

AQUABOX



GEOCELLULAR STORMWATER MANAGEMENT SYSTEM



THE SOLUTION

Aquabox is a modular underground retention unit made of virgin or regenerated polypropylene, designed for the sustainable management of rainwater.

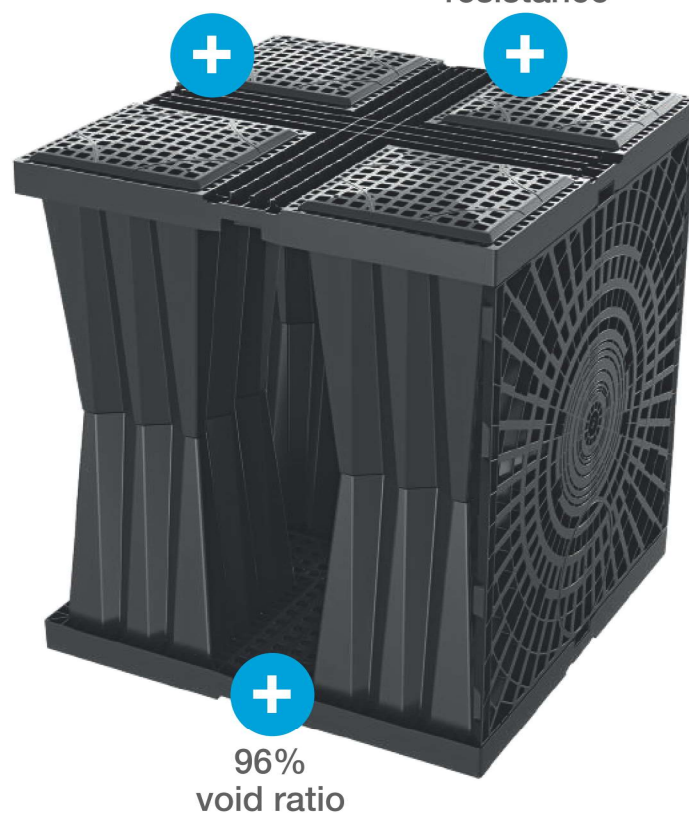
Built areas can suffer flooding due to lack of proper rainwater management. Aquabox is used for controlling a rainwater by creating infiltration, storage and retention tanks or collection tanks to reuse water and turn it into a resource.

The elements are assembled on site and joined by high-strength connectors that ensure the stability of the tank.

Thanks to its high mechanical resistance, Aquabox can be installed both in urban areas and in industrial/commercial areas subject to heavy vehicle traffic.

fast and easy
installation

high load
resistance



96%
void ratio

RAINWATER INFILTRATION

STORMWATER ATTENUATION

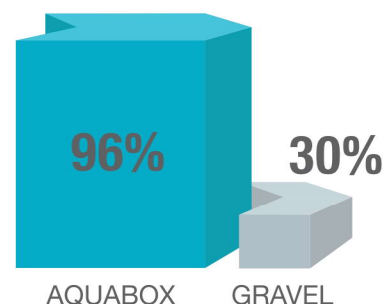
RAINWATER HARVESTING

THE CONCEPT: HIGH VOID RATIO

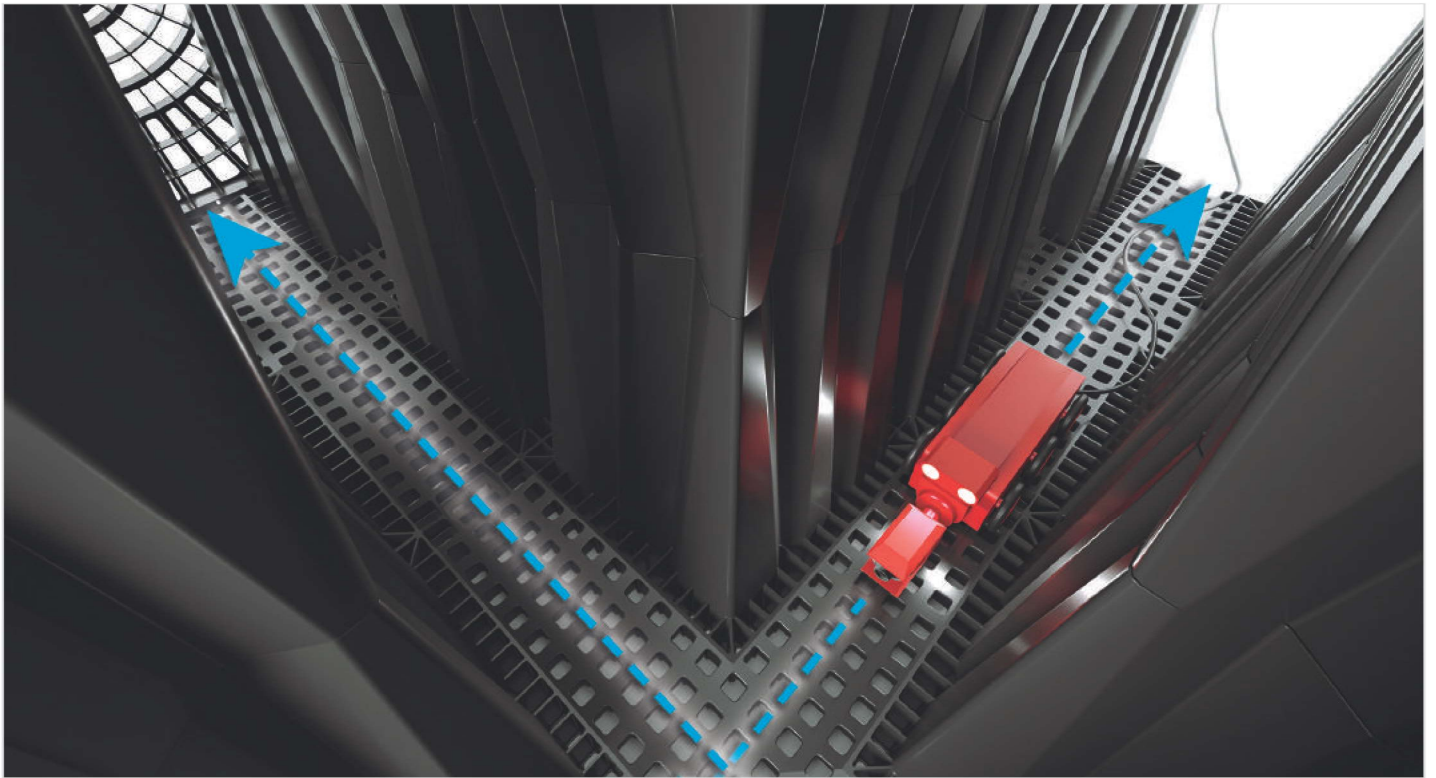
Aquabox is an alternative to gravel pits.

The assembled module guarantees a void ratio that is 3 times greater than gravel. Due to its shape, Aquabox stores a high volume of rainwater while significantly reducing the volume of excavation.

Each assembled Aquabox element offers a net water storage capacity of 432 litres (nominal 450 litres). Designers and clients prefer the Aquabox system over traditional methods (gravel and pipes) thanks to its very high void ratio (96%).



ADVANTAGES



Each Aquabox module is formed by coupling two semi-modules. The system is composed of a series of modules joined by snap-lock clips and confined by lateral grids and upper closing covers: all these elements together create structural voids suitable for underground rainwater management.



HIGH STRENGTH

The load-bearing capacity of a rainwater management system is essential for effective and durable system design.

The system was designed for use up to SLW 60 / HGV 60 and installation depths of up to 6.3 m: its honeycomb structure is solid and rigid, thanks also to the integrated fastening system and high-strength connectors.



HIGH VOID RATIO

The Aquabox system allows storage volumes of rainwater equal to 96% of the nominal volume of the basin, guaranteeing a void ratio that is 3 to 4 times higher than gravel, with consequent savings in the surfaces used and a reduction in excavation depth.

Aquabox will reduce the risk of flooding in impervious urban areas.



INSPECTABLE

The internal configuration of the modules makes the system easily accessible for inspection, routine maintenance and cleaning.

The cavities are designed to allow the entrance of a wheeled camera to make a video inspection of the basin in any direction and on all levels.

STORMWATER MANAGEMENT



Aquabox was designed to meet the technical, logistical and economic needs of the stakeholders involved in the design, construction and management of underground tanks: the design community, the installation and building companies, and last but not least, the bodies that contract and then manage the water and rainwater drainage networks. Aquabox brings important benefits to each of them.



MODULAR

Aquabox is a system of 75 x 75 x H80 cm modular elements that is easy to manage at all different stages: from design to installation on site.

The elements are easy to handle and have dimensions and weights optimised for high productivity on site.

Finally, logistics are fully rationalised as the packaging makes full use of the available volumes in the transport vehicles and containers.



STACKABLE

The Aquabox elements were designed according to the philosophy of maximum possible packing density: all the larger elements are stackable, allowing 460 m³ of installed volume to be transported in just 60 m³ of packaging and a single truck load. The economic, logistical and environmental advantages are very clear and appreciated by all the players in the value chain.

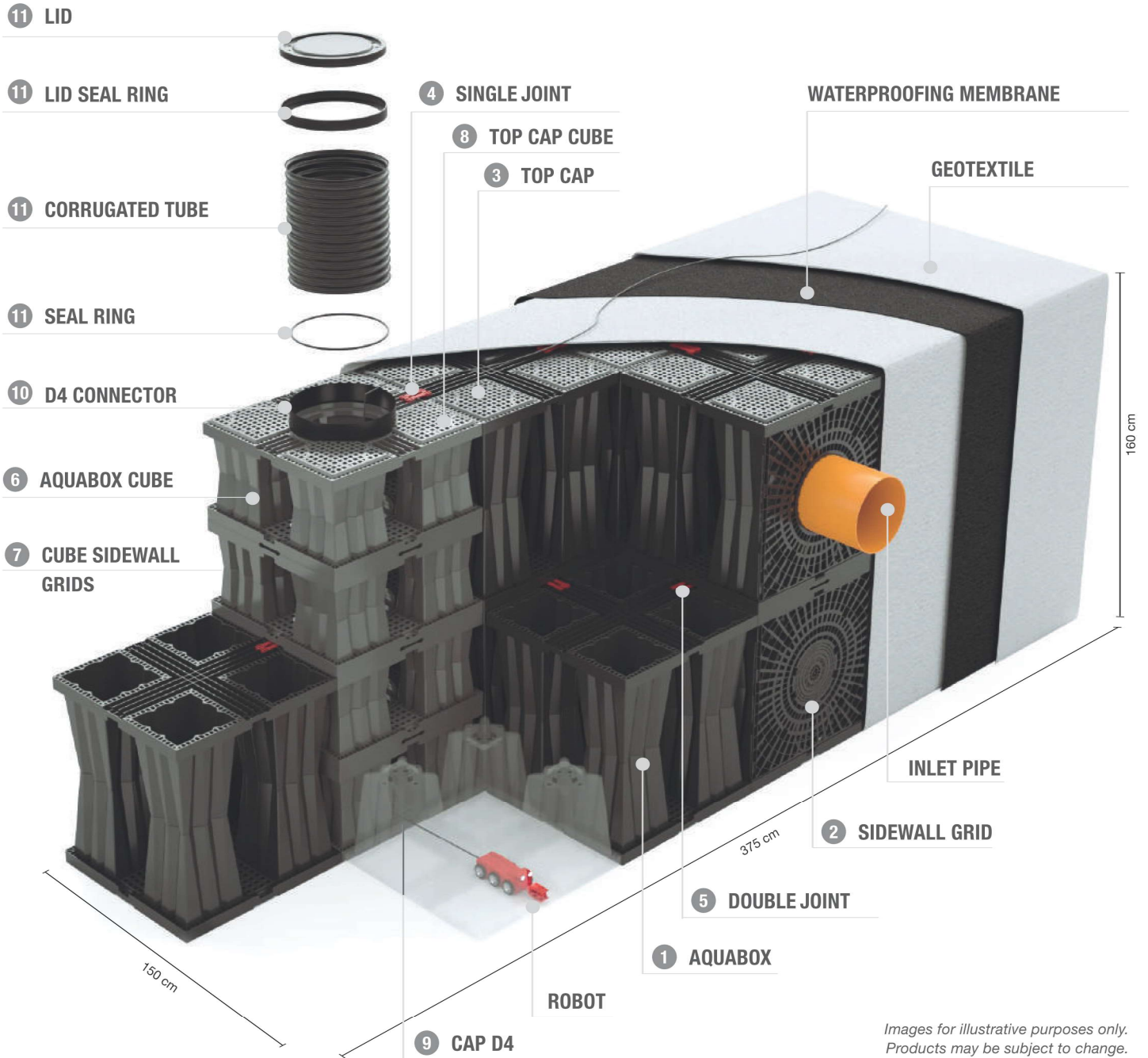


VERSATILE

Each project and each tank has its own history and its unique requirements: Aquabox is designed as an open and flexible system that can be used for different loads and tank depths.

The Aquabox element, produced in 4 different versions, was designed to meet a wide range of different needs: materials with high mechanical performance meet the requirements of strict technical specifications and performance; while the use of 100% regenerated materials meet the sustainability requirements that demanded for environmental preservation.

THE AQUABOX SYSTEM



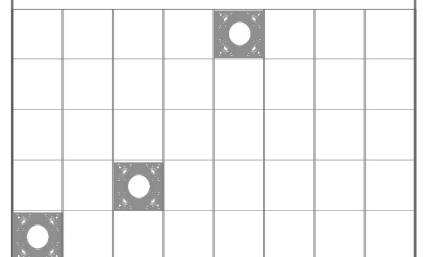
Images for illustrative purposes only.
Products may be subject to change.

SYSTEM COMPONENTS

1 AQUABOX	2 SIDEWALL GRID	3 TOP CAP	4 SINGLE JOINT	5 DOUBLE JOINT	11 INSPECTION ACCESSORIES
6 AQUABOX CUBE	7 CUBE SIDEWALL GRIDS	8 TOP CAP CUBE	9 CAP D4	10 D4 CONNECTOR	

CUBE POSITION

The Aquabox Cube shaft can be placed in any point of the tank.



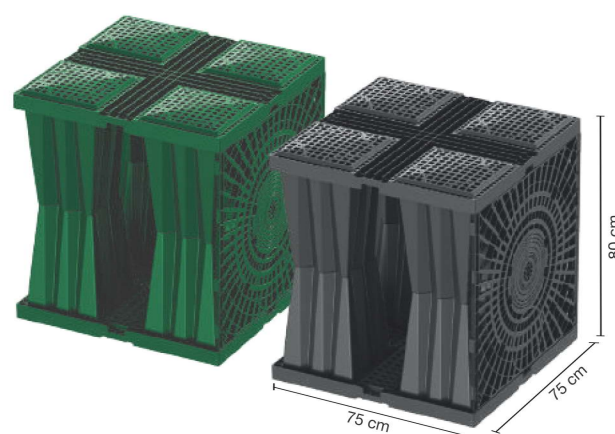
AQUABOX

Aquabox is a modular element in plastic material used for the realization of underground basins for rainwater infiltration, detention and harvesting.

The Aqualock mounting system makes it possible for each module to be pre-assembled by one person without the use of cranes or mechanical means.

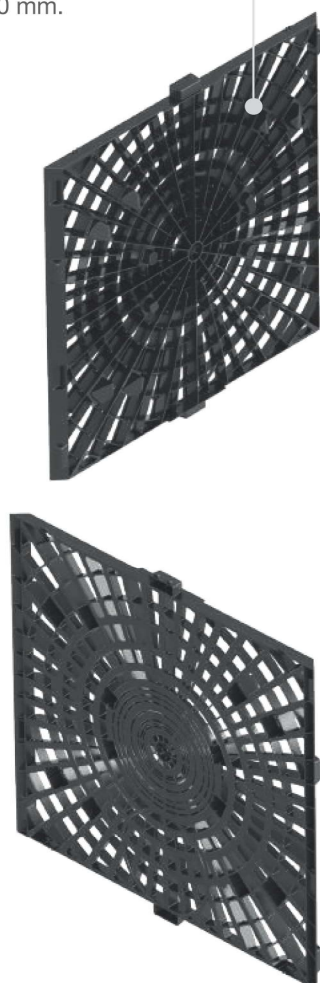
Finally, the modules are installed in-situ very quickly; in the case of multi-level basins the single and double connectors guarantee stability and solidity of the basin.

Each Aquabox module is composed by two assembled semi-modules, its total height is 800 mm.



SIDEWALL GRIDS

The sides of the tank are closed by the Sidwall Grids, which distribute lateral loads and make installation of geotextiles and waterproofing membranes easy. They also enable the connection of inlet and outlet pipes with pipe diameters up to DN500 mm.



TOP CAPS

The upper surface of each element is equipped with four perforated closing lids that allow the passage of water. At the same time, these closures create a homogeneous walkable surface which is useful both during installation and to distribute the loads acting on the system.

SINGLE JOINT

It allows the simple and quick horizontal connection of the Aquabox modules placed in the first and last level.

AQUABOX SINGLE

Hollow semi-module formed by four truncated-pyramidal pillars (H=400 mm).



DOUBLE JOINT

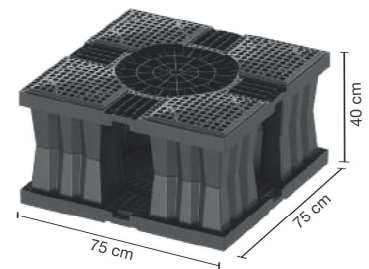
Allows quick and easy horizontal connection of the Aquabox modules located in the intermediate levels.

AQUABOX CUBE - INSPECTION

Aquabox Cube is a modular hollow element in virgin or regenerated polypropylene, designed to make inspection shafts for the inspection and management of Aquabox underground tanks.

The modularity of the elements always allows the installation in all tanks, even multi-layered ones.

Four assembled Aquabox Cube elements are 800 mm high, the equivalent of two assembled Aquabox elements.



CUBE SIDEWALL GRIDS

Grids are used on the sides of the tank. This allows a even distribution of side loads and the simple installation of geotextiles or waterproofing membranes. Moreover, being pre-shaped, they allow the connection of pipes of different diameters for the management of incoming and outgoing flow rates.

CUBE TOP CAP

The upper surface of each element is equipped with four perforated closing caps that allow water to pass through. At the same time, these caps create a homogeneous surface that can be walked on, which is useful both during installation and for the distribution of the loads acting on the system.

SINGLE JOINT

Allows quick and easy horizontal connection of the Aquabox Cube modules with the Aquabox modules located in the first and last level of the basin.

AQUABOX CUBE SINGLE

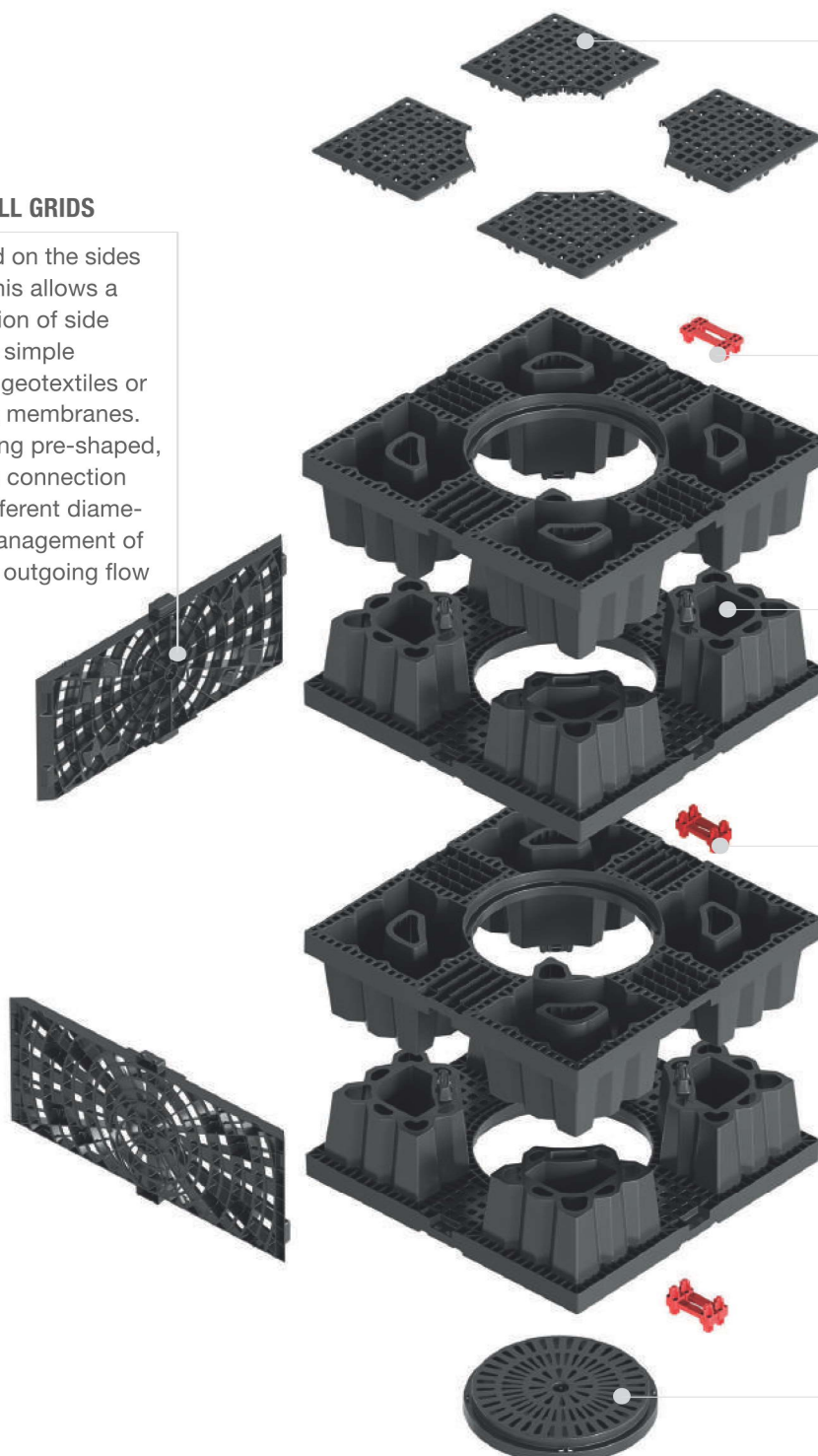
Half module made of 4 internally hollow truncated cone elements. (H= 200 mm)

DOUBLE JOINT

Allows quick and easy horizontal connection of the Aquabox Cube modules with the Aquabox modules located in the intermediate layers.

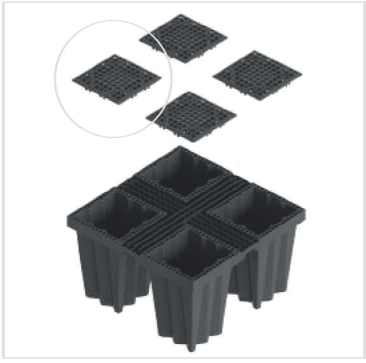
D4 CAP

Circular lid to close the bottom side of the Aquabox Cube inspection shaft.



SYSTEM COMPONENTS







TOP CAPS AND D4 CAP



The Top Cap is the top closing element for Aquabox and Aquabox Cube, to be installed only on the upper level of the Aquabox installation. The Top Cap is the top closing element in common for Aquabox and Aquabox Cube, to be installed only on the upper level of the Aquabox installation. The D4 Cap is used to close the Aquabox Cube shaft at the bottom of the tank and, if required, to close the upper side as well if Aquabox Cube is not used as access point to the tank.



INSPECTION SHAFT ACCESSORIES

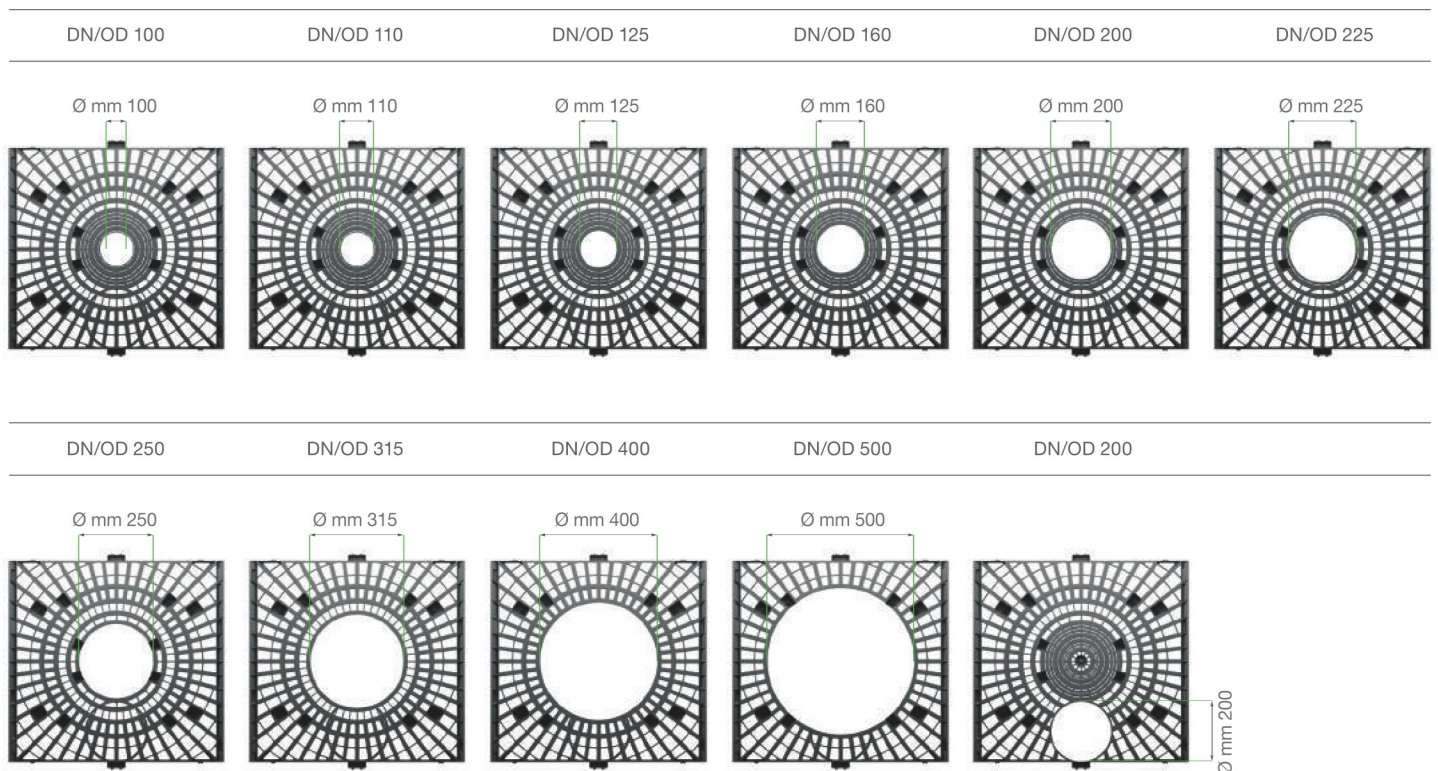
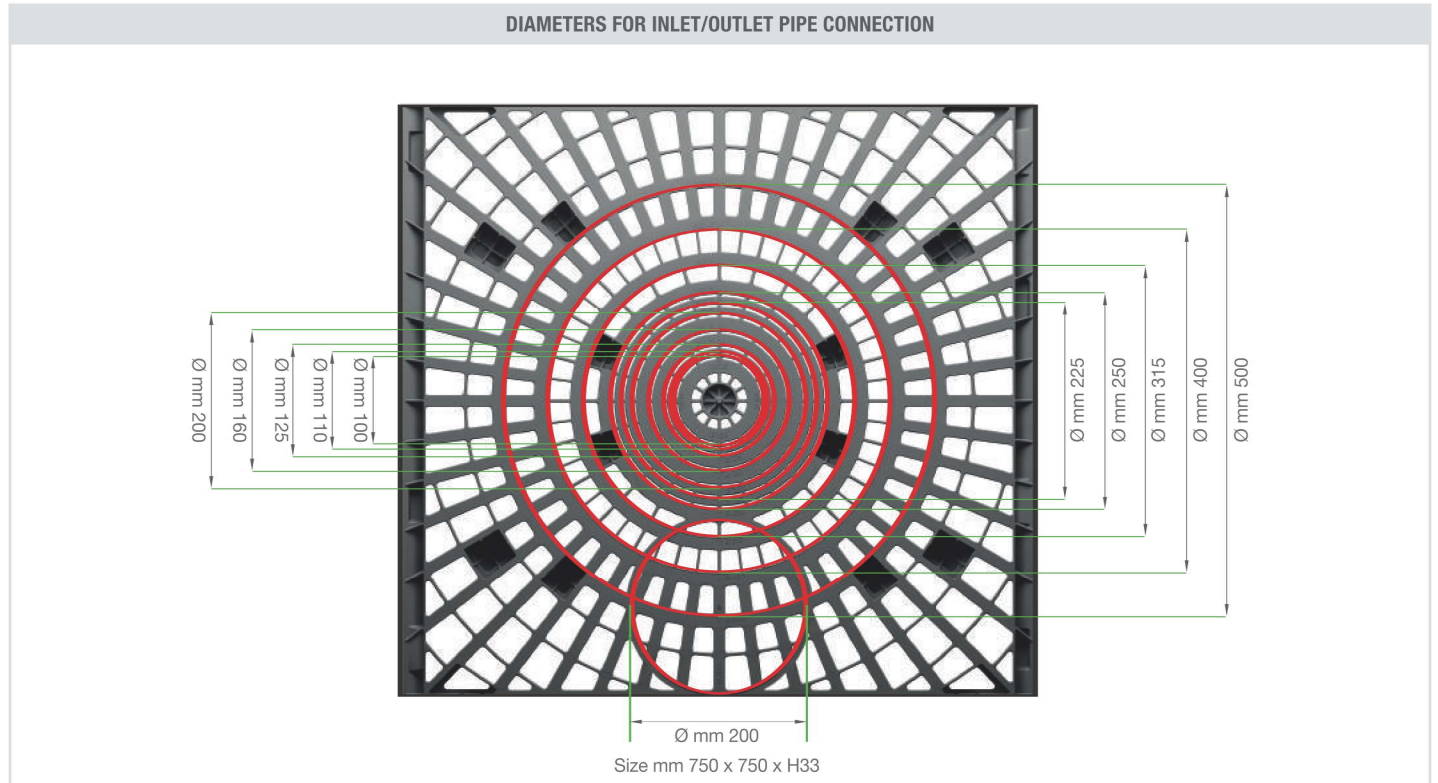
	LID Ø400 mm	
	LID SEAL RING Ø400 mm	
	CORRUGATED TUBE Ø400 mm	
	SEAL RING Ø400 mm	
	D4 CONNECTOR Ø400 mm	

AQUABOX SIDEWALL GRID

The Aquabox sidewall grid is used to close the lateral surface of the basin and is fixed to Aquabox with a simple integrated clip.

Each grid is equipped with templates corresponding to the market-standard diameters for inlet/outlet pipes.

The sidewall grids are designed to close the side of the basin and perfectly support the membranes chosen to wrap it.

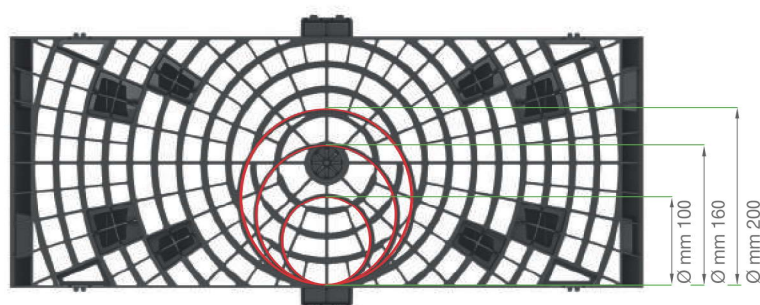


AQUABOX CUBE SIDEWALL GRID

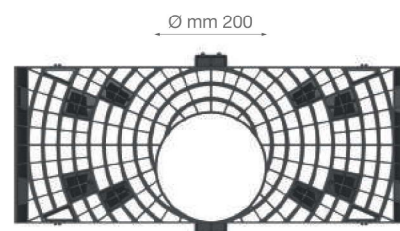
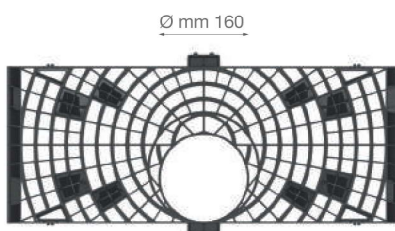
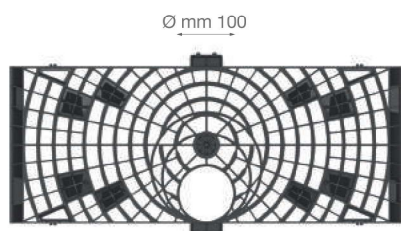
The Aquabox Cube sidewall grid is used for the side closing of each module when the access point is installed at the perimeter or at the edge of the basin.

If the Aquabox Cube is used inside the basin, no side grid is required.

DIAMETERS FOR INLET/OUTLET PIPE CONNECTION

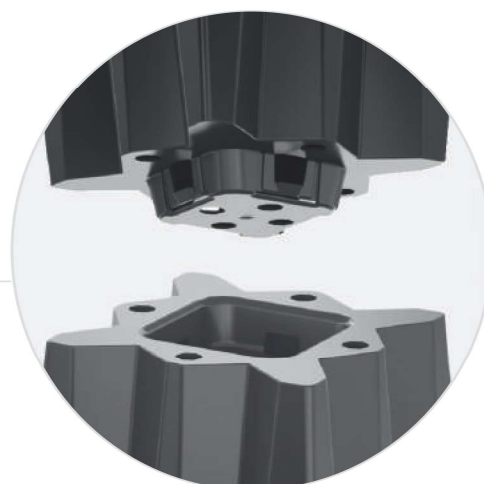
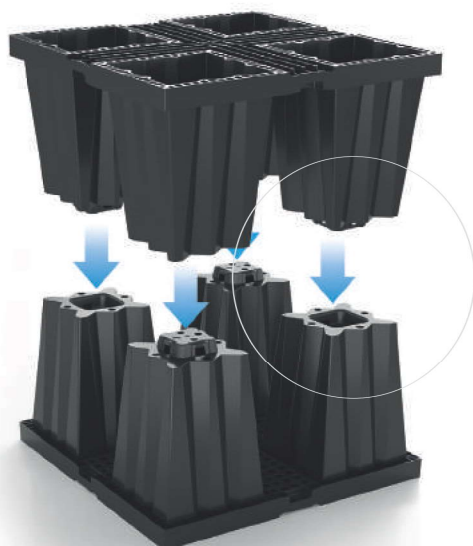


Size mm 296 x 746 x H26



THE AQUALOCK CONNECTOR

The functional design has led to the development of the Aqualock snap-lock connector, that allows a quick, intuitive and safe assembly.



AQUABOX HP AND HPR FOR HEAVY GOODS VEHICLES

The choice of Aquabox HP and HPR is based on the depth of the excavation, the storage volume required and the applied loads.

Underground drainage basins with Aquabox HP and HPR allow the overlying surfaces to be used for the following purposes:

SLW 60 / HGV 60 RATED SURFACES

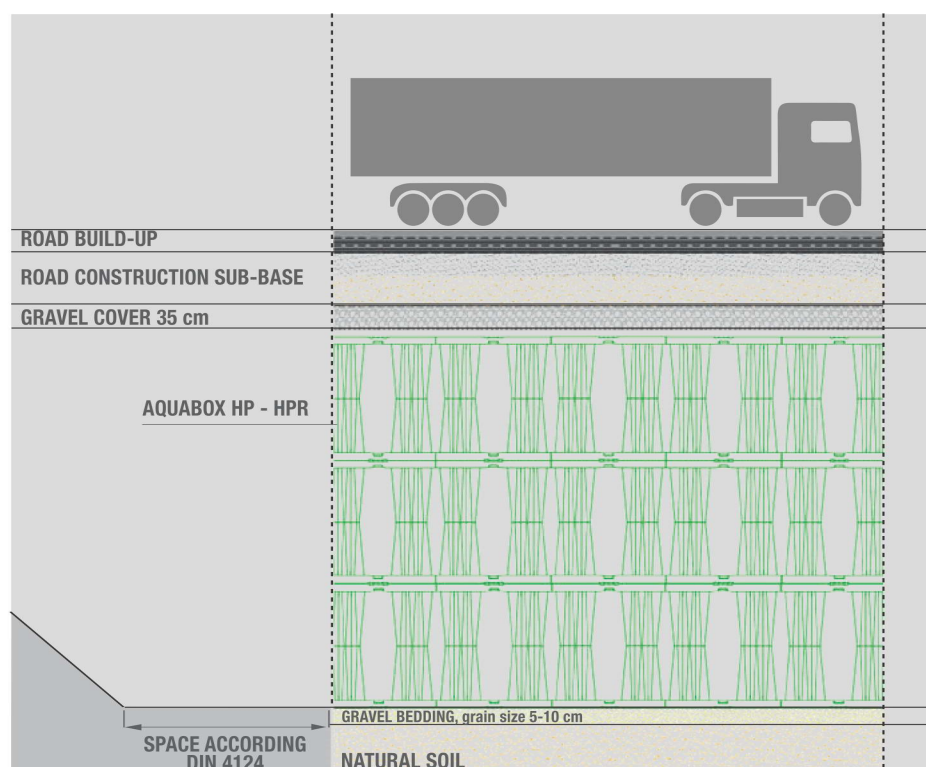
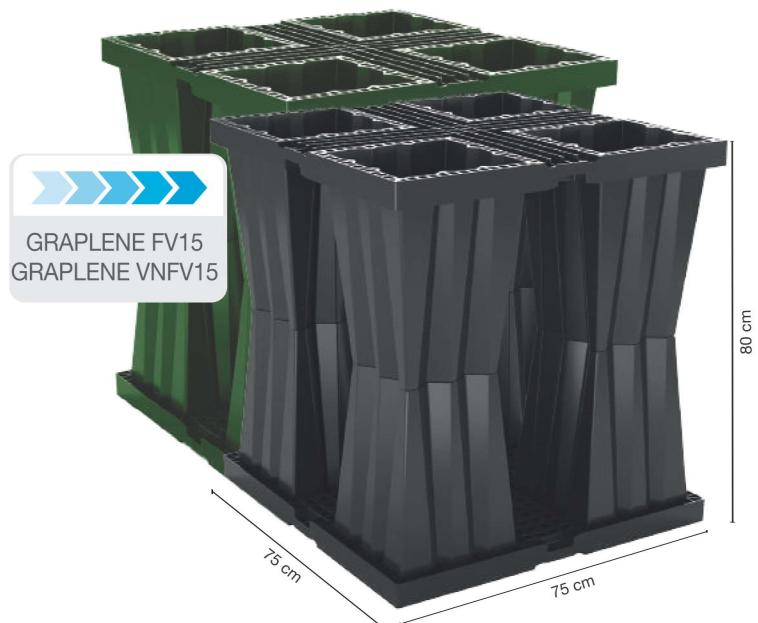
ACCESS RAMPS FOR HEAVY GOODS VEHICLES

ACCESS ROADS TO INDUSTRIAL AREAS

**PARKING AREAS FOR SPECIAL VEHICLES
(TRUCK MIXERS, FIRE ENGINES)**

Aquabox HP responds to the most stringent specifications, with high load conditions and demand for high mechanical performance.

For projects requiring the highest possible system performance, and high installation depth (up to 6.3 m) Geoplast produces Aquabox HPR in Graplene VNFV15 from virgin polypropylene.



TANK DEPTH

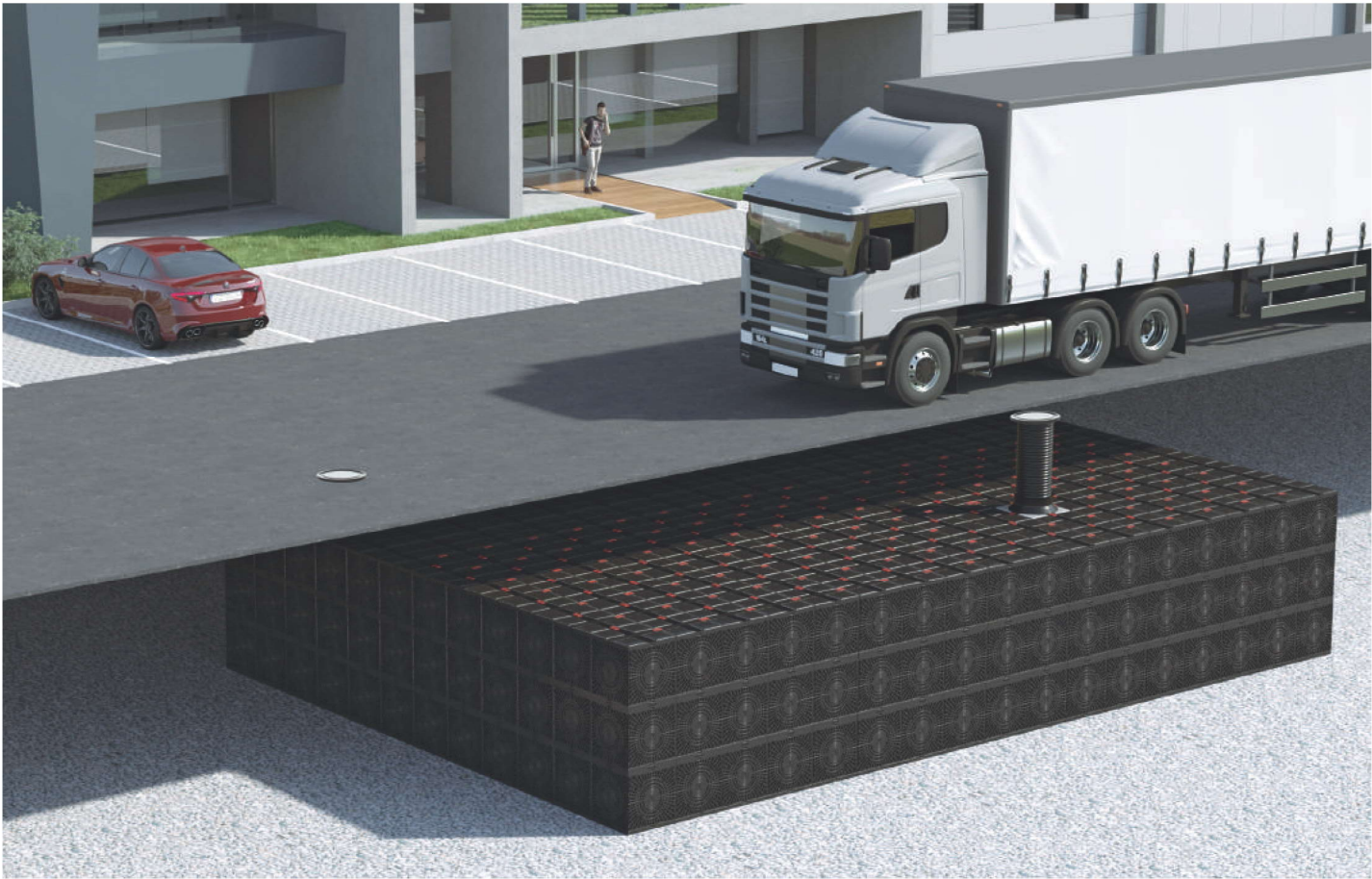
**up to
6.3 M ***

When building a tank under a road surface an upper levelling layer (ballast base layer) with a thickness of at least 350 mm must be applied. A further road construction sub-base according to norm/directive is absolutely necessary.

Aquabox HP and HPR are suitable for traffic loads up to SLW 60 / HGV 60.

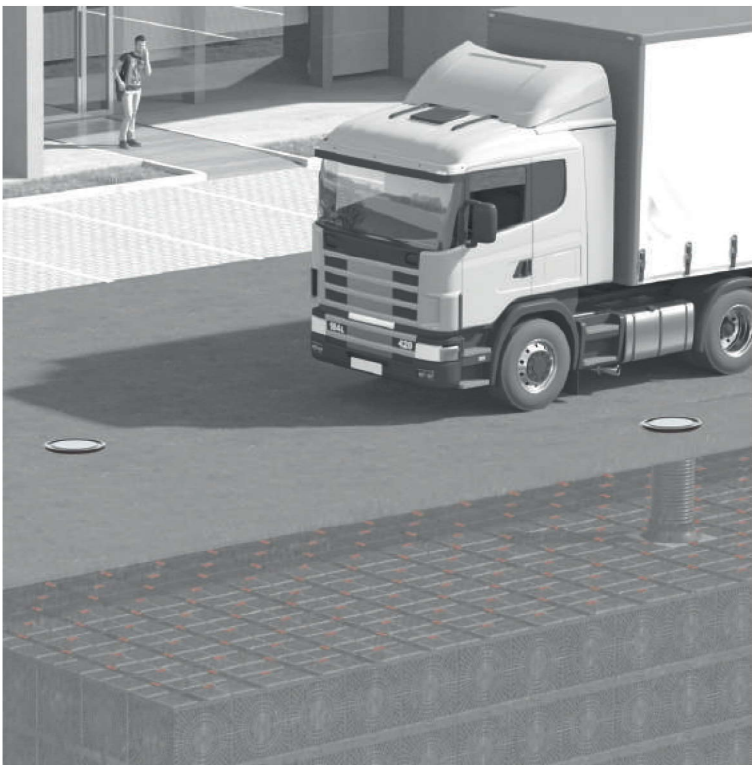
An analysis specific to your project can be prepared by Geoplast's technical department which, depending on the project, can assess the maximum depth of installation.

* The fields of application of the system must be verified and agreed with the Geoplast technical office.



Aquabox HP and HPR are designed for the passage of heavy vehicles, load class SLW 60 / HGV 60. The basin is equipped with access points for inspection and cleaning of the basin.

Aquabox HP and HPR are designed for a useful lifetime of 50 years.



SLW 60
HGV 60

AQUABOX HPR AQUABOX HP		
Maximum installation depth (m) tank base	6.3	6.1

Loads according to DIN1072. In the case of frost-related requirements, minimum covering 0.8 m according to DIN1054, or following the locally applicable norms and regulations.
For a correct sizing of the tank please contact Geoplast Spa.

AQUABOX STR

FOR CARS AND COMMERCIAL VEHICLES

The choice of Aquabox STR is based on the depth of the excavation, the storage volume required and the type of applied loads.

Underground drainage basins with Aquabox STR allow the overlying surfaces to be used for the following purposes:

SLW 30 / HGV 30 RATED SURFACES

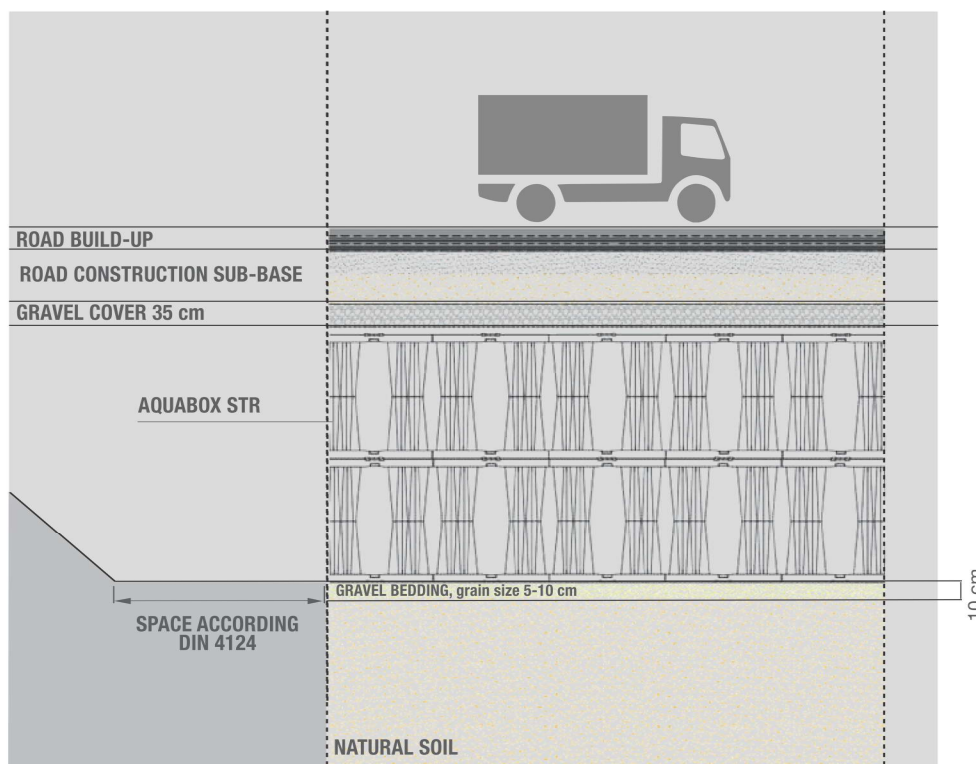
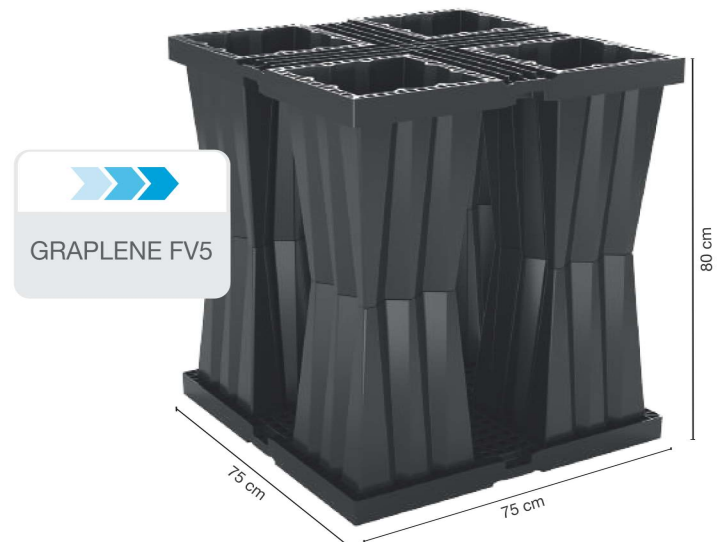
ACCESS ROADS TO RESIDENTIAL AREAS

PARKING AREAS FOR CARS AND LIGHT VEHICLES

CYCLING TRACKS

Aquabox STR is the most popular choice for regularly loaded traffic situations.

Made from Graplene FV5, a 100% recycled polypropylene. Compatible with water network technology used in public works, it can be inspected and connected to any rainwater pre-treatment and filtering system.



TANK DEPTH

up to
4.2 M *

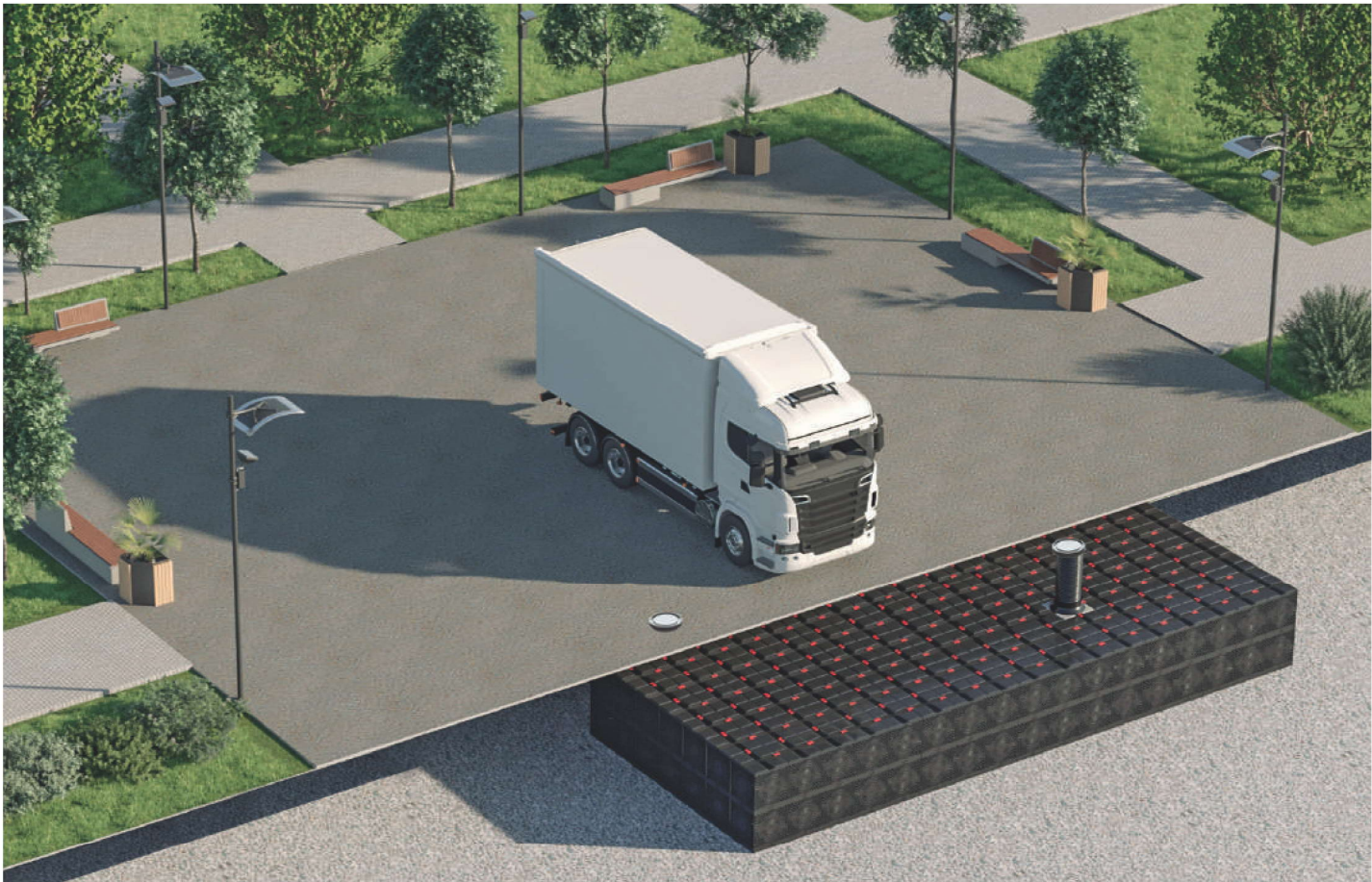
When building a tank under a road surface an upper levelling layer (ballast base layer) with a thickness of at least 350 mm must be applied.

A further road construction sub-base according to norm/directive is absolutely necessary.

Aquabox STR is suitable for traffic loads up to SLW 30 / HGV 30.

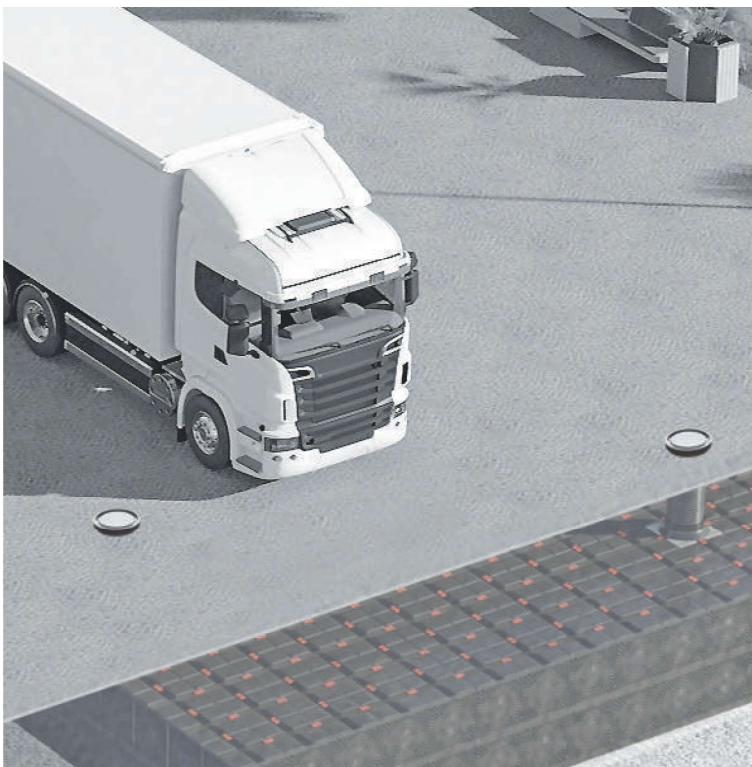
A project of specific stability analysis can be prepared by Geoplast's technical department which, depending on the project, can assess the maximum depth of installation.

* The fields of application of the system must be verified and agreed with the Geoplast technical office.



Aquabox STR is suitable for the passage of vehicles with load class SLW 30 / HGV 30. The basin is equipped with access points for inspection and cleaning of the basin.

Aquabox STR is designed for a useful lifetime of 50 years.



SLW 30 (60) ✓
HGV 30 (60)

AQUABOX STR

Maximum installation depth (m) tank base	4.2
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Loads according to DIN1072. In the case of frost-related requirements, minimum covering 0.8 m according to DIN1054, or following the locally applicable norms and regulations.
For a correct sizing of the tank please contact Geoplast Spa.

AQUABOX ST

FOR LANDSCAPING LOADS

The choice of Aquabox ST is based on the depth of the excavation, the storage volume required and the type of applied loads.

Underground drainage basins with Aquabox ST allow the overlying surfaces to be used for the following purposes:

GREEN AREAS

LANDSCAPING AREAS

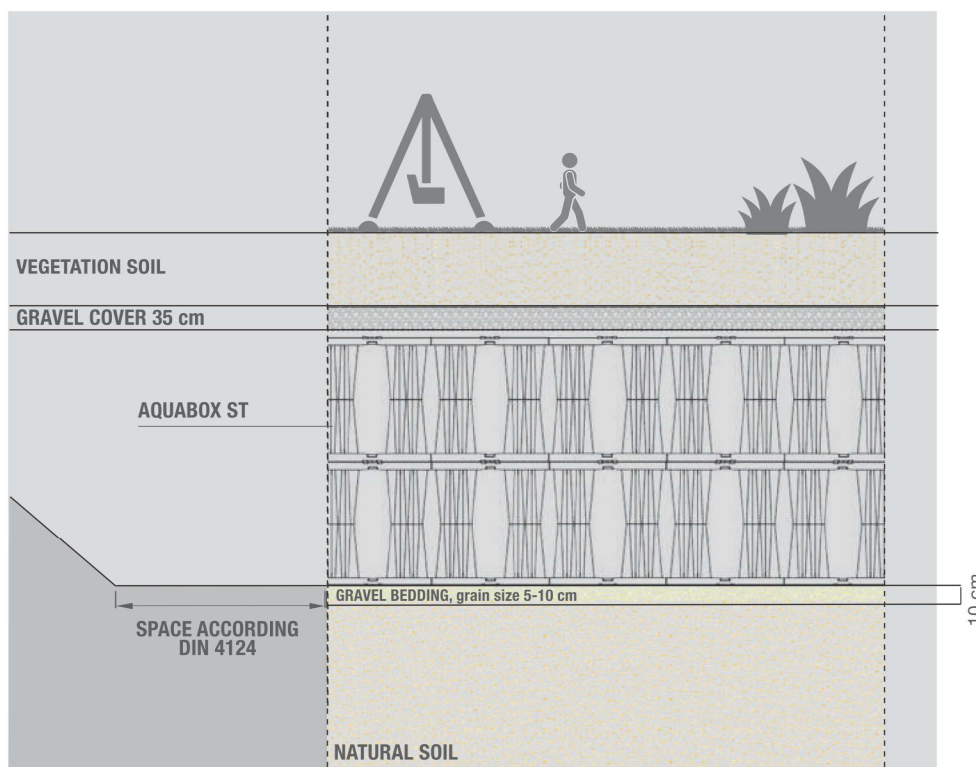
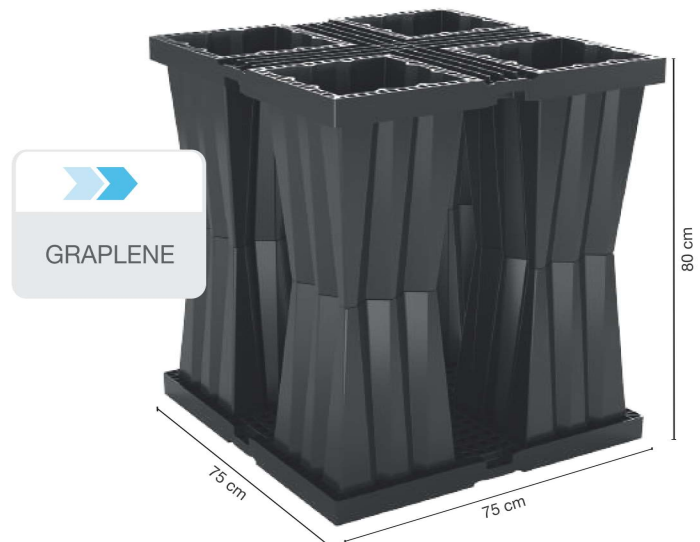
WALKWAYS AND PARKS

RECREATIONS AREAS AND PLAYGROUNDS

Aquabox ST is a product made of Graplene, a 100% recycled polypropylene blend.

It is the best choice for cases where extreme technical characteristics are not required, in landscaped areas without vehicular traffic.

Aquabox ST has the same excellent access and inspection characteristics as the rest of the range: for this reason, and thanks to its high useful volume, the system is suitable for reuse storage for irrigation of parks and gardens.



TANK DEPTH

up to
3.1 M *

The minimum cover of Aquabox ST underground basins is mainly related to the type of flooring or the vegetation expected on site. In the case of vegetation, care should be taken to ensure sufficient soil depth for the chosen plant species. It is also advisable to avoid tall trees or shrubs with deep roots to avoid intrusion into the basin.

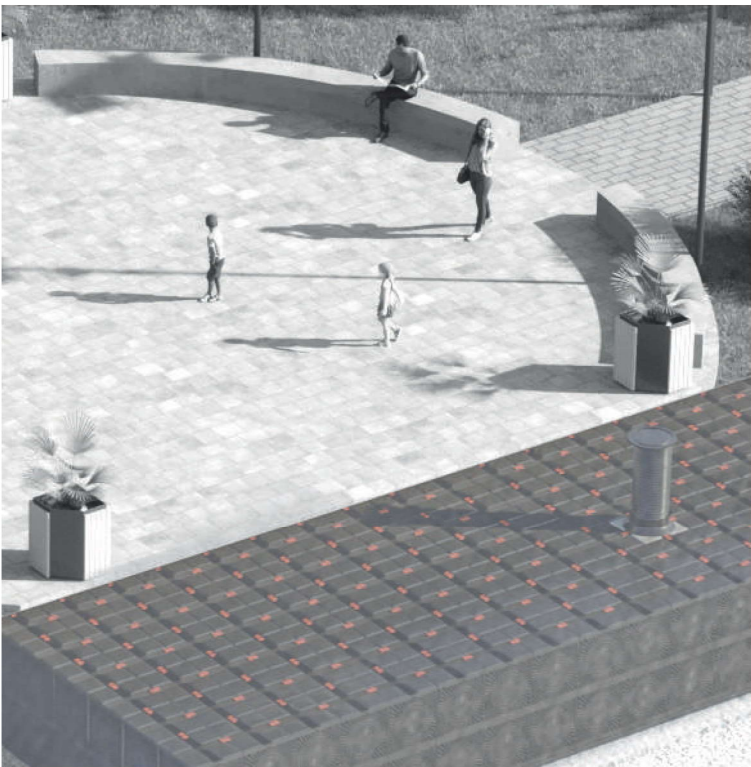
A project of specific stability analysis can be prepared by Geoplast's technical department which, depending on the project, can assess the maximum depth of installation.

* The fields of application of the system must be verified and agreed with the Geoplast technical office.



Aquabox ST is designed for landscaping loads and areas without access to vehicle traffic. The tank is equipped with access points for inspection and cleaning of the basin.

Aquabox ST is designed for a useful lifetime of 50 years.

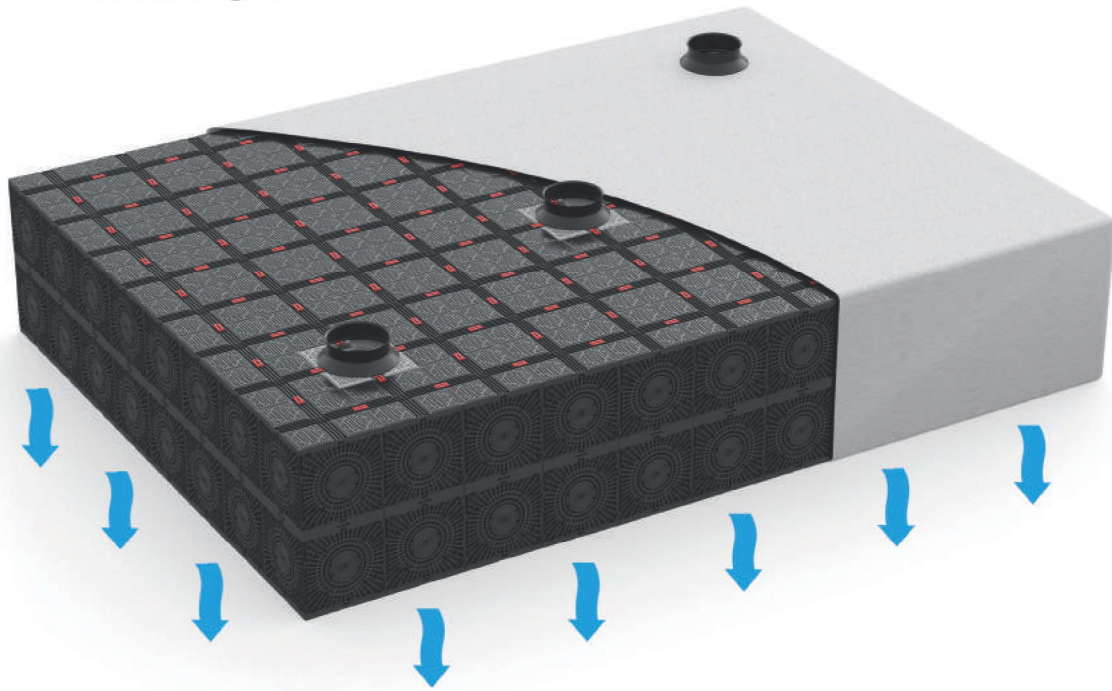


AQUABOX ST

Maximum installation depth (m) tank base	3.1
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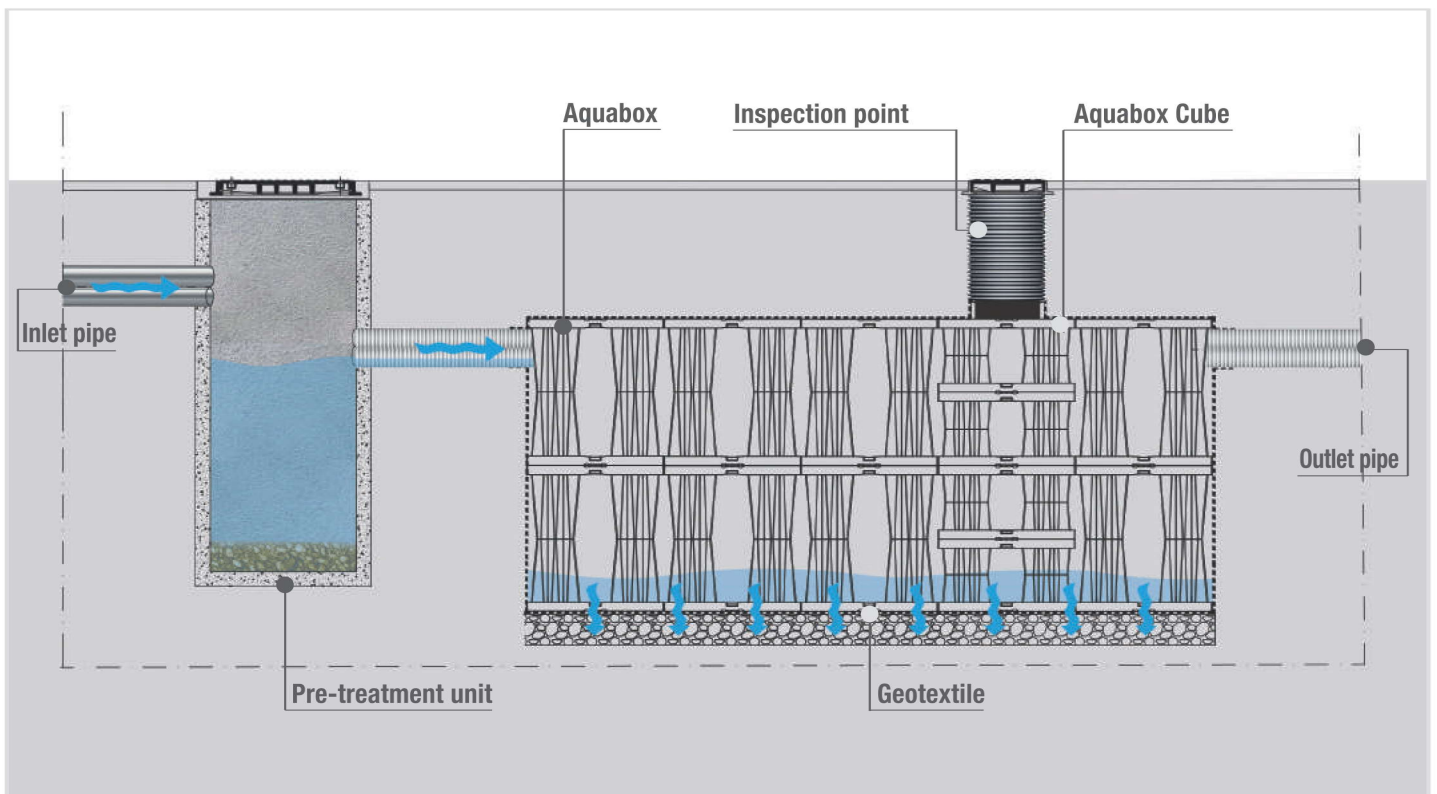
Loads according to DIN1072. In the case of frost-related requirements, minimum covering 0.8 m according to DIN1054, or following the locally applicable norms and regulations.
For a correct sizing of the tank please contact Geoplast Spa.

INFILTRATION

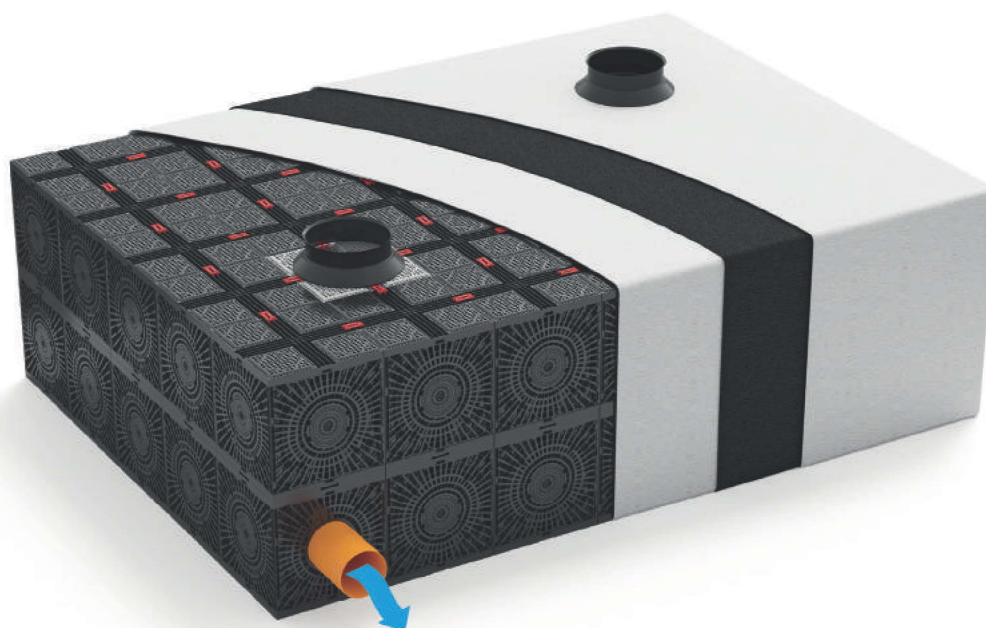


The replenishment of groundwater aquifers during heavy rainfalls is a crucial design point in stormwater management regulations. An Aquabox basin is a good solution for rainwater infiltration, promoting its management in situ and contributing to the restoration of the natural water cycle. The system stores incoming water and releases it gradually into the ground. The soil must have geotechnical characteristics of permeability such that it is able to receive the water stored in the Aquabox basin.

Advantage: compared to traditional methods (gravel or pipes) the useful storage volume for equal volume is 3 times higher. This results in a lower cost for digging, excavation work and disposing of the dig material (sand, gravel, stones).



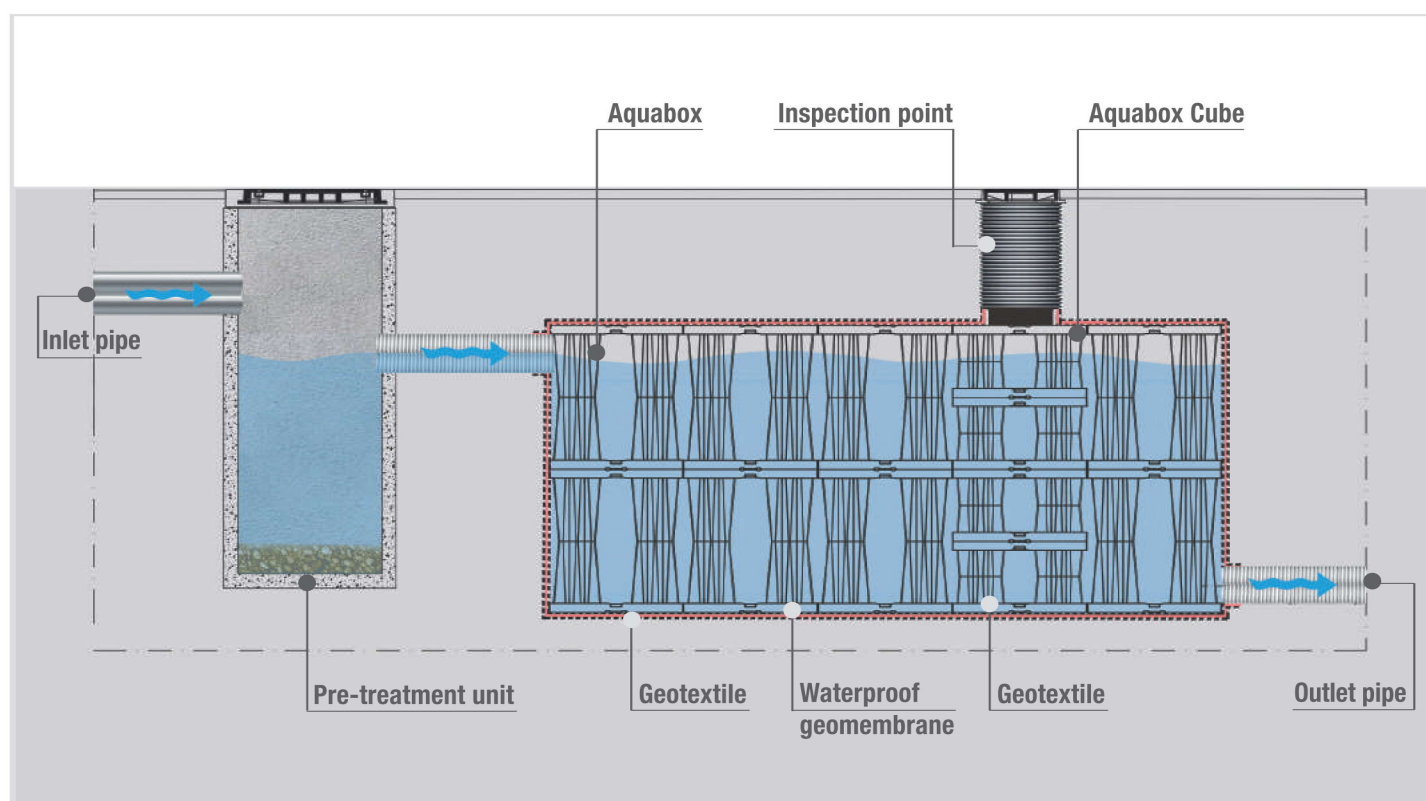
ATTENUATION



Where the permeability of the soil is poor and water cannot penetrate into the soil, storage tanks must be built. The attenuation tank allows to attenuate the peak flow rates avoiding the overloading of the sewer and the receiving water bodies.

After filling, the release takes place through a special drain pipe placed in the lowest layer of the basin and designed for gradual outflow rate, not exceeding the maximum discharge rate allowed by the planning authorities.

Advantage: less stress on the water infrastructure. It reduces the flood flow rates that depend on the capacity of the downstream drainage system to convey water.

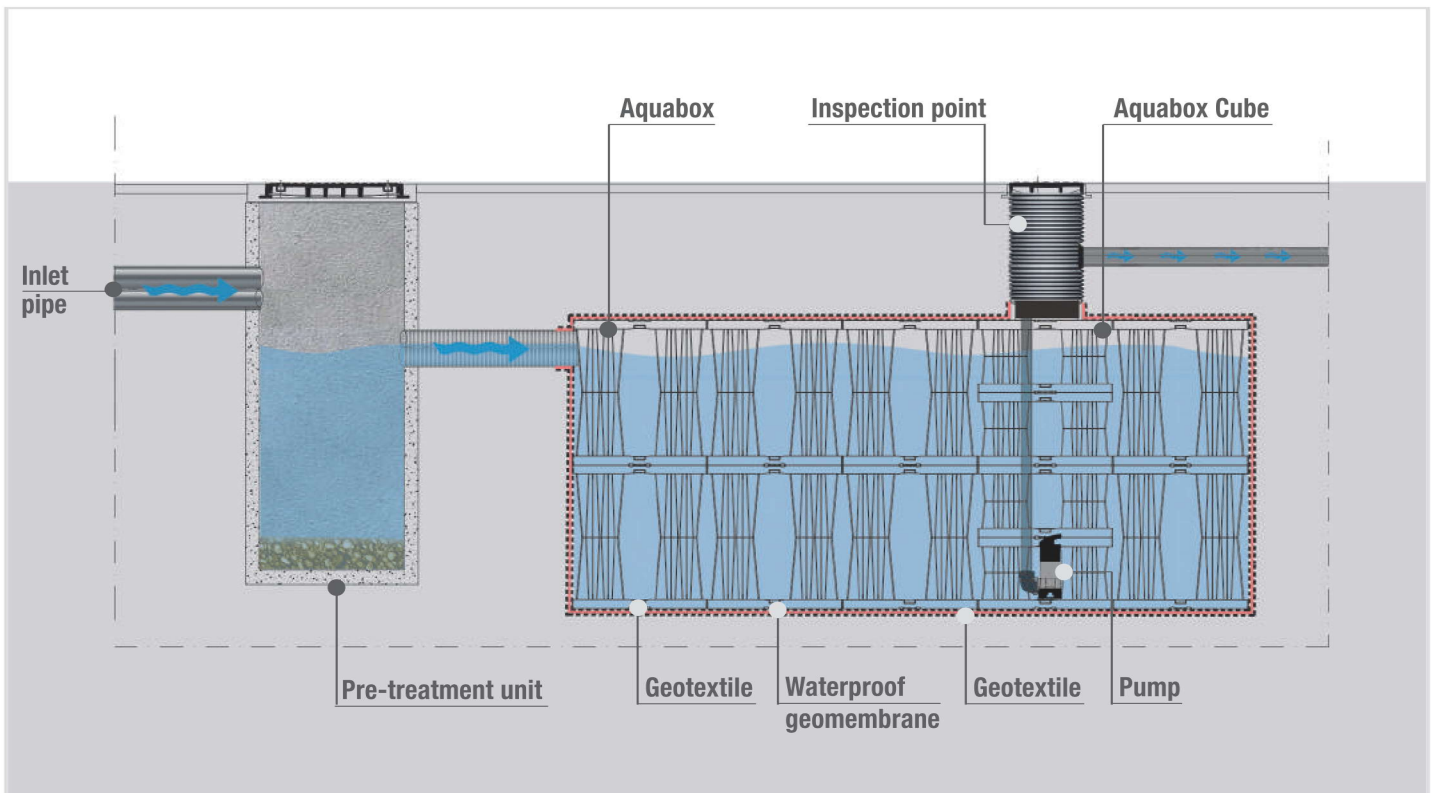


HARVESTING FOR REUSE



The rainwater running off from roofs or other surfaces and harvested for reuse is always channeled through a suitable pre-treatment stage before it can enter the storage tank.
The water is conveyed into the Aquabox basin through one or more inlet pipes and is extracted when necessary with a pump housed in a suitably placed Aquabox Cube shaft.

Advantage: lower water supply costs and lower municipal wastewater charges.



360° INSPECTION AND CLEANING



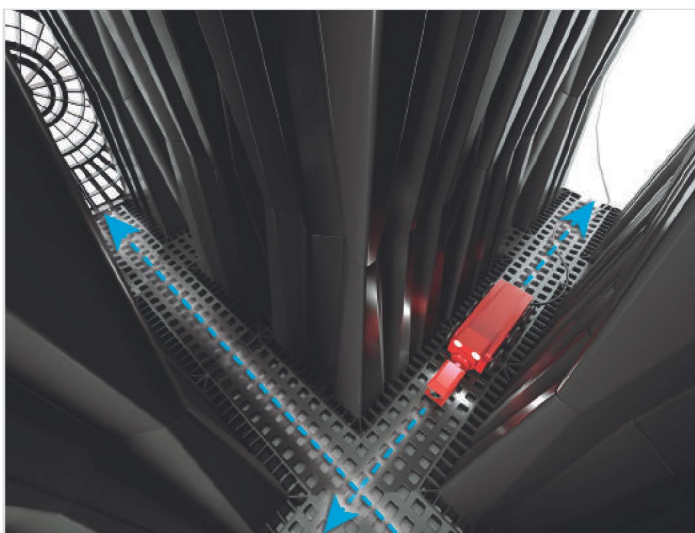
INSPECTION WITH SWIVEL CAMERA



Both during testing and once in operation, the basin must be inspected by a specially designed camera.

Accessibility is always guaranteed by the Aquabox Cube maintenance shafts that allow access to the basin in depth.

The structure of Aquabox offers great visibility and accessibility in every axis of the basin. The operator on the surface receives a live video stream on the whole inspection operation of the basin and the tubes, which can be recorded for offline viewing.

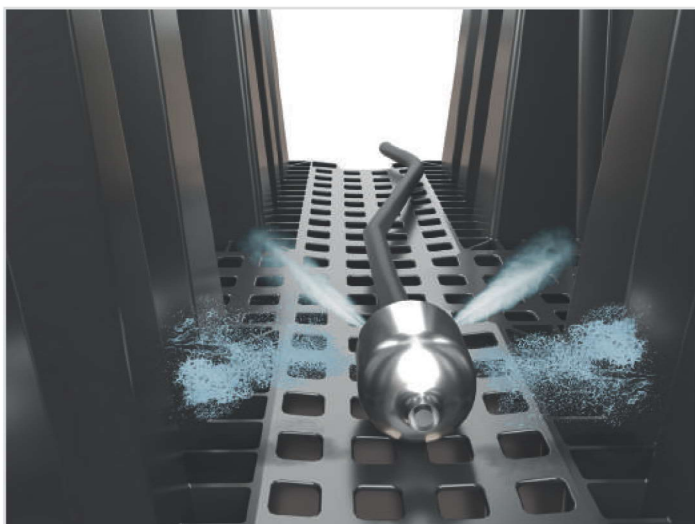


360° INSPECTION ON ALL LEVELS AND IN ALL DIRECTIONS



Inspection with a special wheeled camera gives the opportunity to verify the true internal situation of the basin, evaluating its state of repair and the presence of silt deposits.

The concave surfaces of the Aquabox tunnels guarantee the easy passage of an inspection robot.



HIGH PRESSURE WASHER OF INTERNAL CHANNELS



The internal structure should be cleaned by means of a high-pressure jet cleaner, accessing the basin through the Aquabox Cube shafts located downstream.

Depending on need and situation, the jets be directed forwards or backwards.

With more than 300 meters of hose length the nozzle of the pressure washer will reach every point of the basin and perform a complete cleaning.

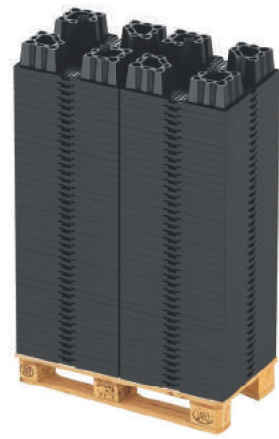
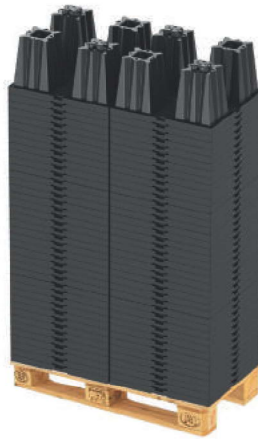
STORAGE AND ASSEMBLY

The innovative design of Aquabox makes stacking the elements very easy, reducing the space used for storage and transport of materials on site.

Stackable

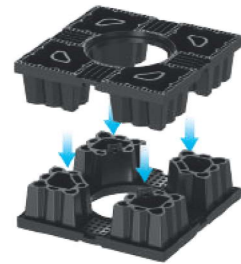
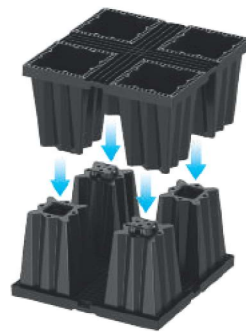
The modules are stackable and are supplied on pallets of 80 pieces, which are equivalent to 18 m³ each.

The dimensions of the packaging are 80 x 152 x H258 cm.



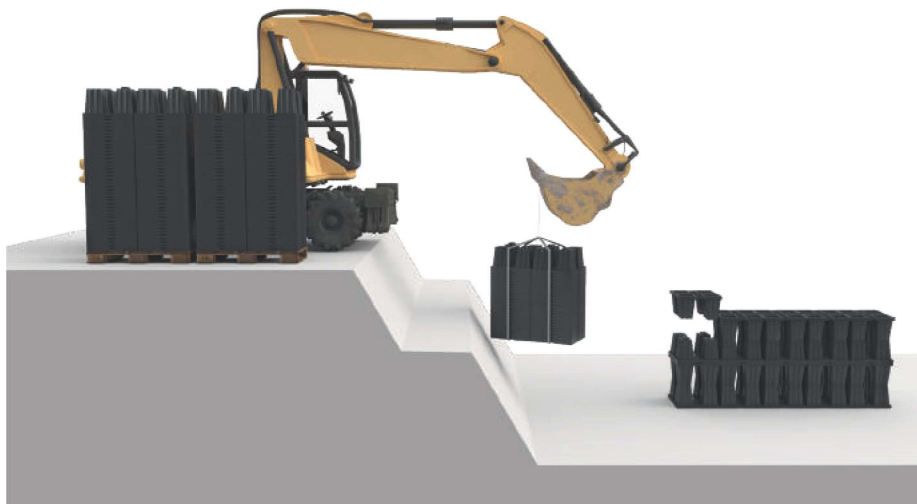
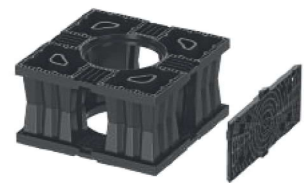
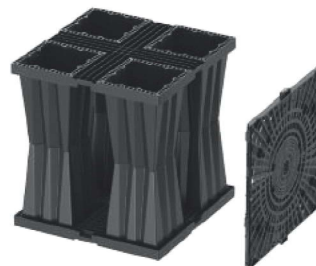
Easy to install

The “Aqualock” locking system joins two semi-modules, which are assembled before the installation in the basin.



Ready for use

Once assembled, the Aquabox modules are ready to be laid in the excavation to create the basin. The side walls also serve as connections for the inlet or outlet pipe.



88%

REDUCTION OF STORAGE SURFACE

compared to non-stackable infiltration/attenuation crates

LOGISTICS

A classic articulated lorry measuring 13,6 x 2,45 x H2,5 m allows to transport 27 pallets measuring 80 x 152 cm.

Thanks to its shape and stackability, the total volume of product transported per articulated truck is 460 m³.

This reduces CO₂ emissions considerably when compared to the number of vehicles needed to transport the equivalent storage volume in gravel.



COMPARISON BETWEEN GRAVEL AND AQUABOX

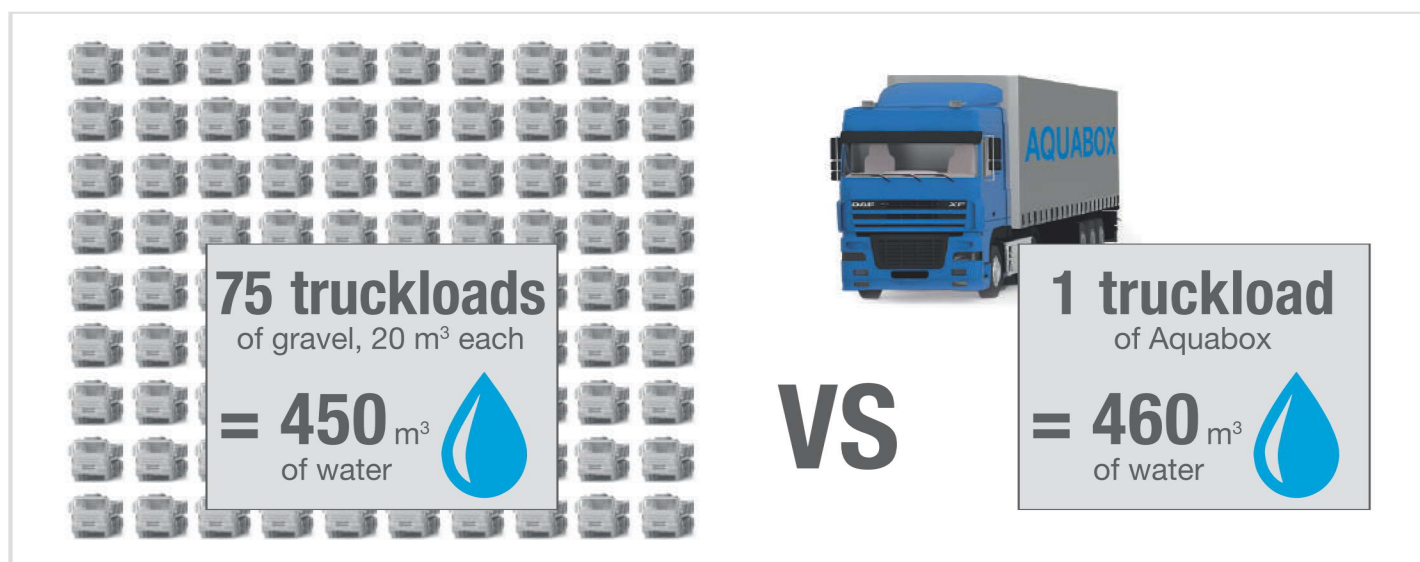
To build a basin of about 450 m³ it is possible to use the Aquabox system moving only 1 articulated truck compared to the traditional gravel solution, which requires 75 truckloads.

The advantages are obvious and countless:

LOGISTICS: 1 vs. 75 trucks.

ECONOMIC: fuel saving, less wear and tear on vehicles, reduction in man-hours and use of earthmoving machinery.

ENVIRONMENTAL: lower CO₂ emissions, less disfigurement of the landscape.



INSTALLATION



① EXCAVATION

Hole excavation and verification of the soil permeability by a geologist.



② GEOTEXTILE LAYING

Place a gravel subbase (size 2-8 mm) and lay a geotextile 200 g/m².



③ INSTALL MODULES

Install Aquabox assemblies and red connectors as designed.



④ INSTALL SIDE GRIDS

Install the Side Grids along the sides of the basin.



⑤ INSTALL TOP CAPS

Install the top caps on the upper side of the basin.



⑥ WRAP WITH GEOTEXTILE

Close all the remaining surfaces of the tank by wrapping them with a geotextile.



⑦ INSPECTION POINT

Cut the geotextile above the Aquabox Cube elements in order to create access points to the basin.

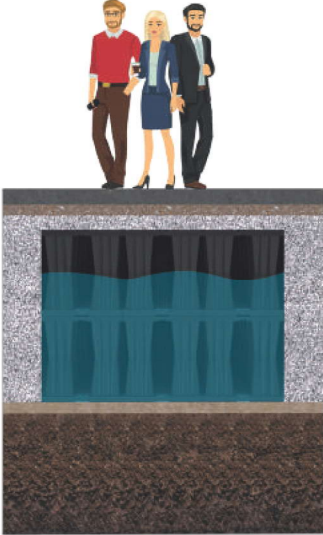

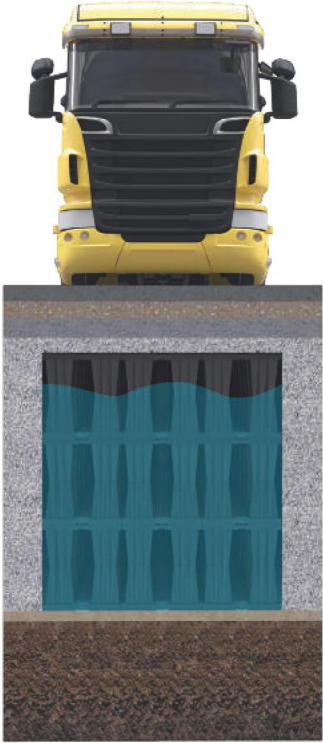


⑧ BACKFILL AND COVER

Backfill 350 mm above the tank. Further backfill is to be carried out according to applicable norm guideline. Total cover depends from the load class.

LOAD CLASSES

Depending on the loads applied, the area where they will be created and the height of the water table, tanks of different depth can be designed.



SLW 60
HGV 60

SLW 30
HGV 30

LANDSCAPING

AQUABOX	HPR	HP	STR	ST
Max. load class	SLW 60	SLW 60	SLW 30 (SLW 60)	LANDSCAPING
Minimum depth of cover (m)	0,7	0,7	0,5 (0,8)	0,5

Calculation parameters: loads as per DIN1072, specific soil weight 18 kN/m³, maximum average soil temperature 20°C, k=0.3. Data valid for infiltration tanks.

In the case of frost-related requirements, minimum covering 0.8 m according to DIN1054, or following the locally applicable norms and regulations.

AQUABOX	HPR	HP	STR	ST
Maximum installation depth (m) at the base of the tank (pedestrian load)	6,3	6,1	4,2	3,1

Valid for 3-layer Aquabox basins. For other conditions, and for a correct sizing of the tank please contact Geoplast Spa. Aquabox has been designed for attenuation tanks wrapped in a waterproof membrane installed at a depth above the maximum level of the water table. In the case of installation below that level a review of the necessary technical conditions is mandatory.