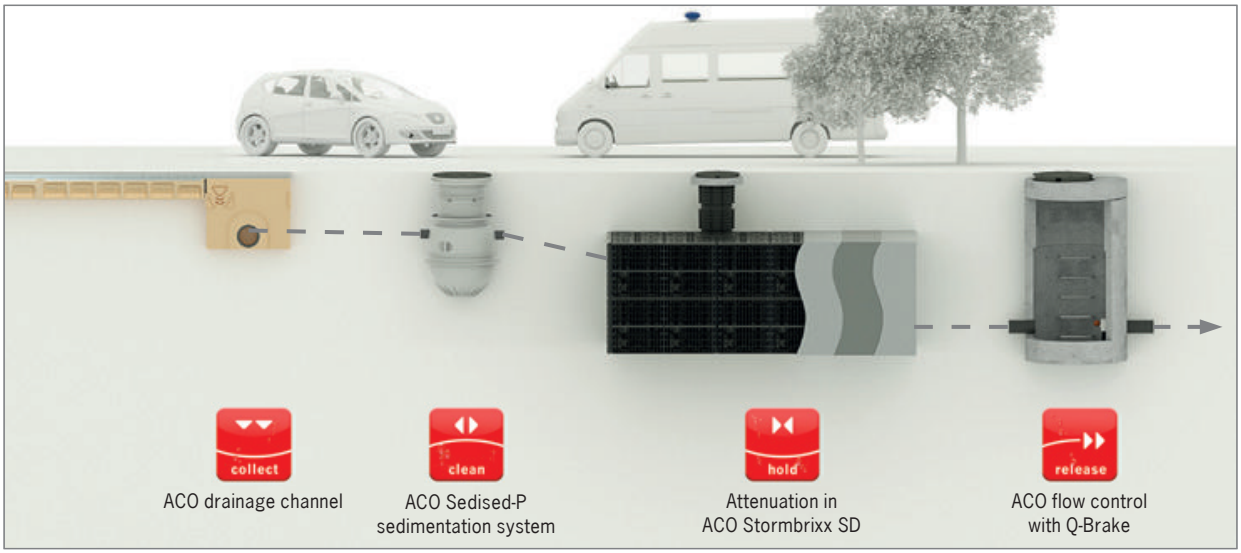
Logistics space



Application example of ACO system chain for rainwater infiltration with ACO Stormbrixx

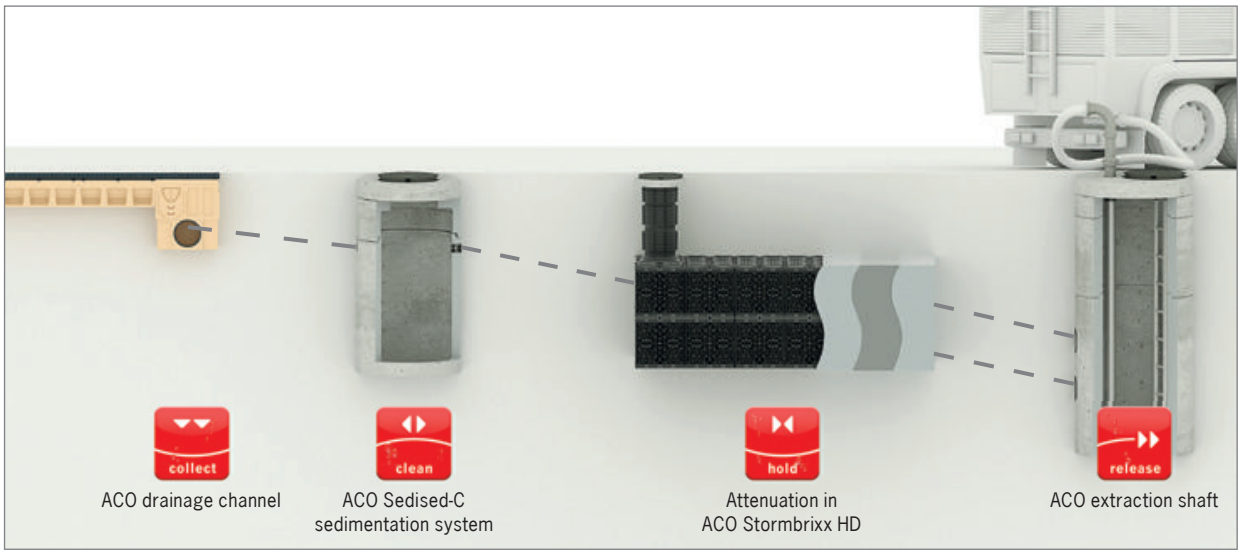
Application examples – Attenuation

Public areas, roads and parking areas



Application example of ACO system chain for rainwater attenuation with ACO Stormbrixx

Reservoir for fire extinguishing water

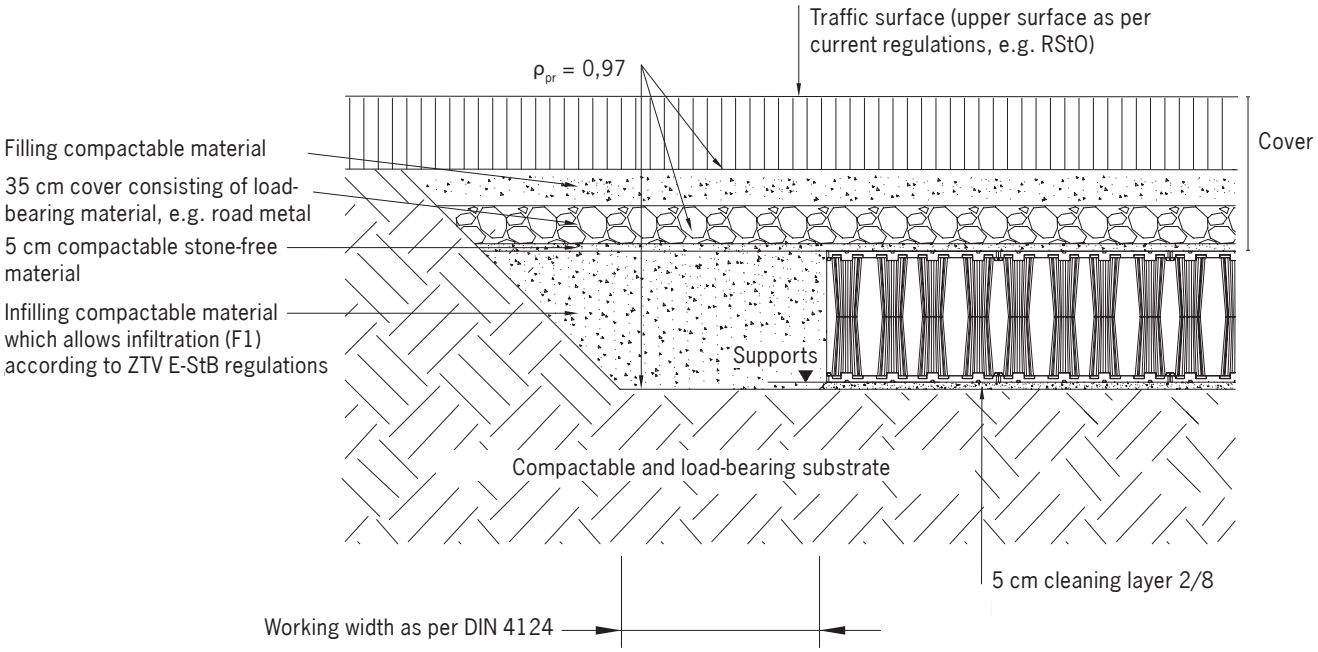


Application example of ACO system chain as a fire extinguishing water tank according to DIN 14230.
Fire extinguishing water tank and extraction shafts must be approved and accepted by the responsible authority.

Service
ACO Application engineering advises you.
Please contact them in your country.

Installation

Standard soil cover for installation of Stormbrixx SD

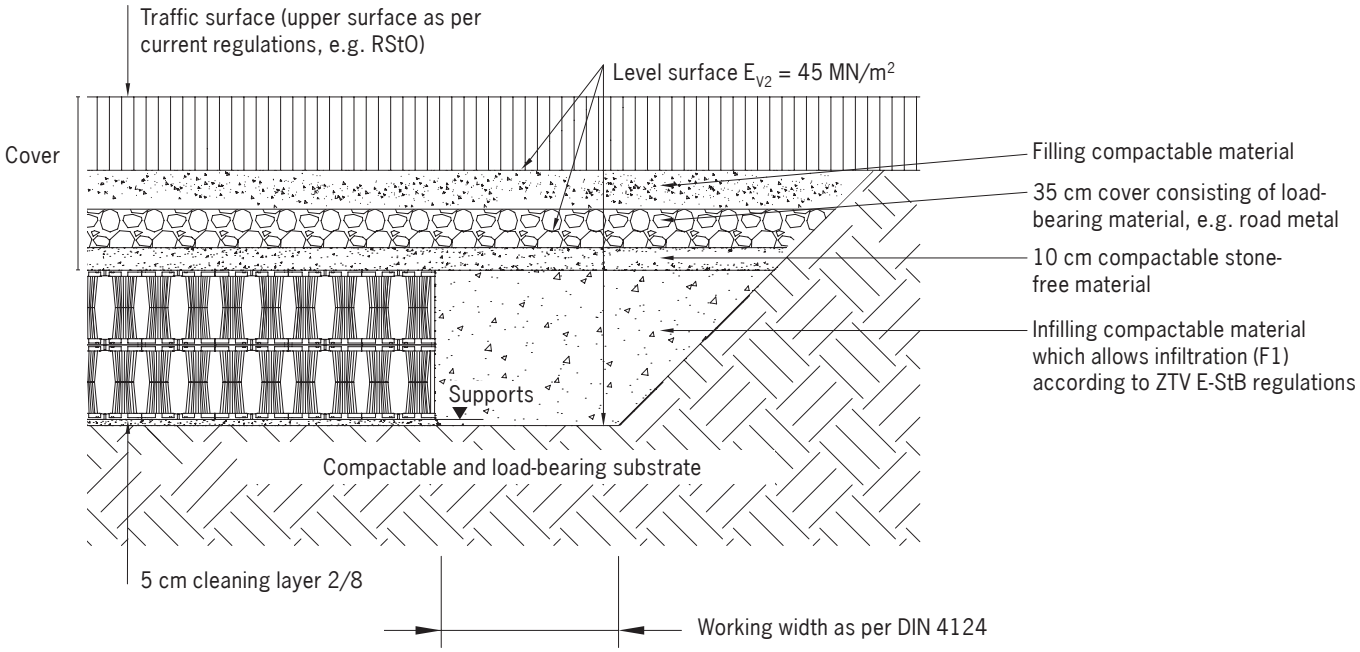


Installation dimensions Stormbrixx SD

Layers	Walkable			Trafficable		
	Cover depth minimal[2] [mm][1]	Cover depth maximal[3] [mm][1]	Installation depth maximal [mm][1]	Cover depth minimal[2] [mm][1]	Cover depth maximal[3] [mm][1]	Installation depth maximal [mm][1]
1	800	2000	2914	800*	2000	2914
2	800	2000	3828	800*	2000	3828
3	Please contact ACO Application engineering in your country					

*Please consider the required road construction

Standard soil cover for installation of Stormbrixx HD



Installation dimensions Stormbrixx HD

Layers	Walkable and trafficable			Trafficable with heavy traffic		
	Cover depth minimal[2] [mm][1]	Cover depth maximal[3] [mm][1]	Installation depth maximal [mm][1]	Cover depth minimal[2] [mm][1]	Cover depth maximal[3] [mm][1]	Installation depth maximal [mm][1]
1	800*	3400	4010	1000	3400	4010
2	800*	3400	4620	1000	3400	4620
3	800*	3400	5230	1000	3400	5230
4	Please contact ACO Application engineering in your country					

*Please consider the required road construction

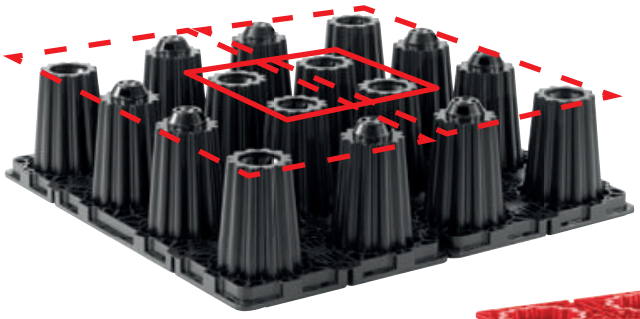
To ensure the stability of the system, various requirements and standards must be observed when installing ACO Stormbrixx.

[1] Ground cover consisting of cover and upper surface as per RStO regulations

[2] Please allow for local conditions when defining the frost-free installation depth

[3] Other cover depths for special cases should be agreed with ACO application technology

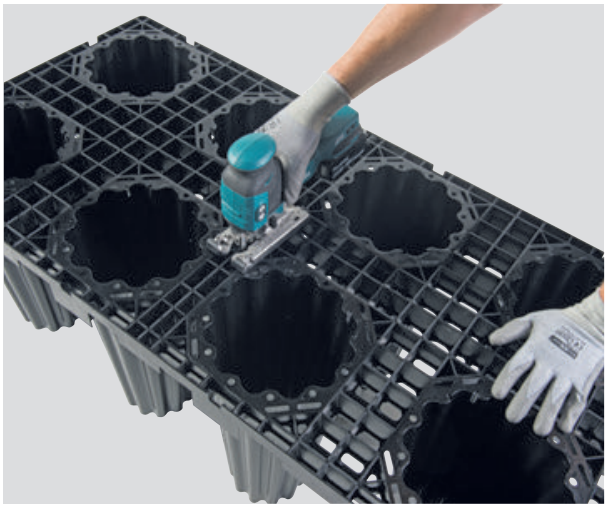
System configuration



Linking blocks

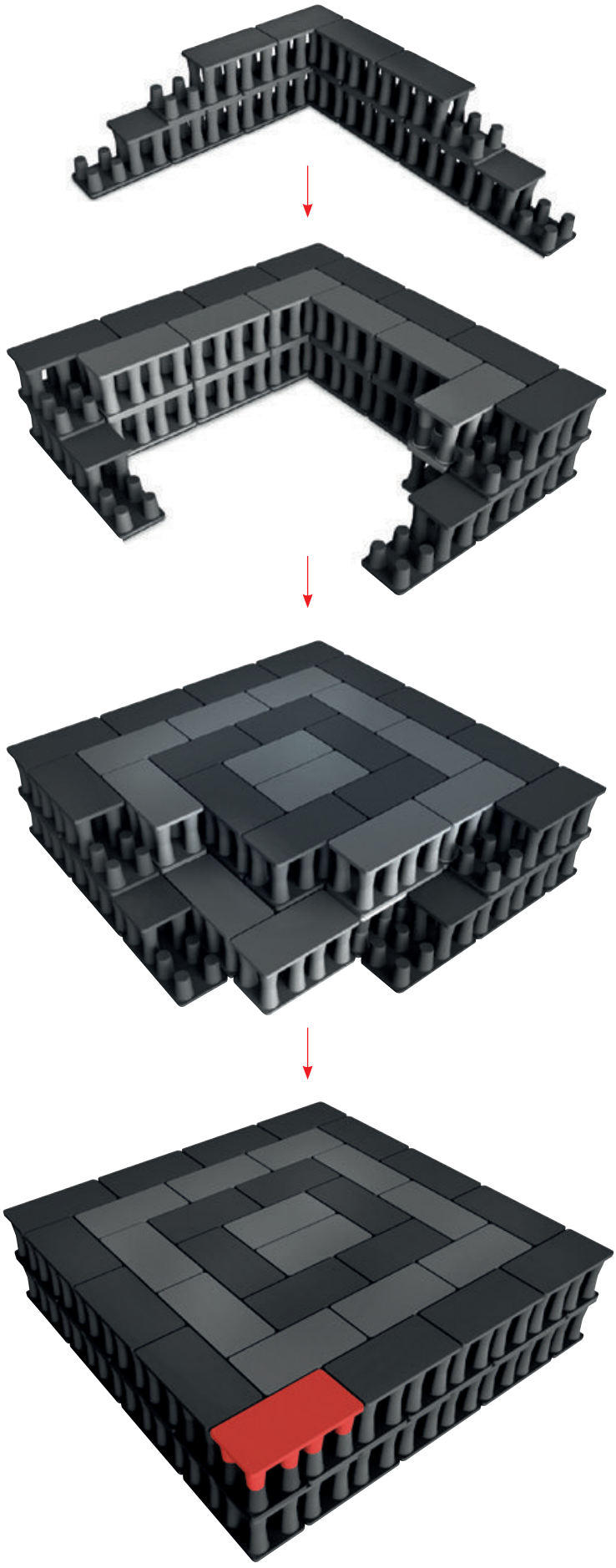
The basic elements consist of eight columns, of which four are equipped with spigots and four with sockets.

They are easily assembled by plugging together the individual components. The basic elements are assembled with interlocking to optimise the positional safety of the overall system. To achieve this, four push-fit connections must be positioned next to each other.



Halve the basic elements

ACO Stormbrixx basic elements can be bisected along their central rib using a handsaw or jigsaw. Each half can be linked to the rest of the system using connectors. The cut surfaces must face into the centre of the tank system.

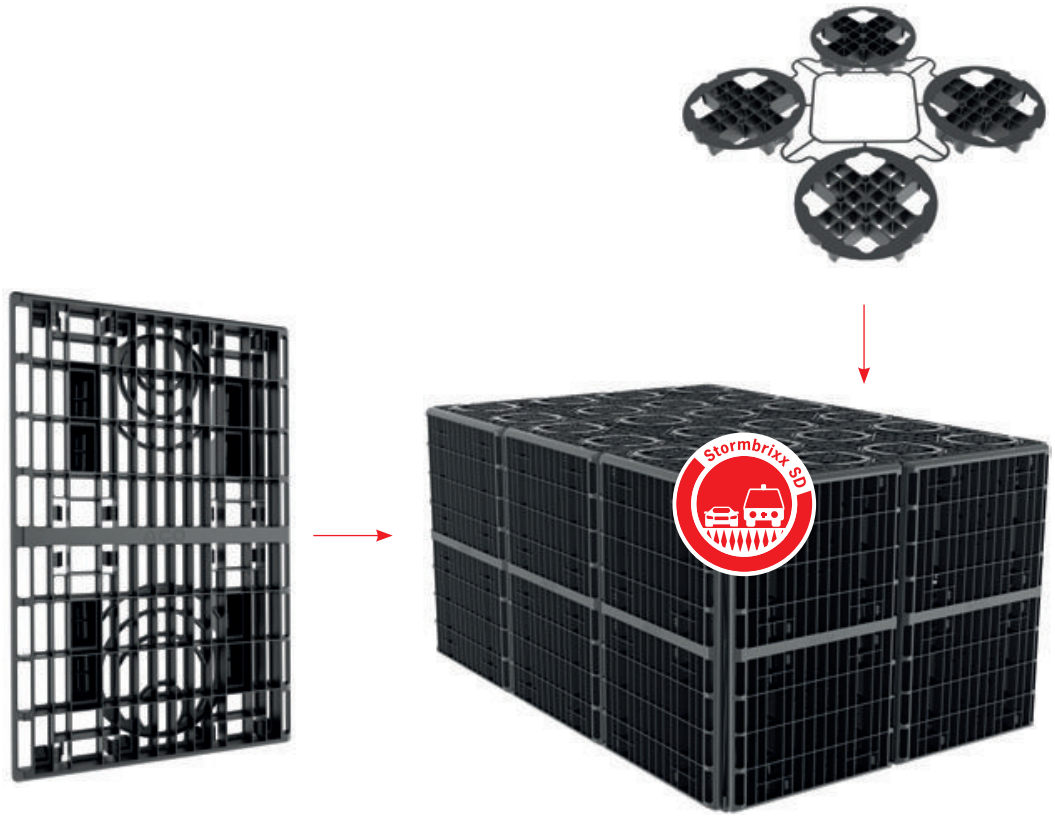


Recommended layout:

Concentric design

This is a series of rings, which become increasingly smaller as they approach the middle of the system.

1. Set out the outlines of the system and level the base of the excavation and lay a levelling layer of sand (H = 5 cm) to form the formation.
2. Lay geotextile (filter nonwoven) and/or waterproof membrane if necessary
3. Set the outer perimeter of the infiltration system with basic elements.
   Principle:
   Two ACO Stormbrixx basic elements are placed on the ground. A third basic element is turned upside down and is laid on the first two elements in a block bond.
4. If necessary, cut half-basic elements to size
5. Repeat steps for all other layers.
6. Connect together the individual layers with the help of the connectors
7. For large systems (larger than 100 m^3), we recommend starting the installation from a corner, an end or a side. At the same time, begin assembling the inner rings.
   If necessary, connect existing rings and layers with the help of connectors.



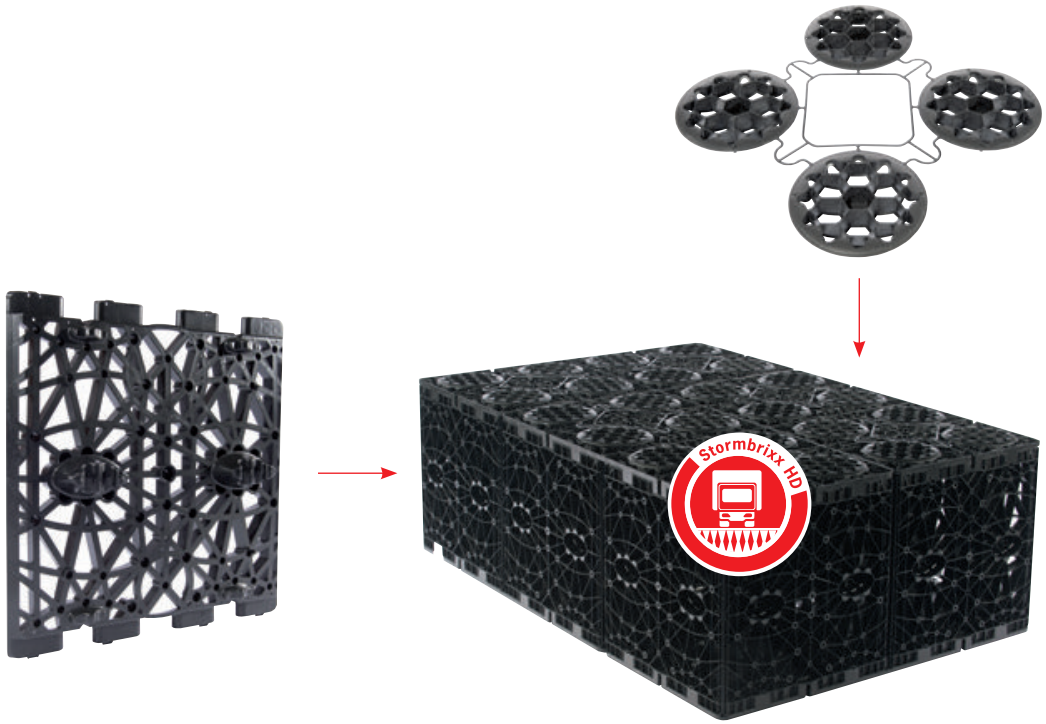
Side panels as the outer boundary

Covers close off the top layer

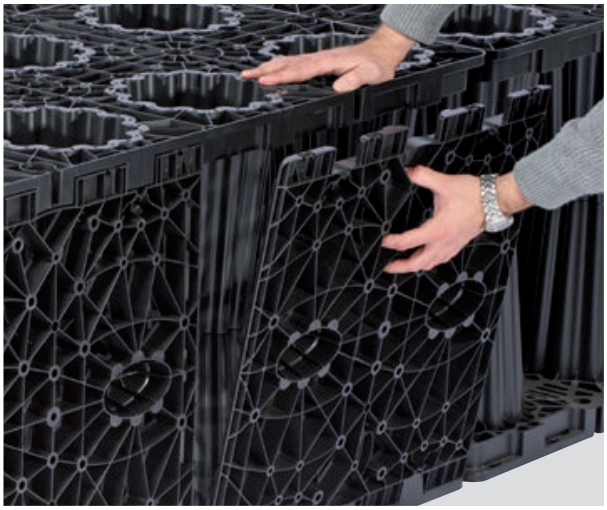
Side panel and top cover

The side panels are only used at the outsides of the block infiltration system. The covers are only used to close off the openings of the columns in the top layer.
If necessary, pipe connections DN/OD 110–315 can be cut out in the places provided (markings).

Different side panels and covers are available for ACO Stormbrixx SD and HD.



Side panels as a clean system surface for the enveloping geotextile



Covers prevent geotextile and soil from penetrating the system

Installing the side panel

Easy assembly: The side panels latch into the basic elements and close off the outer border of the infiltration system. Due to the soil pressure, the geotextile cannot penetrate into the infiltration system.

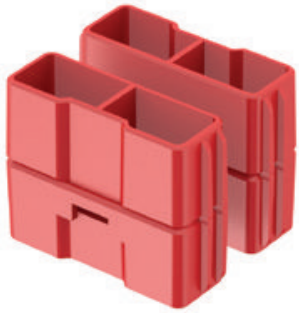
Installing the top cover

Fast attachment: Four column openings can be closed off in a single step with the help of the ACO Stormbrixx cover. Covers are only mounted on the top layer of the basic elements, before installing the geotextile.

Open side
facing downwards

+

Closed side
facing upwards



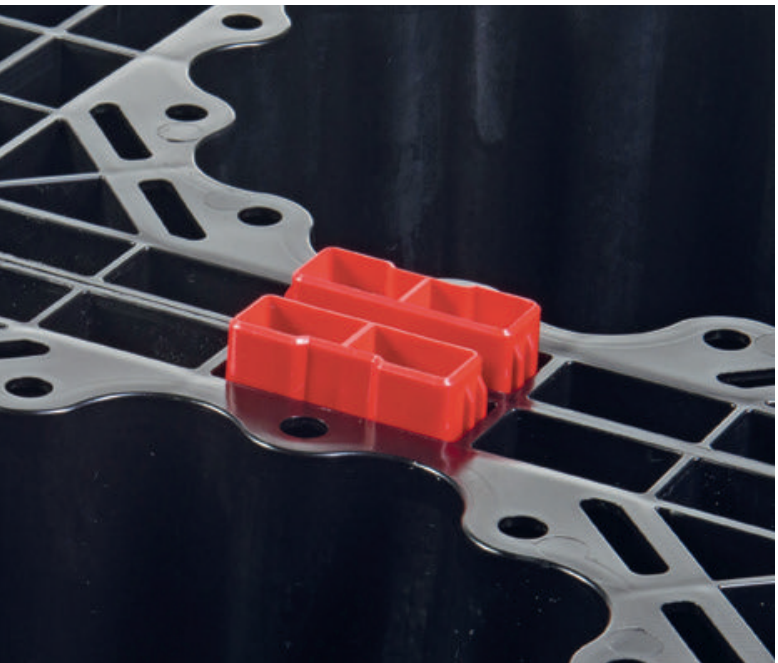
Stormbrixx SD

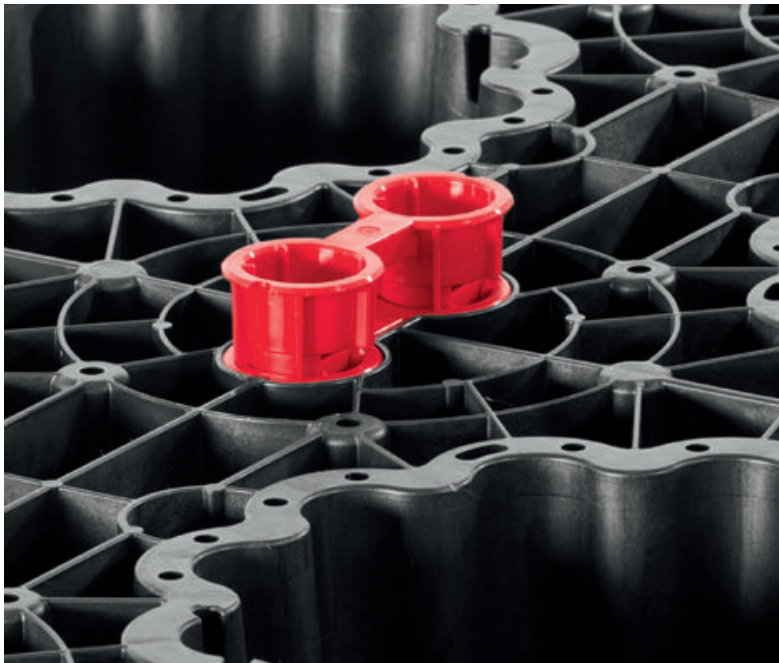
Rounded side
forwards

+

Flattened side
forwards

Stormbrixx HD





Connectors

When assembling two or three layers of ACO Stormbrixx, the layers are aligned and secured positionally by means of two connectors pushed together. The exact position of the basic elements and connectors within the overall infiltration system is shown in the laying diagram!
The connectors must each be mounted in the middle of the basic element.

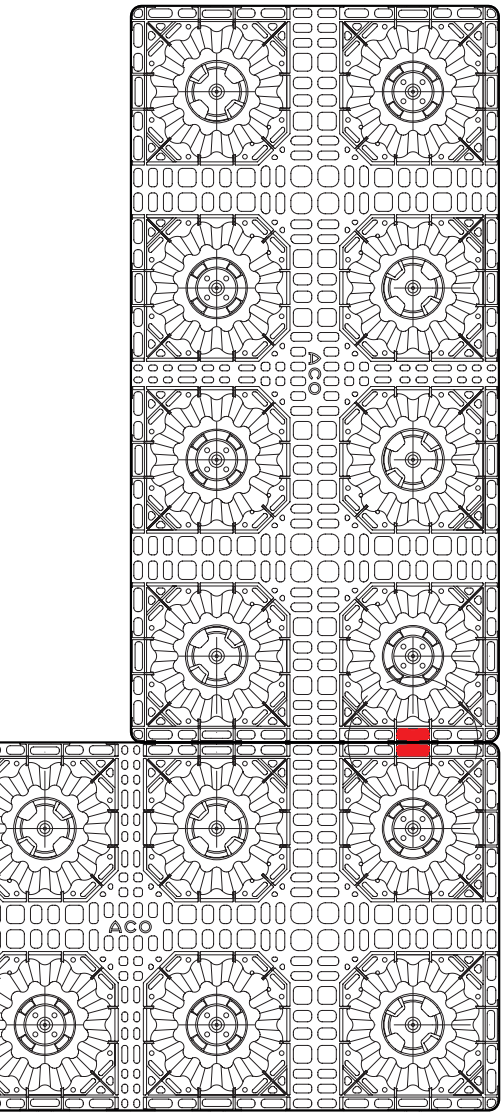
Installing one layer

If only one layer of ACO Stormbrixx is installed, unlike other block infiltration systems, **no connectors** are required. Laying the basic elements in the interlocking bond or pattern (see page 32/33) provides additional stability for the overall system.

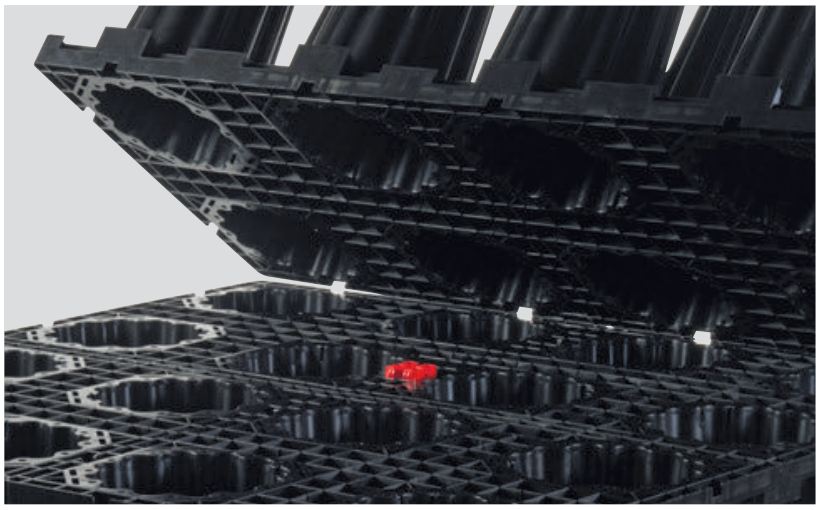
Installing several layers

Connectors are used if two or more layers of ACO Stormbrixx are installed: Two individual connectors are pushed together to form one and are inserted between the individual layers as positional fixing. This helps to achieve precise alignment of the spigots of several layers.

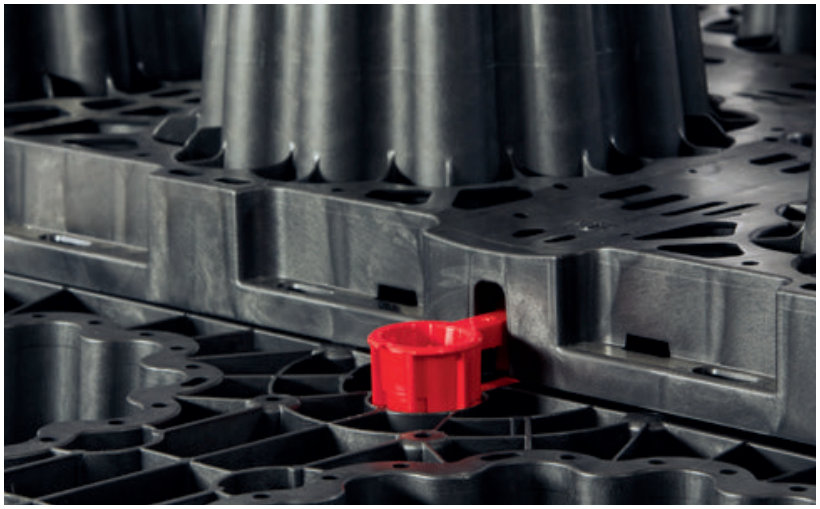
The basic rule of thumb is: one double connector must be used for each basic element.



One double connector for each basic element

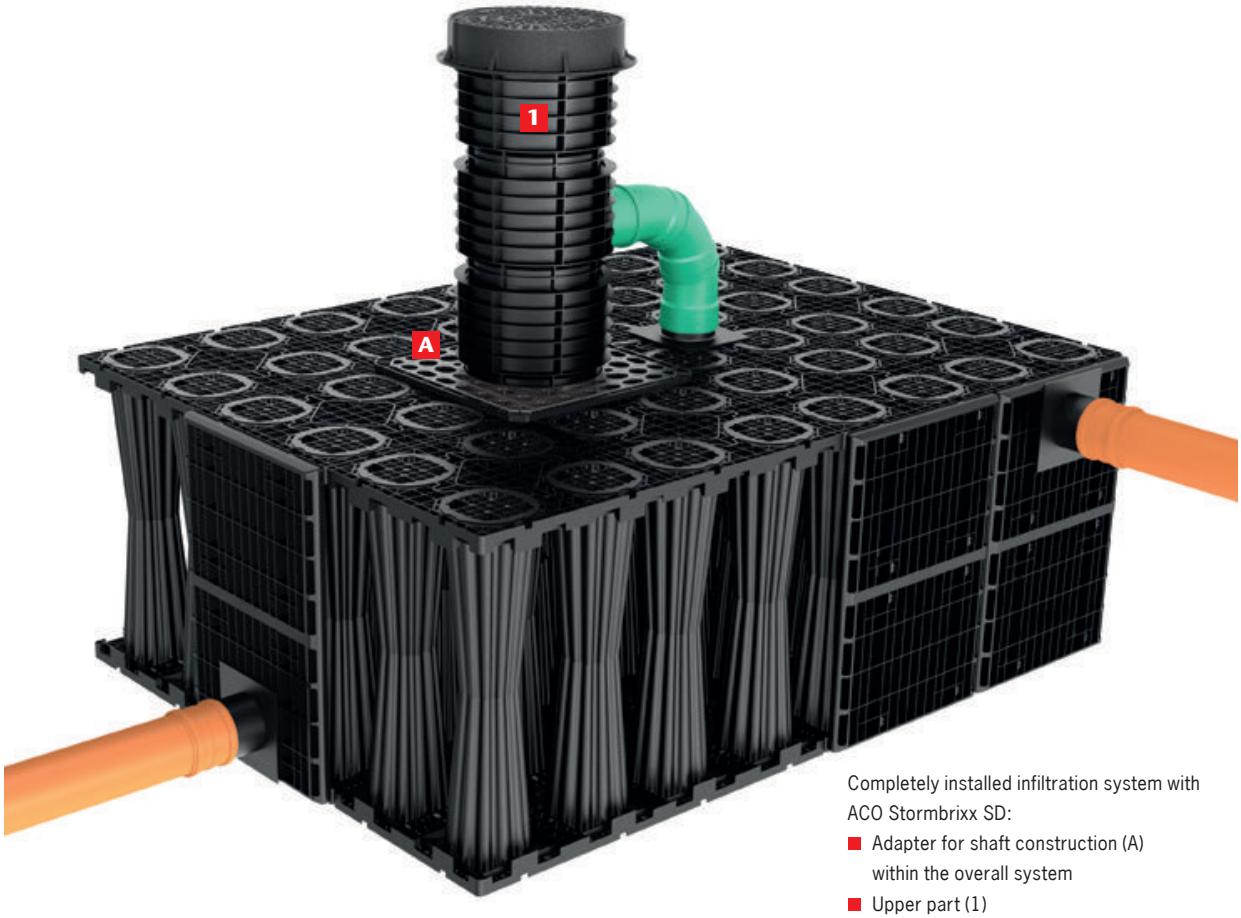


ACO Stormbrixx SD:
Two connectors pushed together secure the alignment of the spigots of two installation layers



ACO Stormbrixx HD:
Two connectors pushed together secure the alignment of the spigots of two installation layers

Inspection and maintenance access

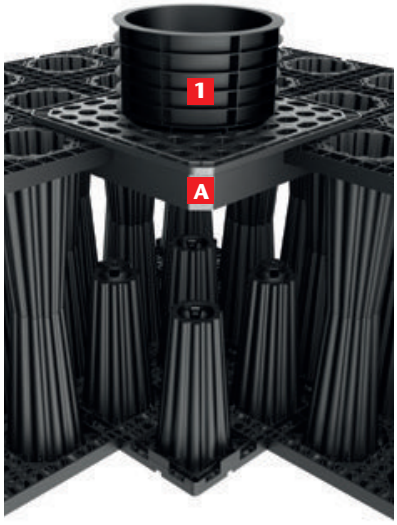


Completely installed infiltration system with ACO Stormbrixx SD:
- Adapter for shaft construction (A) within the overall system
- Upper part (1)

Entrance via access plate

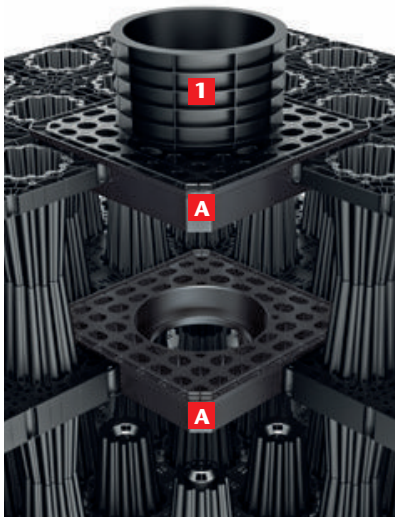
The ACO Stormbrixx Adapter for shaft construction (A) is installed as an inspection access **within the block infiltration system**. An inspection shaft can thus be installed quickly and economically by simply assembling in the required place. The ACO Stormbrixx upper parts (1) are added to the top of the access.

Stormbrixx SD

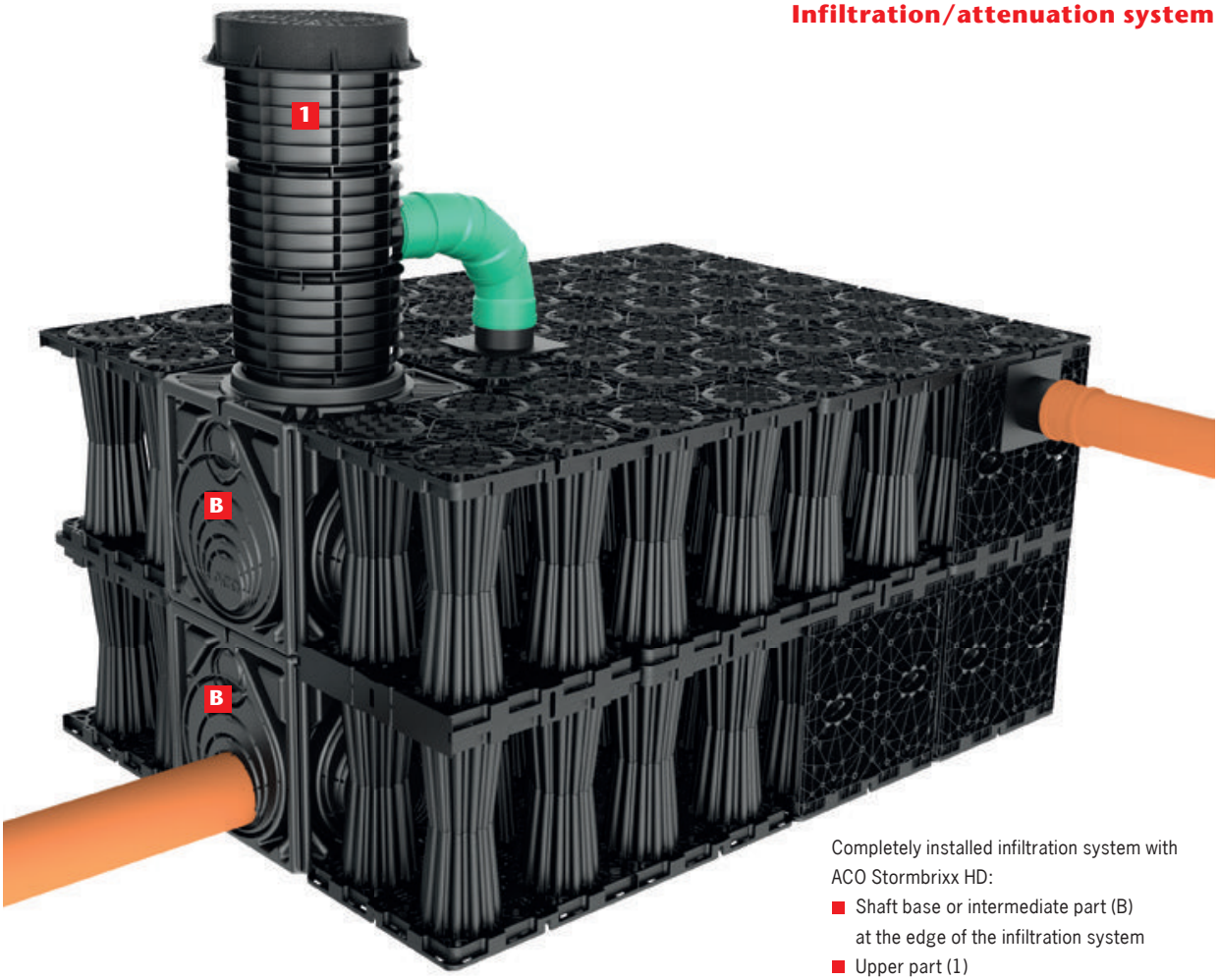


Infiltration system with ACO Stormbrixx SD: The adapter for shaft construction (A) together with the ACO Stormbrixx upper part (1) is mounted within the overall system for inspection and cleaning of the infiltration system

Stormbrixx HD



Infiltration system with ACO Stormbrixx HD: If accesses are required within the system, the adapter for shaft construction (A) can be used together with the upper part (1) as an alternative to the shaft base or intermediate part (B)

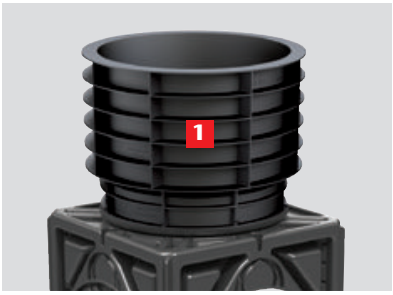


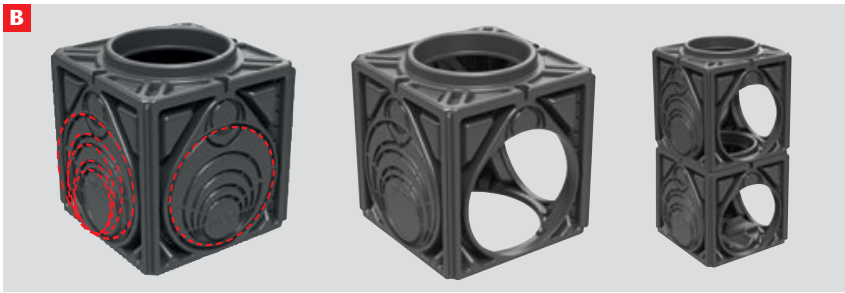
Completely installed infiltration system with ACO Stormbrixx HD:
- Shaft base or intermediate part (B) at the edge of the infiltration system
- Upper part (1)

Entrance via access chamber

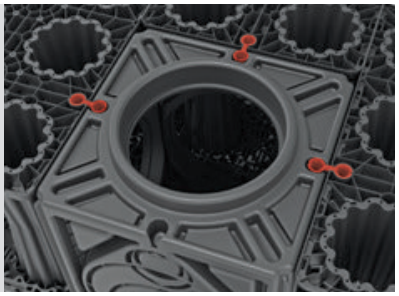
For ACO Stormbrixx HD, the shaft base or intermediate part (B) can be integrated not only in the overall block infiltration system but also at the edge of the block infiltration as a connection and inspection shaft. In multi-layer infiltration systems the shaft bases and intermediate parts are simply assembled on top of each other.

Each shaft base and intermediate part can be cutout on site for different pipe size connections according to the in situ requirements (DN/OD 110, 160, 200, 315, 400).
Tip: It is advisable to make a predrilled hole for the saw blade.
The top of the shaft is added to with ACO Stormbrixx upper parts (1). The height is variable and is adapted to the ground level. A shaft cover rounds off the modular system.



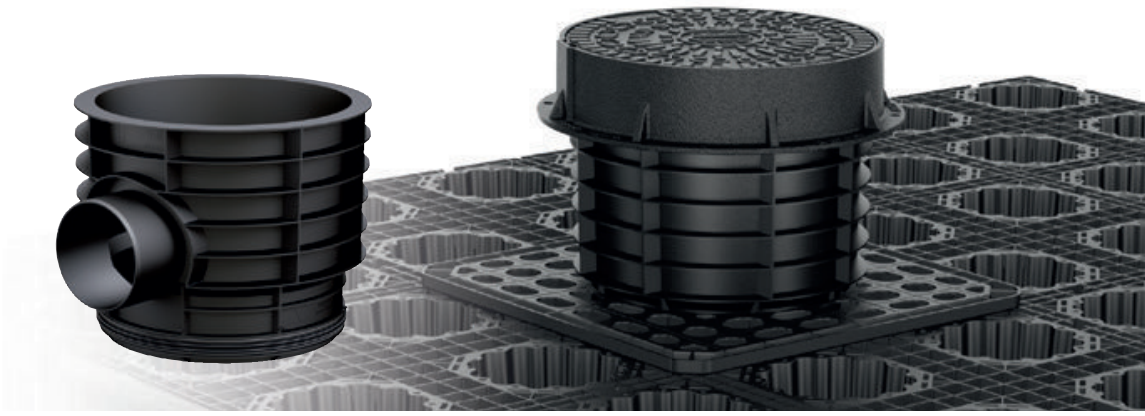


Only in conjunction with Stormbrixx HD!
The shaft base and intermediate part can be used at the edge of the infiltration system for inspection and cleaning of the infiltration system. A lateral pipe connection DN/OD 400 can be made via this.



Shaft bases and intermediate parts are connected with individual connectors at the edge of the basic element.
Do not use connectors on the underside!

Manholes



ACO Stormbrixx offers two options for accessing the system with a sewer camera or jetting nozzle or lance for inspection or maintenance of the block infiltration system (see page 60/61). Shaft upper parts enable access to the Stormbrixx system from the surface.

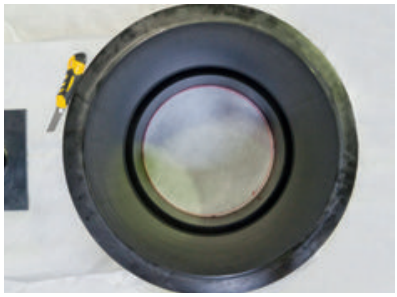
The upper parts with and without sockets can be rotated to match the pipe axis. Their push-fit connection can be adjusted to the longitudinal and transverse gradient on site and can be telescopically adjusted vertically (+/– 30 mm). They are watertight up to 0.5 bar.

Load separation and vertical alignment of the individual components are ensured by the telescope principle. Any settlement that occurs in the backfill area can be absorbed by the tolerance window in the telescope. The load of the shaft cover is dissipated by the support of the shaft frame in a fresh concrete bed.

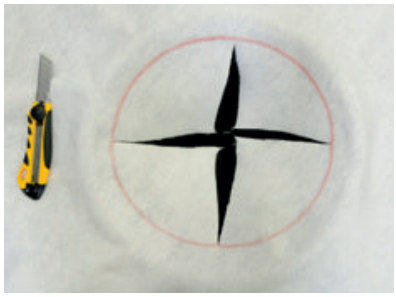
Caution!

- Before inserting upper sections, remove protective film from seal and clean it
- Seals must be coated with a suitable lubricant
- Upper section must be inserted to at least the minimum insertion depth!

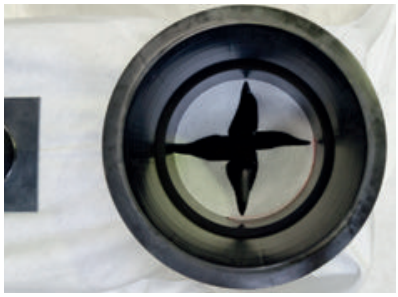
Insert the upper sections



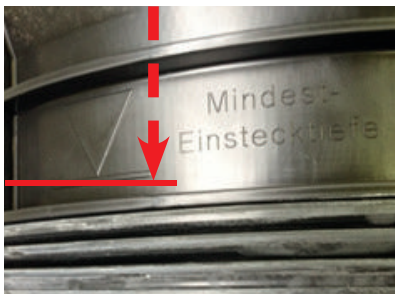
Drawing the inner diameter



Cutting a cross within the marked circle



Installing the intermediate section (= sand tight)



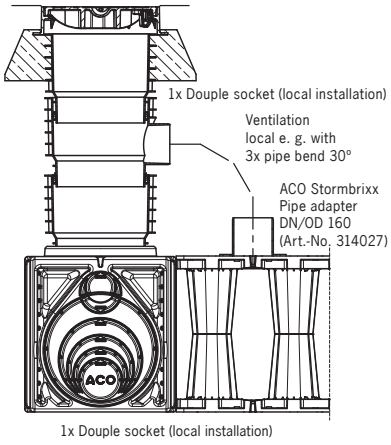
Insert to at least the minimum depth!

The temporary cover/formwork must protect the opening throughout the whole of the construction phase

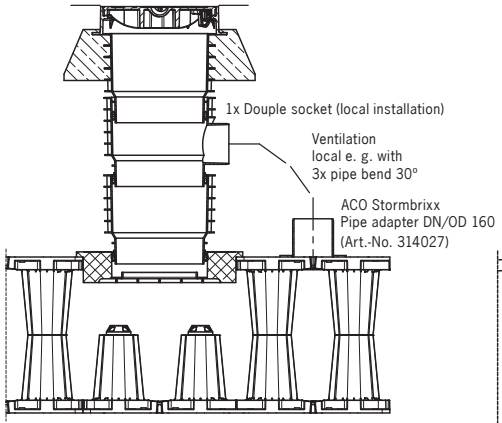
Creating a ventilation:
A pipe elbow connects the upper part with the nozzle and the pipe connection adapter

Inspection via different access points

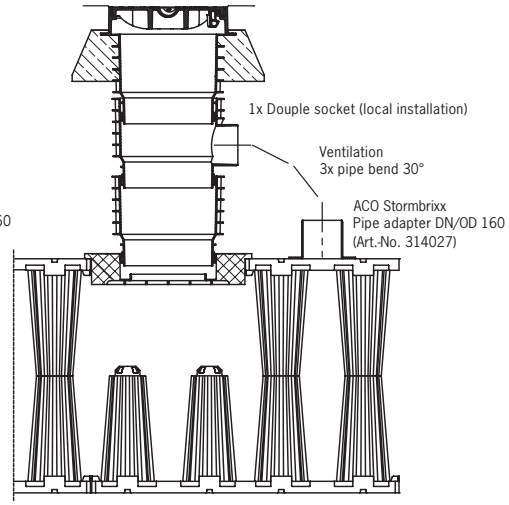
At the edge of the box
via the ACO Stormbrixx upper part
(inner diameter = 339 mm)
in connection with the access chamber
(inner diameter = 400 mm)



Within the box
via the ACO Stormbrixx upper part
(inner diameter = 339 mm)
in connection with the access plate
(inner diameter = 400 mm)



Within the box
via the ACO Stormbrixx upper part
(inner diameter = 339 mm)
in connection with the access plate
(inner diameter = 400 mm)

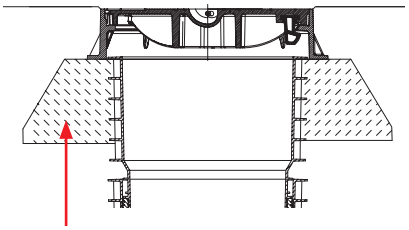


Shaft cover SA 400

The shaft cover has a maintenance free, screw-free and traffic-safe catch made from highly wear-resistant plastic (conforms to DIN EN 124 / DIN EN 1229, is stable at extreme temperatures, repels dirt, is self-locking and vandal-proof). Once the cover has been put in place, it can be locked into place by stepping on it vertically on the area sitting over the frame. A concrete seating surrounding the upper section provides the load transmission for the shaft cover. A concrete seating C12/15 approx. 20 cm wide is created all the way around, as defined by DIN EN 206-1, and raised by 2 cm to the highest drain upper section.

Use the inserted temporary cover/formwork to smooth off the inserted concrete flush. Then remove the temporary cover/formwork, press the frame into the wet cement base to a depth of approx. 2 cm until it is completely seated on the upper shaft section or as required for the final height.

After inserting the frame, it is possible to use a dirt bucket compliant with DIN 4052-B, low profile.



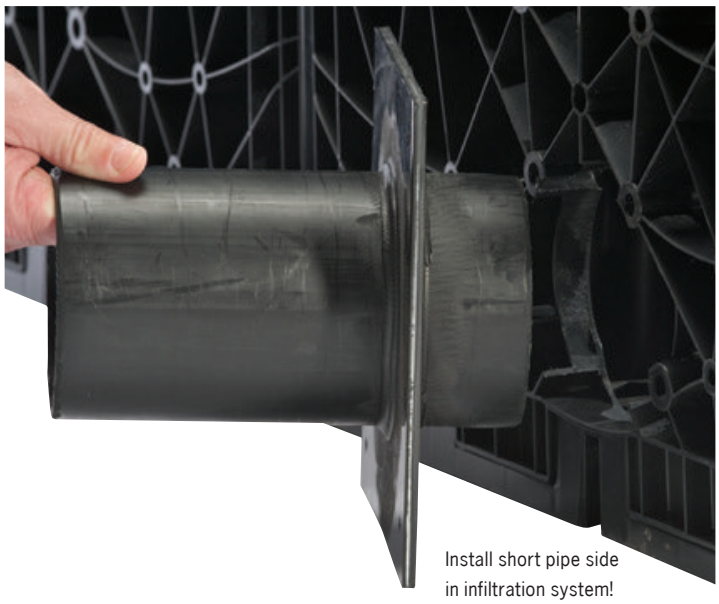
Depth of concrete: 20 cm
Concrete quality: ≥ C12/15

Available with and without air vents

Making the pipe connections

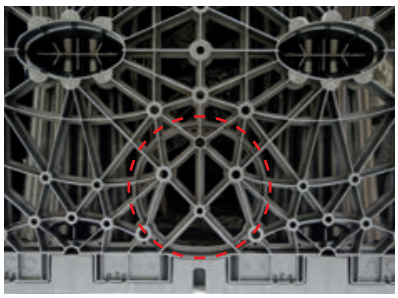
ACO Stormbrixx pipe adapters must be used for the connection of inlets and outlets and ventilation pipes at the side panels of the infiltration system. Sizes from DN/OD 110 to DN/OD 315 are available.

Pipes size DN/OD 400 are connected laterally only via the shaft base or intermediate section of the ACO Stormbrixx HD infiltration system.

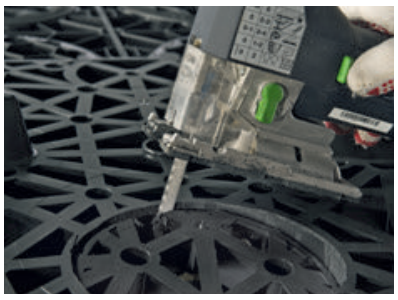


Install short pipe side in infiltration system!

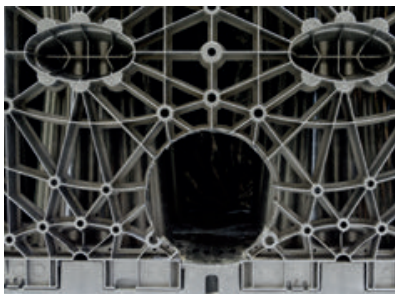
Side openings



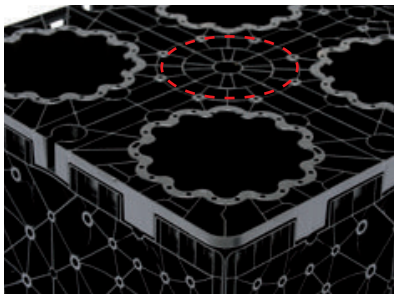
The openings for inlets and outlets must be cut out before installing the side panels



A keyhole saw with extra-long saw blade is required to cut out the pipe connection opening in the side panel

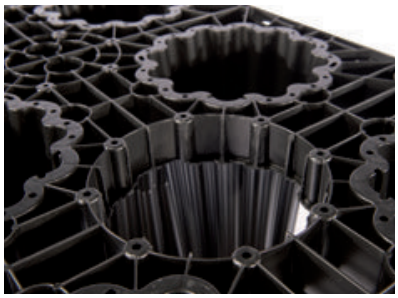


Top openings

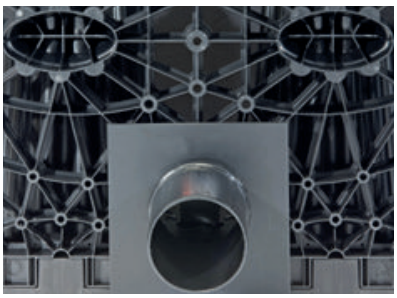


The openings for ventilation and the inspection openings must be cut out of the basic elements before they are installed

A keyhole saw with extra-long saw blade is required to cut out the openings for the pipe penetrations in the side panels and at the top of the basic elements

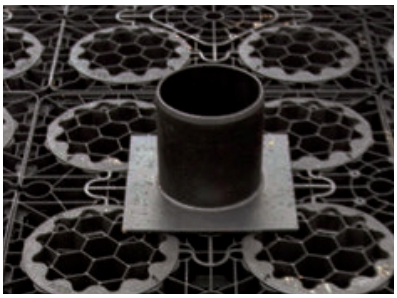


Markings on the side panels indicate the opening sizes for different pipe diameters



The pipe adapter is mounted in the previously cut out opening in the side panel

The geotextile is cut in and is pushed over the pipe adapter



The pipe adapter is mounted in the previously cut out opening at the top

The geotextile is cut in and is pushed over the pipe adapter

Pit excavation and surrounding the infiltration system

The soil must be load-bearing and sufficiently permeable for infiltration. In case of non-load bearing soil the geological conditions must be investigated and suitable measures taken. The load-bearing substrate must be stone-free, flat and without a gradient.

The bedding consists of the in situ soil or exchanged soil with a minimum load-bearing capacity of $E_{V2} \geq 45$ MN/m² and an approx. 5 cm thick blinding layer (chippings/gravel without fines) with grading range 2/8. This blinding layer must be drawn off flat.
The permeability of the soil must be ensured even after compaction. The quality of this bedding is decisive for the further laying and has a significant influence on the load-bearing and settlement behaviour of the hollow block infiltration systems, especially where a multi-layer structure is used or large loads occur (soil/traffic load).

The system must not be installed permanently or temporarily in in-situ groundwater, stratum or perched water. The relevant recommendations of the DWA-A 138 standards must be taken into account for infiltration systems. Accordingly, the distance to the mean highest groundwater level should be at least 1.0 m.

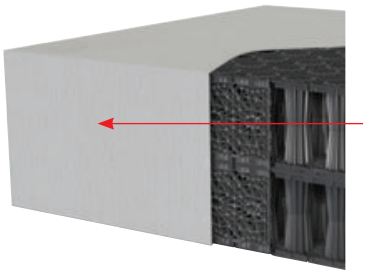
Infiltration – Laying the Filter Fleece

The entire block infiltration system must be surrounded with **filter nonwoven.** Before laying the basic elements, the nonwoven must be laid out on the blinding layer with sufficient overhang. ACO Stormbrixx is completely surrounded with the filter nonwoven, to prevent the penetration of fine soil fractions. At least 0.50 m overlap must be maintained on all sides of the infiltration system. Ensure that the nonwoven fits tightly on the ACO Stormbrixx system and soil does not penetrate between the components and the nonwoven enclosure.

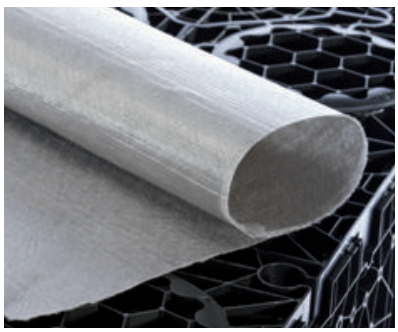
The filter nonwoven is dimensioned as follows: Length of the nonwoven sheets = infiltration system perimeter **+ at least 0.50 m overlap.** The two ends of the geotextile are temporarily and adequately fixed on the trench slopes or edges. After installing the ACO Stormbrixx components the filter nonwoven is detached from the trench slopes/edges and is placed over the infiltration system with overlap at the nonwoven joints. Ensure that the nonwoven fits tightly on the ACO Stormbrixx System and soil does not penetrate between the components and the nonwoven enclosure.

After creating a level surface which is free of stones, even and without gradient the trench is lined with a filter fleece.

Please note!
Take care that the overlaps are always at least 50 cm, that the fleece surface is completely sealed and that it cannot fall open during in-fill.



Infiltration geotextile

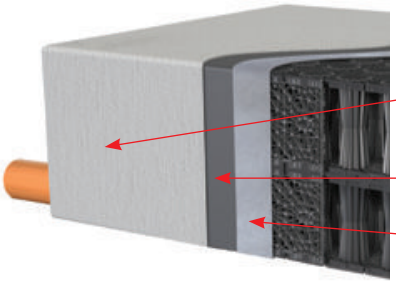


Attenuation – Laying the protective fleece and sealing membrane

If the modular ACO Stormbrixx infiltration system is used to retain surface water, the entire system must be surrounded by a **waterproof membrane** and welded. The waterproof membrane must be protected against mechanical damage by a **protective nonwoven on both sides**.

The pipe adapters and shaft upper parts must be welded with the sealing membrane. The sealing membranes must be welded by examined qualified welders with testable welds in accordance with the DVS guidelines. The tightness of the welds must be verified and appropriate test records must be submitted to the client. The work must be carried out by a specialist company with examined plastic welder.

Important!
It must be ensured that the surface of the nonwoven and waterproofing is completely closed and no openings can occur during backfilling!



Covering over – Infilling

Recognised good technical practice, and applicable laws and standards must be respected (such as „Additional technical specifications and guide lines for soil works in road constructions“ (ZTV E-StB), „Directive for standardisation of upper surfaces for road constructions“ (RstO)).

Filling the trench sides
The stone-free infill material (which must meet DIN 18196) must be compactable and able to absorb percolated water. The coefficient of permeability of the infill material must at least match the calculated kf-value.
Side infilling is to be carried out according to DIN EN 1610, in layers no deeper than ≤ 30 cm each time, up to the upper edge of the trench.

Compact the fill material with a light-weight compactor to a Proctor value of approx. 97%. Avoid any direct contact between the compactor and the plastic components. The insertion of the infill material must not create any problematic distortion, damage or inappropriate loading of the trench system. Care must be taken when infilling and compacting that the overlaps of the geotextile are not disturbed and pulled apart, and that the ACO Stormbrixx system is not damaged!

Covering
After completing the infilling around the sides, a compacted covering of 10 cm of stone-free filler material and a 35 cm thick load-bearing layer of e.g. road metal are placed over the infiltration system to create a flat base for the subsequent structure.

Covering the ACO Stormbrixx system must be done in layers, tipping materials from the edge. For this e.g. a light-weight backhoe or wheel loader can be used with a maximum total weight of 15 tonne (4 double wheels). This equipment may only be driven over the site once it is covered by a sufficiently compacted layer with a thickness of ≥ 45 cm, while taking care not to create tracks.

For surfaces which will carry traffic the current road construction regulations apply (RStO). During and after the construction phase care must be taken to ensure that no dirt enters the infiltration system.

Please note!
Compaction using heavy vibrating rollers is not permitted! Driving construction vehicles directly over the ACO Stormbrixx system is not permitted! Driving heavy construction vehicles directly over the ACO Stormbrixx system is only permitted when there is a compacted covering at least 100 cm thick.

Planning instructions and technical regulations

The information in this brochure, our application technology consultancy advice, and any other recommendations are based on a large volume of scientific research and many years of experience. Nevertheless, they are only indicative, and designers and fitters remain responsible themselves for checking the products and the installation instructions in combination with all local circumstances, current technical regulations and the current state of the art of the technology, and we accept no liability.

ACO Stormbrixx is a modular infiltration system made from synthetic materials which, on the one hand provides bulk storage, and on the other hand is used to provide bulk percolation of storm water. The installation is carried out totally below ground level. Providing the correct earth covering is an essential part of this (see Page 42/43). The prerequisites for long-term operation are advance and careful planning, correct installation by professionals and where relevant connection to a functioning watercourse, together with regular maintenance/cleaning. The **standards for concrete** given in the ACO Tiefbau installation details are minimum values. Any special requirements which arise from local conditions (resistance to frost, road salt, chemicals, abrasion etc.) need to be taken into account by designers, applying the correct **choice of exposure class** as defined in DIN EN 206-1 and DIN 1045-2. For the selection and design in particular, but also for the installation of Stormbrixx, the following **technical regulations** apply in their current versions.

DIN 1045-2 „Reinforced and pre-stressed concrete structures – Part 2: Concrete – Specification, performance, production and conformity; Application rules for DIN EN 206-1“
DIN 4124 „Slopes, planking and strutting, breadths of working spaces“
DIN 18196 „Civil Engineering – Soil classification for civil engineering purposes“
DIN EN 206-1 „Concrete – Specification, performance, production and conformity“
DIN EN 1610 „Construction and Testing of Drains and Sewers“
DWA (German Association for Water, Wastewater and Waste) and ATV-DVWK (former name of above) work instructions

- A 166 Structures for centralised storm water treatment and retention, 1999

DWA and ATV-DVWK fact sheets

- M 176 Notes and examples for the design and equipment of structures for centralised storm water treatment and retention, 2001
- M 178 Recommendations for the planning, construction and operation of retention ground filters for additional rainwater handling in mixed and separated systems, 2005

(In addition to the DWA rules listed on page 64)
RAS-Ew „Directives for Road Design – Section: Drainage“
RStO „Directives for the Standardization of Traffic Area Surfaces“

VOB (standard building contract terms) Part C:
ATV (general technical requirements) DIN 18299 „General regulations for construction work of all kinds“
VOB Part C: ATV DIN 18300 „Excavations“
VOB Part C: ATV DIN 18315 to 18318 „Construction of traffic-bearing roads; Surface courses without binder/ … with hydraulic binder/… made of asphalt/ … dry-jointed sett and slab pavements and surrounds“
Working paper „„Surface pavements with pavings and slabs by bonded construction“ ((Research Company for Roads and Traffic) FGSV-No. 618/2)
ZTV Asphalt-StB „... for the Construction of Asphalt Pavement Surfaces“
ZTV Beton-StB „... for the Construction of Concrete Pavement Surfaces“
ZTV E-StB „...for Civil Engineering for Road Construction“
ZTV Ew-StB „Additional Technical Terms of Contract and Directives for the Construction of Drainage Systems in Road Construction“
ZTV P-StB „... for the Construction of Dry-jointed Sett and Slab Pavements“ (without binder)
ZTV T-StB „... for the Construction of Base Courses for Road Construction“

The above list of regulations, standards and directives is indicative only for the design and implementation of line drainage in surfaces which bear traffic, and makes no claim to be exhaustive. To provide verification and certainty we recommend a local hydraulic test be organised on your site by ACO Application engineering. For special applications or for solutions which you do not see in this documentation, please contact ACO Application engineering. Our colleagues will be pleased to advise you and assist you in finding the best solution. Please contact them in your country.

Please also refer to the legislation and technical regulations on page 64.

Maintenance and inspection

Visual Inspection, maintenance and cleaning

Thanks to the intelligent building block architecture of ACO Stormbrixx, which requires only an external perimeter to the entire system using easy-to-erect side walls, the total volume of the installed infiltration system is accessible for inspection and washing.

Basically, maintenance work needs to be thought about during the planning phase. In detail, this may mean: in addition to the maintenance instructions we always recommend adhering to all the current relevant legal requirements (DWA-A 138 with instructions for the maintenance of infiltration systems)

During and after the construction phase care must be taken to ensure that no sediment enters the inlet pipes, shafts and the infiltration system. During and immediately after the construction phase an increase in the volume of sediment must be expected from the connected surfaces and must be counteracted.

Maintenance frequency

The initial inspection/cleaning of the ACO infiltration system should take place after completion and before handover, so forming part of the commissioning of the installation.
A visual inspection of the shafts and a camera passage through the pipes and the infiltration system is recommended. The results should be recorded in an operating logbook.

To guarantee long-term operability, the recommendations of the current relevant legal requirements must be respected (DWA-A 138, instructions for the maintenance of infiltration systems).

A visual inspection must be carried out at least twice a year, preferably in the spring (high pollen levels) and autumn (falling leaves). If necessary, maintenance/cleaning should be undertaken.

The operator is responsible for ensuring that all maintenance work is carried out by qualified expert staff, who are fully aware of the maintenance and operating instructions.
Relevant accident prevention regulations must be respected.

The results of the inspections carried out can then be used to determine the frequency of maintenance interventions in future.

If unusual weather conditions occur (heavy rainfall or similar), additional inspections and/or maintenance are recommended.

The inspection equipment can be moved freely through the trough-shaped indentations in the base plates of the system

Camera, jetting nozzle

The inspection and cleaning accesses, consisting of shaft bases, intermediate sections and upper parts, provide an easy way for sewer cameras, jetting nozzles and jetting lances to access the ACO Stormbrixx hollow block infiltration system (see page 50–53).

Cleaning

The cleaning of the ACO Stormbrixx infiltration system can if necessary be carried out using sewer cleaning equipment (sewer cleaning technology/high-pressure washing). The maximum water pressure must not exceed 100 bar.

The water can be sucked out through the upper sections and the lower and intermediate shaft sections.
When disposing of the cleaning water/sediment all applicable legal requirements must be observed.

Visual inspection

Visual inspection includes the following points:

- The condition of the infiltration space (side walls, bases, covers, columns)
- Connecting pipes

If there are signs of leakage, the watertightness of the system must be re-established by suitable tests.

Maintenance measures

If faults are detected during the visual inspection (dirt, distortions etc.) these must be corrected immediately.

Operating logbook

The results of the visual inspection and any maintenance and repair measures undertaken must be recorded in an operating logbook. These records then allow decisions to be made about the necessary frequency of future visual inspections and maintenance measures.

The following data and information must be recorded in the operating logbook:

- Completeness of the operating log book
- Date of visual inspection or maintenance work
- Identity of staff involved
- Problems arising (also causes of problems)
- Measures taken

Keeping a logbook has many benefits, e.g. traceability of sources of problems, targeted error analysis and determination of follow-up measures.

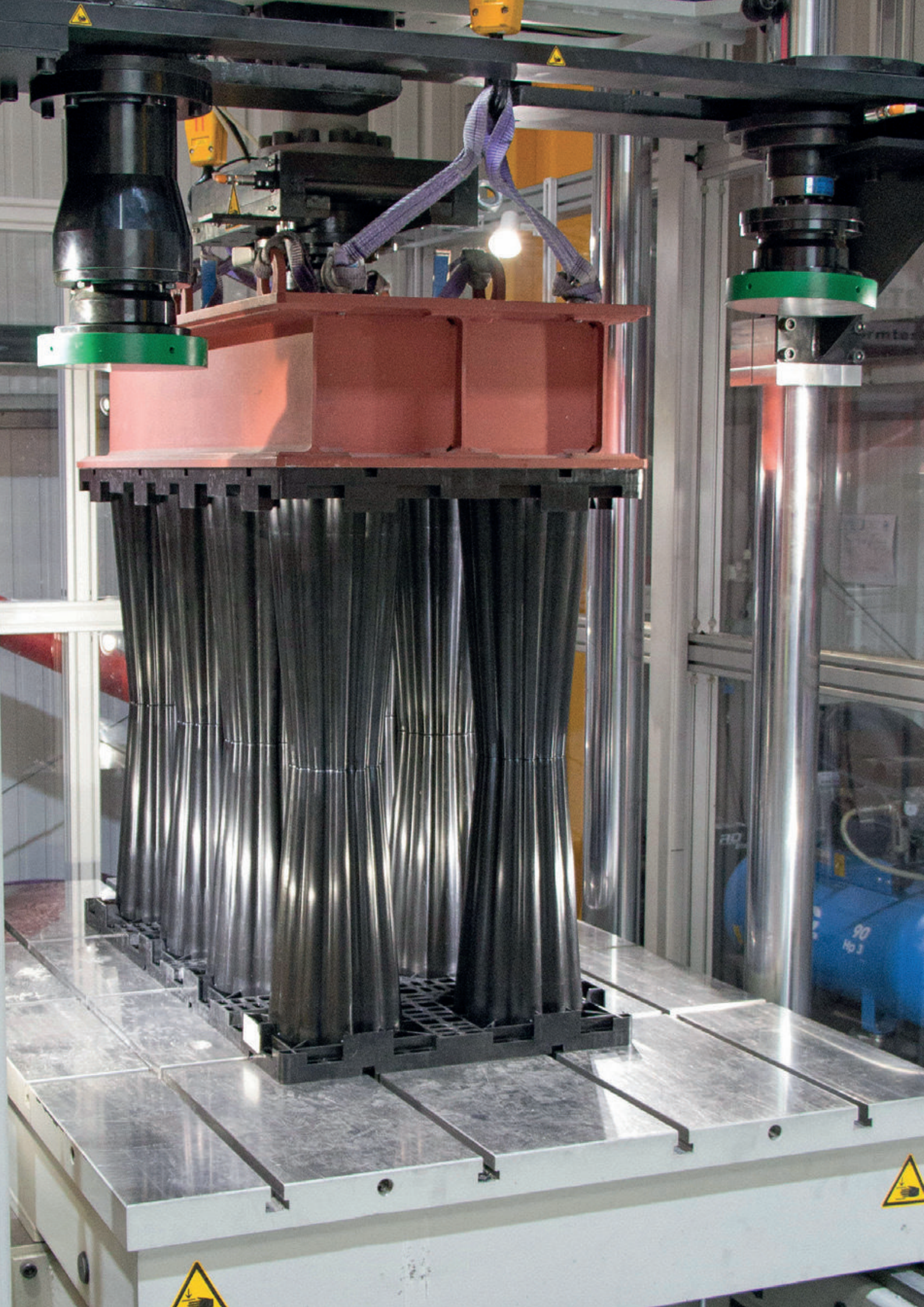
Warranty

Please refer to the relevant section in the general terms and conditions of sale of the ACO company in your country.

Vertical access directly through the system

Push camera, cleaning equipment with a rinsing head

Self-propelling camera



FEEL SAFE WITH US

50 YEARS

Product testing

According to the installation conditions ACO Stormbrixx systems provide a product safety, which is designed for 50 years in accordance with DIBt guidelines.

ACO Stormbrixx HD is DIBt-certified. ACO Stormbrixx SD has been tested by the Gesellschaft für Materialforschung und Prüfanstalt für das Bauwesen Leipzig mbH, Germany.

Regular material and product tests ensure continuous quality.

MFPA

Deutsches Institut für Bautechnik DIBt

The specifications in Germany:

Legislation and technical regulations that support solutions

Over the past few decades, draining the accumulated surface water to the watercourse as quickly as possible became an overriding goal. Today, the aim is to enable rainwater to seep, or to recycle it, as well as to keep sealed surfaces to a minimum: surface water should seep away where it falls. Statutory rainwater charges are now levied for sealed surfaces in practically all regions of Germany.
If securing surfaces is unavoidable, rainwater can be managed by means of infiltration and storage.

German Water Resources Law

Both the EU Water Framework Directive and the German Water Resources Law establish clear requirements for handling rainwater.
"Surface water should seep away or be irrigated locally, or be routed into a watercourse directly via a sewage system, without being mixed with grey water, provided that this does not contravene legal requirements on water or other regulations under public law, nor come into conflict with water management issues" (Section 55 German Water Resources Law of 01.07.2009).

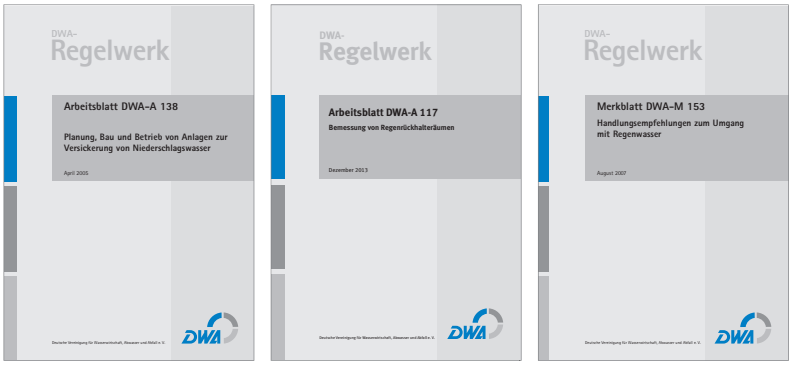
As well as this, German federal states as well as municipalities, towns and cities define their own specifications and regulations that building owners, planners and land owners are required to adhere to.

DWA set of rules

The following rules must be considered when dimensioning infiltration systems and surface water attenuation facilities:

- Standard DWA-A 138
  "Planning, Construction And Operation Of Facilities For The Infiltration Of Precipitation Water". Applies to the infiltration of precipitation that falls on permeable and impermeable secured surfaces. This serves as an essential foundation and must be taken into account for every infiltration system.
- Standard DWA-A 117
  "Dimensioning Of Storm-Water Holding Facilities". Applies to general waste water drainage between land drainage and watercourses.
- Advisory Leaflet DWA-M 153
  "Recommended Actions for Dealing with Storm Water". Provides recommendations for pre-treating rainwater before it is allowed to seep away or routed to a watercourse.

DWA
Klare Konzepte. Saubere Umwelt.



The services:

Dimensioning, consultation, development – benefit from ACO's expertise

The ACO application engineering team assist with all the technical development work involved in the building projects you are planning.
Its services include:

- Selection, dimensioning and determining quantities of required products, such as drainage channels and/or gullies, sedimentation systems, separators and heavy metal seperators – with the applicable directives taken into consideration in each case
- Dimensioning and configuring trench storage components
- Dimensioning the flow control shaft (if required)
- Creating the relevant drawings and installation plans (if required)
- Compiling project-specific performance specifications

The application engineering team is on hand to answer any technical questions you may have about products and installation. Please contact them in your country.

When it comes to dimensioning Cleaning systems, infiltration and attenuation systems, enlisting the assistance of experts is a must. There is also the option of completing and returning the project questionnaire, which is designed to help you determine all the specifications required for expert infiltration or attenuation as well as identify the right pre-cleaning solution for you.
This involves providing the following information:

- What is the quality and pollution level of the collected rainwater? Does it involve a heavily used road, a metal roof or a surface that is only slightly contaminated?
- What is the estimated recurrence interval?
- What are the maximum dimensions that can be used for the infiltration system (number of layers)?
- How far away from buildings is the system?
- What is the ground like?
  Does it have good infiltration properties or is it not very permeable (based on a soil survey)?
- What are the prevailing groundwater levels?
- Where should the water be routed to?
  Does it involve infiltration directly from the infiltration system into the ground or does it flow into a river or lake that is subject to restrictions concerning what can be introduced into it?
- How many litres per second may be fed into the watercourse?
  If a flow control system is to be used, how should it be designed?

The project questionnaire: Please ask your ACO contact person.