

Stormwater Management Systems



ACO STORMBRIXX®

Technical Handbook and Product Catalogue



Stormwater retention



Stormwater detention

Stormwater infiltration



Introduction to the ACO Group

ACO branded drainage and surface water management systems are recognised throughout the world for their innovative design, high quality, environmental benefits and industry leading performance.

The ACO Group has a research and production base that reaches across four continents. This unmatched resource pioneers the development of solutions that are tailored to individual markets, meeting the need for high performance and sustainable products that deliver optimum value throughout their operational life.



The ACO Group / www.aco.com

ACO New Zealand

ACO Limited NZ is part of the ACO Group, a multinational company specializing in products for the construction and building industries.

ACO introduced the concept of modular Polymer Concrete surface drainage systems to New Zealand over 25 years ago. ACO Limited, established in 2012 in New Zealand, is a sales and marketing company with access to ACO's global strong manufacturing bases.

Service Chain



ACO manufactures a range of construction products from polymer concrete, stainless steel, mild steel, ductile iron and moulded plastics. These diverse materials are used to manufacture products for civil, urban and building architectural applications.

ACO is always bringing new products to the New Zealand market and works in conjunction with the ACO Group's established Research and Development Department responsible for continuous development, quality and testing to ensure ACO products continue to lead the market.

Service Chain



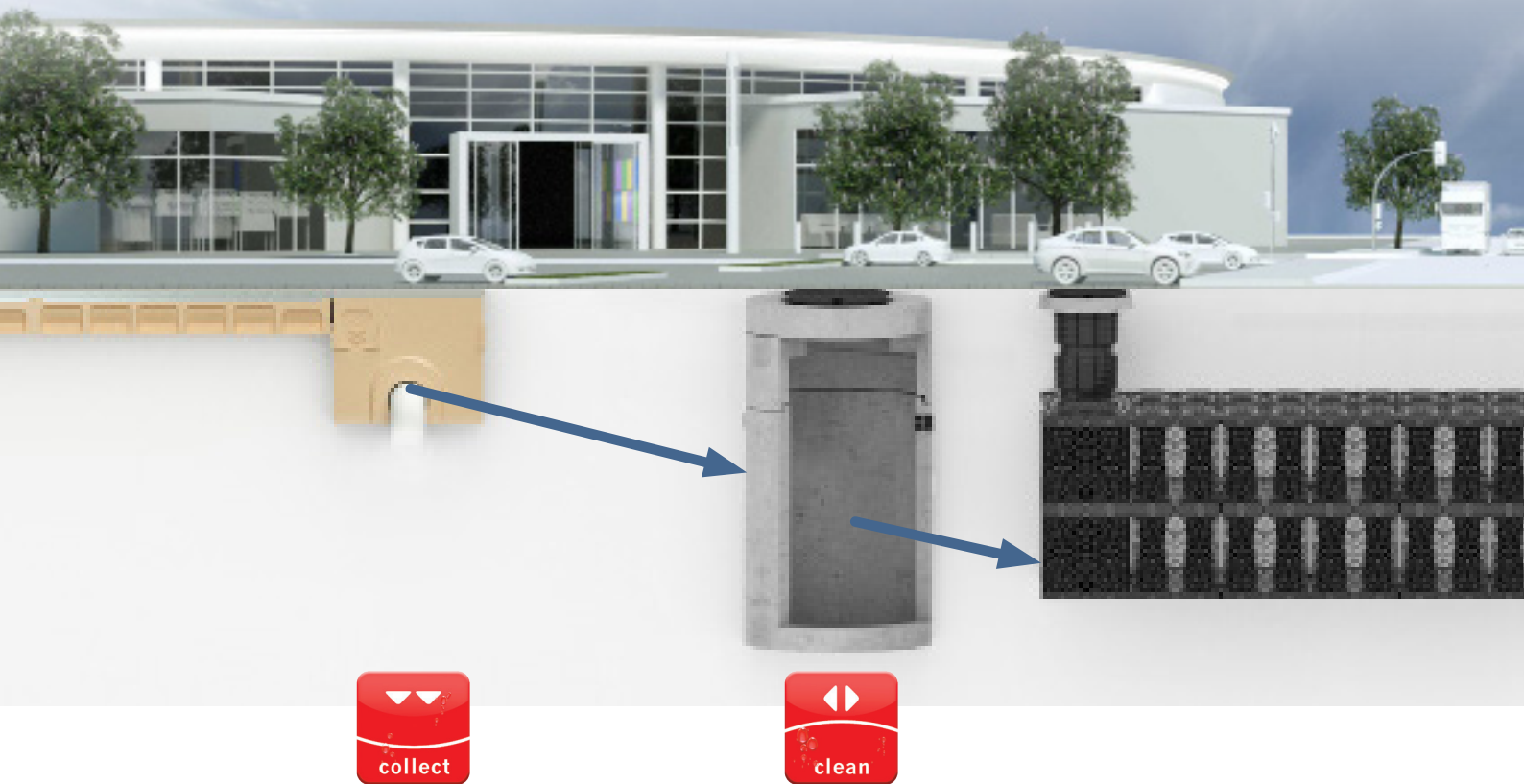
ACO provides onsite support for all aspects of the business from specification advice to installation expertise. Through dedicated training programs, ACO is recognised for providing architects and engineers surface drainage education.



Contents

| | |
|---|----|
| Surface Water Management Cycle..... | 4 |
| Introduction to ACO StormBrixx® range..... | 6 |
| Applications and case studies | 8 |
| StormBrixx® SD overview..... | 12 |
| StormBrixx® HD overview..... | 13 |
| Stability due to brickbonding..... | 14 |
| User friendly inspection and cleaning..... | 16 |
| Optimised logistics and savings | 18 |
| Choosing the appropriate ACO StormBrixx® system..... | 20 |
| Product details..... | 22 |
| Geomembrane and geotextile guide | 25 |
| System configuration – tank body | 26 |
| System configuration – side panels and top covers | 28 |
| System configuration – connectors | 30 |
| System configuration – access | 32 |
| Designing an ACO StormBrixx® system..... | 34 |
| Guide to installing ACO StormBrixx® systems..... | 35 |
| Technical support..... | 36 |
| Maintenance and inspection guidance..... | 38 |
| Testing | 39 |
| Flow control systems..... | 40 |

The Surface Water Management Cycle



Where surface water management and water protection begins



Surface water management begins with an assessment of the hydrological demands of the project landscape. The rainfall and topography determine the surface water solution devised. ACO provides expertise in both the assessment and provision of product solutions to collect surface water across the site.

In hard surfaced areas, the extensive range and capacity of ACO trench drainage products offer a high capture performance along the total length of the trench run, thereby reducing the occurrence of ponding or unwanted runoff.

The safety and convenience of people, buildings and traffic is assured with ACO trench drainage products and surface water is managed on to its next stage in the water management process.

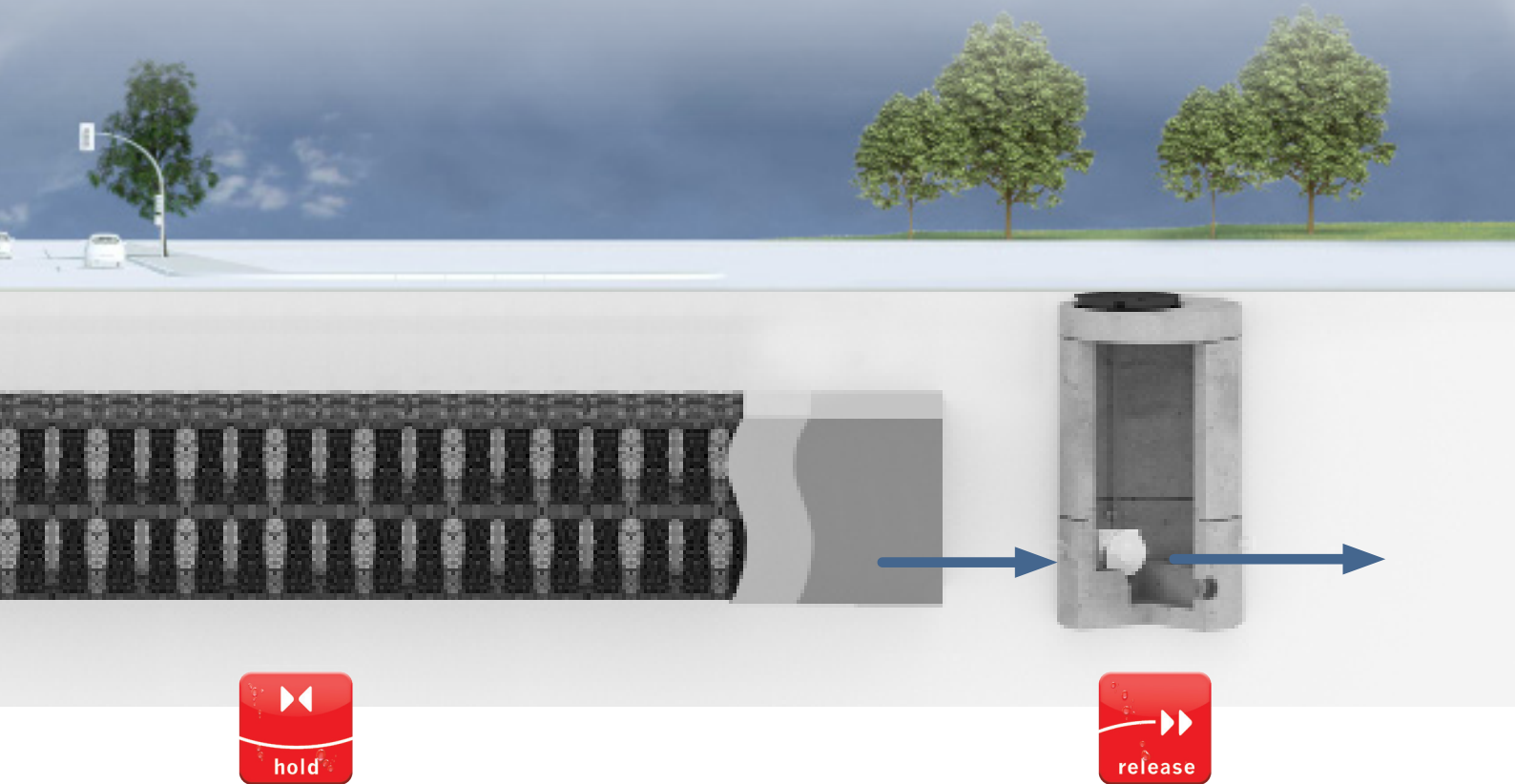
Achieving the right water quality



Water quality is an important factor when designing a surface water management solution. Surface water run-off is at greater risk of contamination from increased urbanisation and transportation demands on the environment. Government policy and planning guidelines require water quality to be taken into account to prevent contamination of surface and groundwater. If untreated water is discharged into the natural surroundings, it could endanger plant and wildlife, therefore preventative methods should be put in place.

Contaminations come in many forms, such as siltation containing suspended hydrocarbons and heavy metals, tyre wear, brake dust, soot and sediments, as well as de-icing products used during winter months in alpine regions.

ACO offers a number of treatment units to deal with water quality including heavy metal and suspended solids separators, and gas/oil interceptors. These can be combined with swales, so clean water can nourish an onsite wildlife area and allow wildlife and biodiversity to flourish.



Reducing surface runoff to a natural level



With increasing urbanisation, larger areas of landscape are being covered with impermeable surfacing. This increases the risk of flooding. The natural water cycle of infiltration, evaporation and evapotranspiration is hindered. Solutions such as ACO StormBrixx® can be used to store and slow down the surface water runoff rate to natural levels. These geocellular systems can be used for retention, detention and infiltration as well as contributing to Water-Sensitive Urban Design (WSUD).

ACO StormBrixx® can help support the stormwater network by providing capacity to meet these high risk flooding scenarios. They can also be used to protect surrounding water networks and inhabited areas through a controlled discharge into the groundwater that mimics natural infiltration.

Control discharge rate to the required level



To meet the limiting capacity requirements of stormwater networks and natural waterways, water discharge rates are controlled on site by either an orifice plate or vortex flow controllers.

ACO has solutions for both environments with units sized to match legislated run-off rates or the runoff rate from a greenfield equivalent to ensure that the infrastructure and environment are not put under strain.

Introduction to ACO StormBrixx® Range

ACO StormBrixx® is a unique, and patented, plastic geocellular stormwater management system. Designed for surface water infiltration and storage, its versatility allows it to be used in applications across all construction environments as a standalone solution or as part of a Water Sensitive Urban Design (WSUD).

What is ACO StormBrixx®?

Sustainable surface water management is becoming an integral part of most major planning applications. Consideration should be given to management of both quantity and quality of water discharged off-site, along with ongoing maintainability.

Plastic geocellular systems are a widely accepted method of creating retention, detention and infiltration tanks. They have been installed in a variety of applications for a number of years. A drawback of some types of systems is a lack of accessibility for maintenance.

ACO StormBrixx® addresses the ongoing maintenance requirements by providing 3D access for inspection and maintenance, while retaining the structural integrity of the installation.



The ACO StormBrixx® system



The ACO StormBrixx® system consists of a single, recyclable, polypropylene body that can be assembled in a variety of ways to form an open bonded structure.

ACO StormBrixx® has a unique pillar structure that gives a high void ratio of 95 to 97 percent. This minimises excavation required to achieve a specified storage capacity, reduces the aggregate needed for backfilling and improves the flow characteristics of runoff through the tank.

Side panels are added to the perimeter of the system for lateral support, and top covers are added to ensure consistent vertical support for cover fill material.

ACO StormBrixx® benefits from a patented cell brick and cross bonding feature, which provides unparalleled stability in the construction of the tank. Where brickbonding is not used, or for multilayered tank structures, connectors are available to support the integrity of the structure.

Additional accessories available include inspection point and pipe connectors, as well as a range of chambers for inspection and maintenance.

ACO StormBrixx® can be configured to minimise silt accumulation and can accommodate a sediment bay or silt trap facility, ensuring the system can be properly maintained throughout its life.

Why choose ACO StormBrixx® ?

Structural integrity

The ACO StormBrixx® system has been tested independently to certify structural integrity and the long term life expectancy.

The patented brickbonding and cross bonding feature provides a strong, long life installation and helps improve the construction speed of the tank.

Access and maintenance

ACO StormBrixx® addresses the fundamental requirement of access and maintenance for local authorities. The open cell structure permits completely free access for CCTV and jetting equipment which allows the whole system, including all the extremities, to be inspected and maintained from a few access points.

Simplified logistics

ACO StormBrixx® simplifies delivery, site logistics and installation as a result of its stackable design. Each single injection moulded body nestles, optimising logistical and installation cost significantly, thus helping to reduce the carbon footprint of the system.

StormBrixx® SD
Standard Duty system



StormBrixx® HD
Heavy Duty system



System benefits

- Brick bonded and cross bonding connection for optimal stability
- Sediment bay and silt trap options for silt management
- Maintenance access and 3D inspection access to tank interior
- Environmentally efficient solution, minimising carbon emissions in manufacture, transportation and on-site assembly
- High void ratio minimises excavation volume
- Fully certified performance
- Manufactured from recyclable polypropylene
- Suitable for all industrial, commercial and residential applications

ACO StormBrixx® Applications and Case Studies

Typical applications



Car parks



Educational facilities

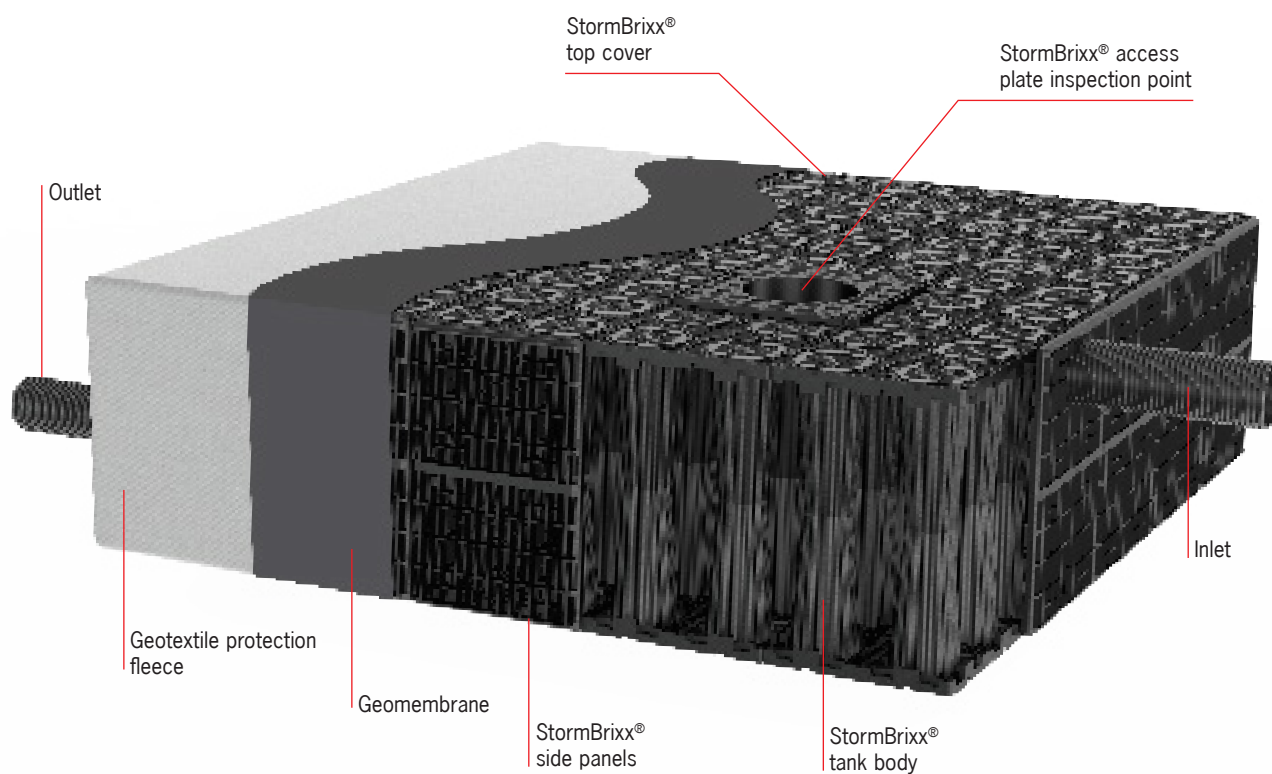


Housing developments

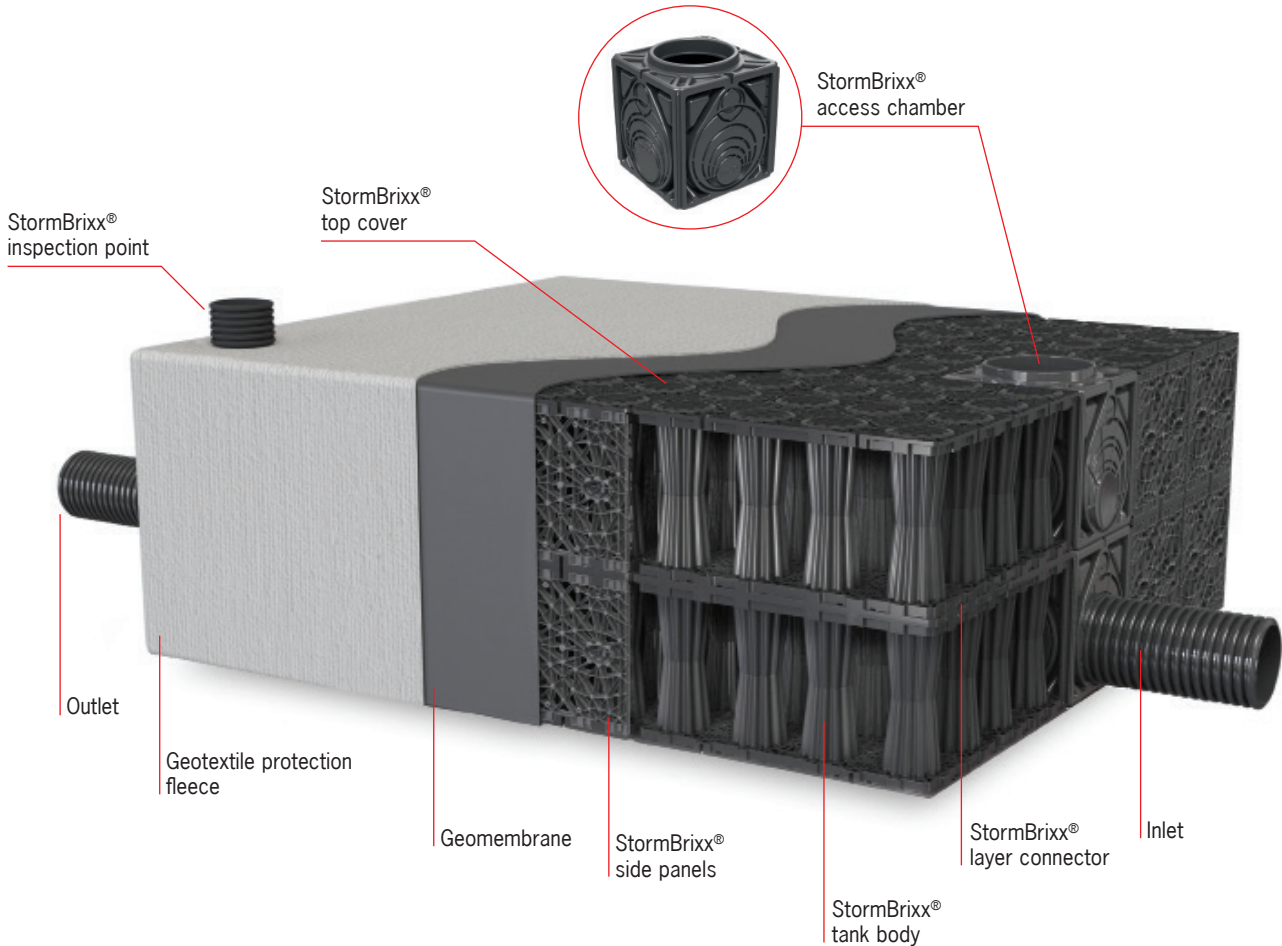


WSUD schemes

StormBrixx® SD (Standard Duty) range is ideal for retention and detention for light to medium duty applications



StormBrixx® HD (Heavy Duty) range is ideal for retention and detention



ACO StormBrixx® Case Study

Project requirement: Mitigate surge effect

Project name: University of Canberra Public Hospital

Design engineer: Sellick Consultants

Contractor: A Plus Plumbing

Location: Canberra, ACT

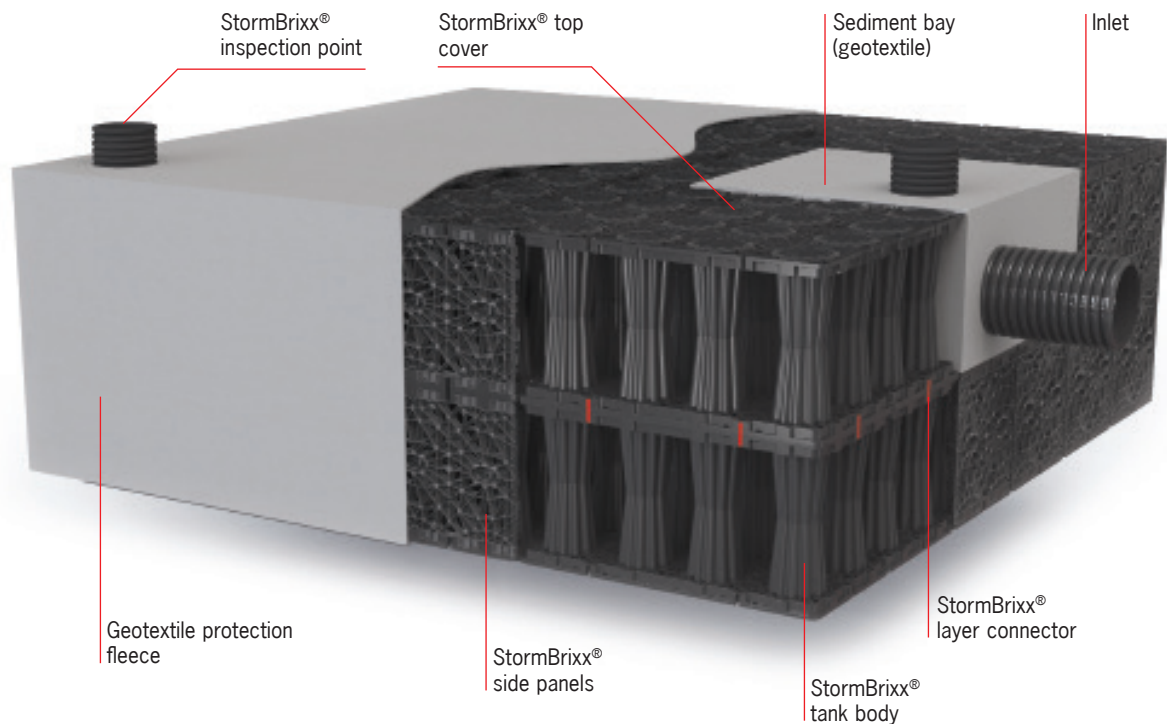
Size: 116m³

The University of Canberra Public Hospital is a new purpose built rehabilitation hospital which will be the first of its kind in the ACT. It will provide rehabilitation and support for people with illness or injuries or who are recovering from surgery. The new hospital has been built at the University of Canberra and will be a teaching hospital which will enhance training and research opportunities.

Designers were asked to incorporate a stormwater management system to deal with runoff from the car park pavements. The stormwater management system will have two different tank systems and is to act as both an infiltration system and detention system to relieve stormwater pressure from the car park areas. The detention system will spread the peak flow of a storm event over a longer period of time, mitigating the surge effect downstream.



StormBrixx® SD and StormBrixx® HD with sediment bay is ideal for infiltration applications



ACO StormBrixx® Case Study

Project requirement: Infiltration

Project name: St Maria Goretti Primary School

Design engineer: P.J Wright & Associates

Contractor: Casotti Plumbers

Location: Redcliffe, WA

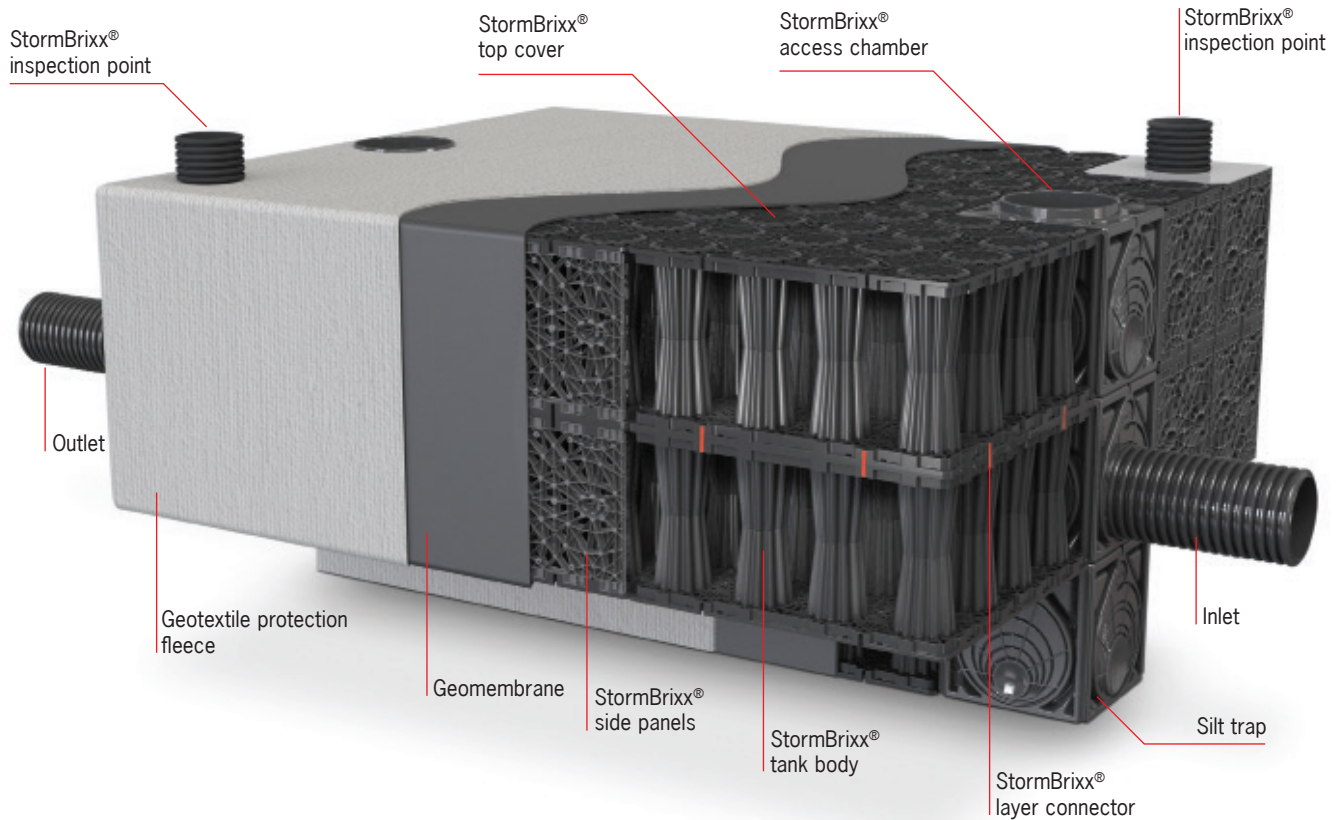
Size: 74m³

St Maria Goretti Primary School is managed by the Sisters of Mercy and caters for children from Kindergarten to Grade 6. The school has students from 28 different cultural backgrounds and currently has 252 students that will grow to an estimated 440 students over the next six years. The school has commenced a building program to cater for the increase in student population.

Part of the building program included a new kindergarten, administration building and upgrade to the carpark. Designers required a high capacity and durable stormwater management system to resolve a drainage problem in the school. The system was required to collect the excess water, filter it and gradually release the water back into the water table. ACO StormBrixx® provided an easy, stable infiltration tank to address this requirement.



StormBrixx® SD and StormBrixx® HD with silt trap is ideal for retention and detention applications



ACO StormBrixx® Case Study

Project requirement: Logistics and detention

Project name: Upminster Depot

Client & design engineer: London Underground Limited and Taylor Woodrow, World Class Civil Engineering

Contractor: Vinci Construction UK Ltd

Size: 88m³

StormBrixx® HD system was used in the Upminster, London Underground depot, working closely with Taylor Woodrow, the Design Engineers, to install a 15x9.6x0.61m tank to meet the detention requirement of the busy depot.

Having London Underground approval for the product, which involved a stringent set of measures that ACO successfully navigated, assured the construction team of the quality of ACO StormBrixx®.

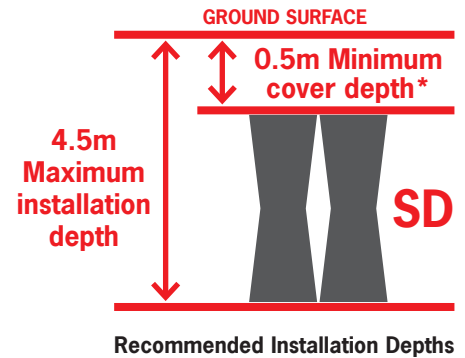
Logistics to the site was not an issue as the ACO StormBrixx® stackable system meant the product could be delivered and more crucially stored in a small area before construction began.



ACO StormBrixx® Features

StormBrixx® SD

50 YEARS
DESIGN LIFE

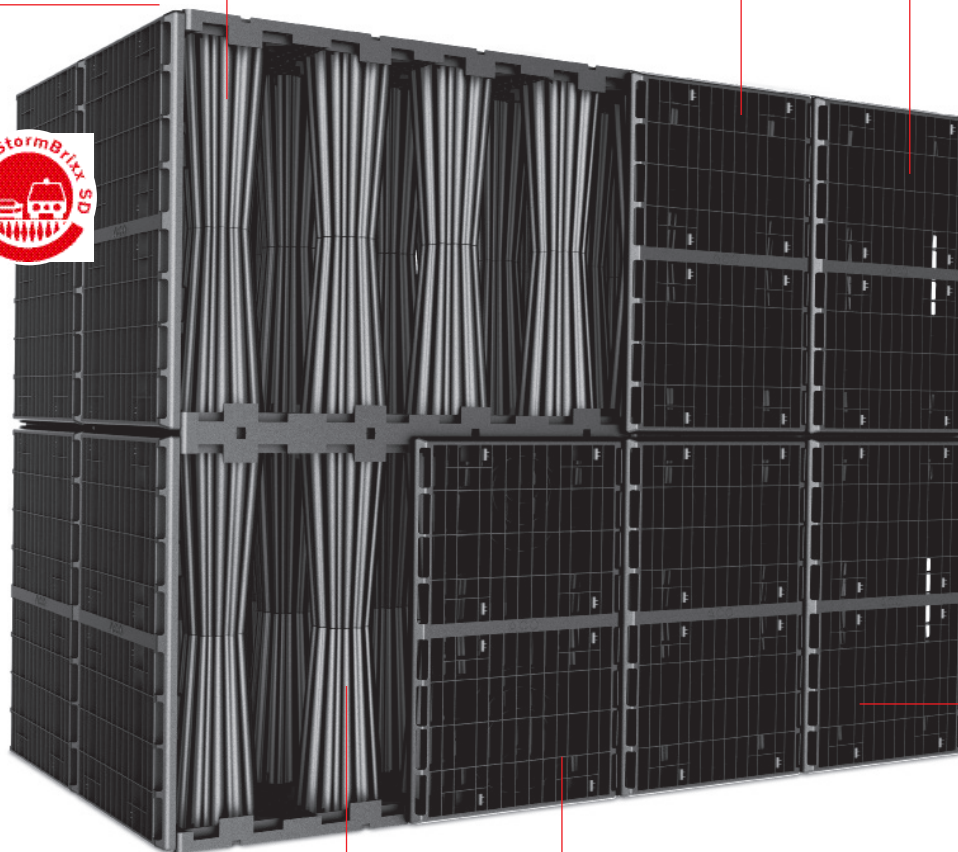


SD & HD – Functional design combined with an intelligent snap-lock system make for easy handling and rapid installation

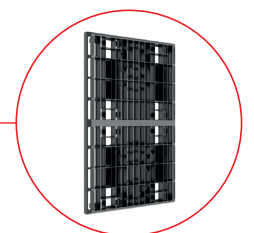
High void ratio of 97% of total volume available for storage

3 Half bodies per cubic metre

Height of 1 layer: 914mm



*Min. cover depth:
0.5m – landscaped
0.6m – car park



SD & HD – Side panels are used on the outer walls of the structure to enable geotextiles and geomembranes to be installed

SD & HD – Small openings at the base of the pillars allow water to fill and drain. This allows the pillars to form part of the storage volume



SD & HD – Recyclable polypropylene material provides a robust and corrosion-resistant basis for a long-lasting stormwater management system

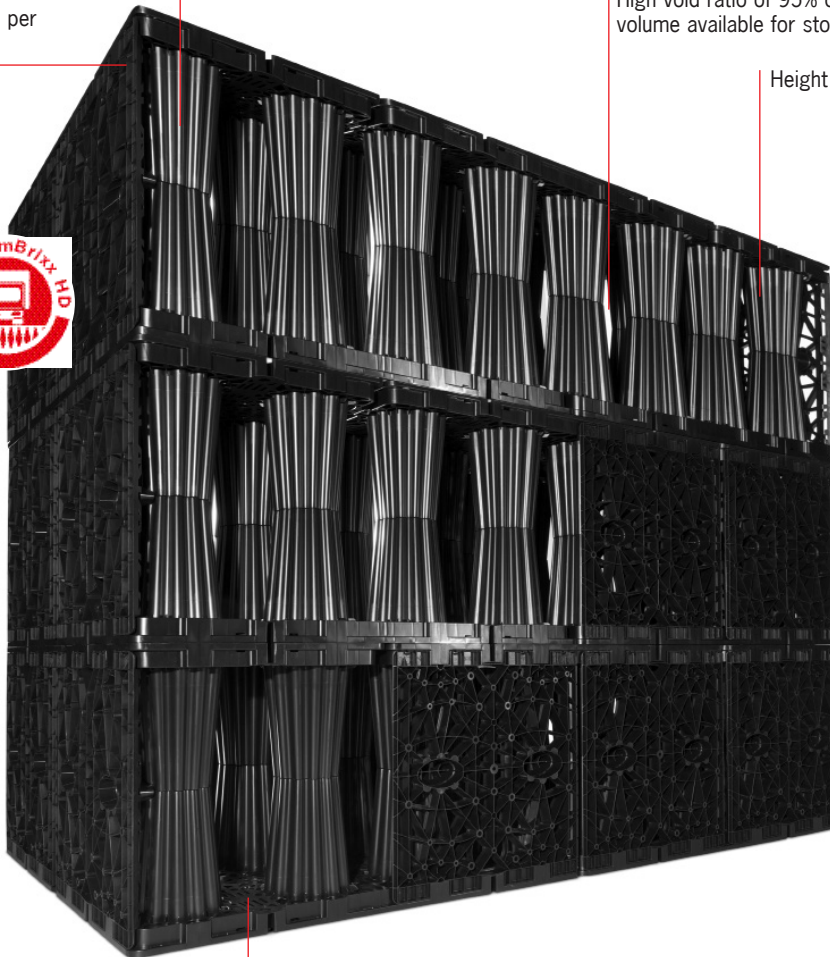
StormBrixx® HD

60 YEARS
DESIGN LIFE



SD & HD – Half bodies are laid and connected together in a brick bonded format to create structural rigidity in the overall system

4.5 Half bodies per cubic metre



High void ratio of 95% of total volume available for storage

Height of 1 layer: 610mm

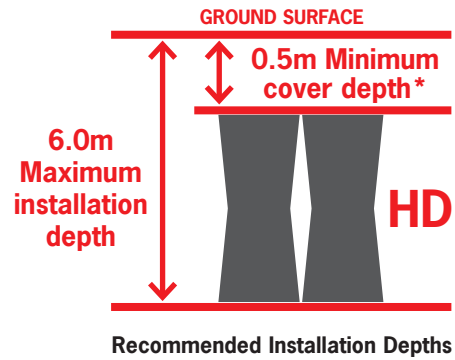
*Min. cover depth:
0.5m – landscaped
0.6m – car park
0.8m – truck traffic



SD & HD – StormBrixx® units can be cut in half to allow integration into the overall system



SD & HD – The open structure of StormBrixx® allows inspection cameras and cleaning devices to have free passage through the system

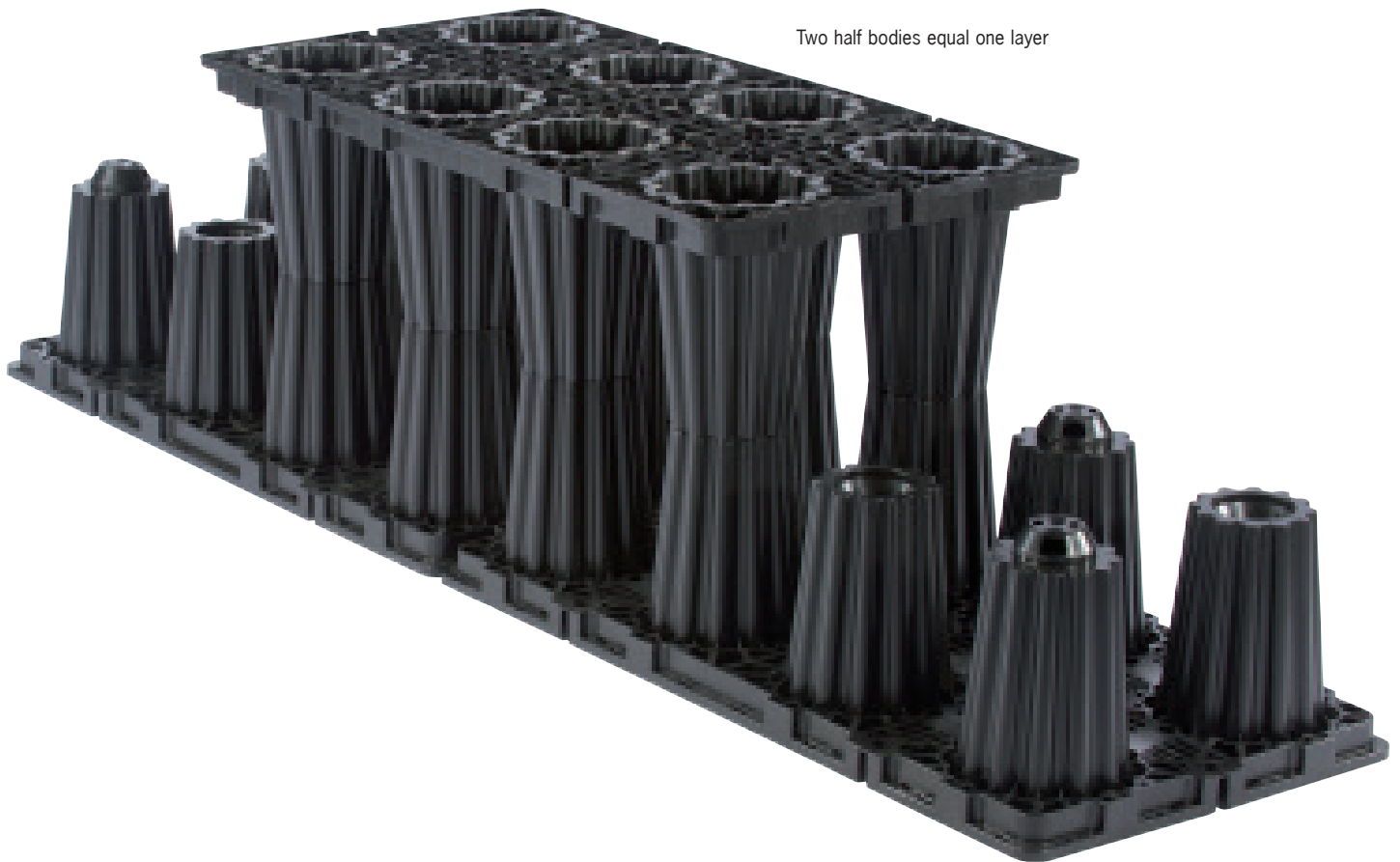
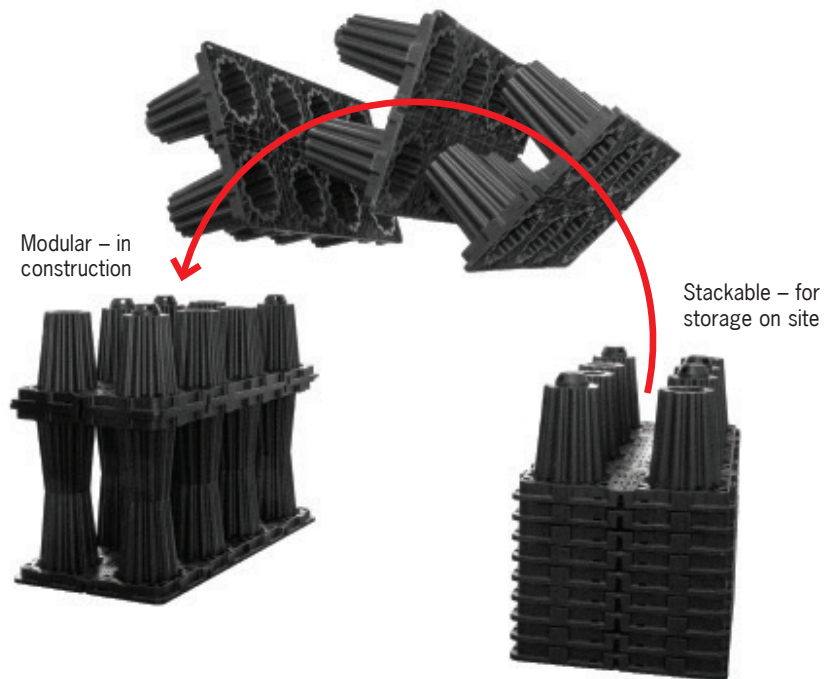


Stability due to brickbonding

The modular system

ACO StormBrixx® is a geocellular tank that is designed to fit together easily to form a strong, long lasting structure.

- Modular configuration
- Robust construction
- High integral strength



Ease of installation

This is due to a snap-lock system consisting of male and female connectors that audibly lock into place during assembly, providing an exceptional level of structural integrity throughout the overall system.



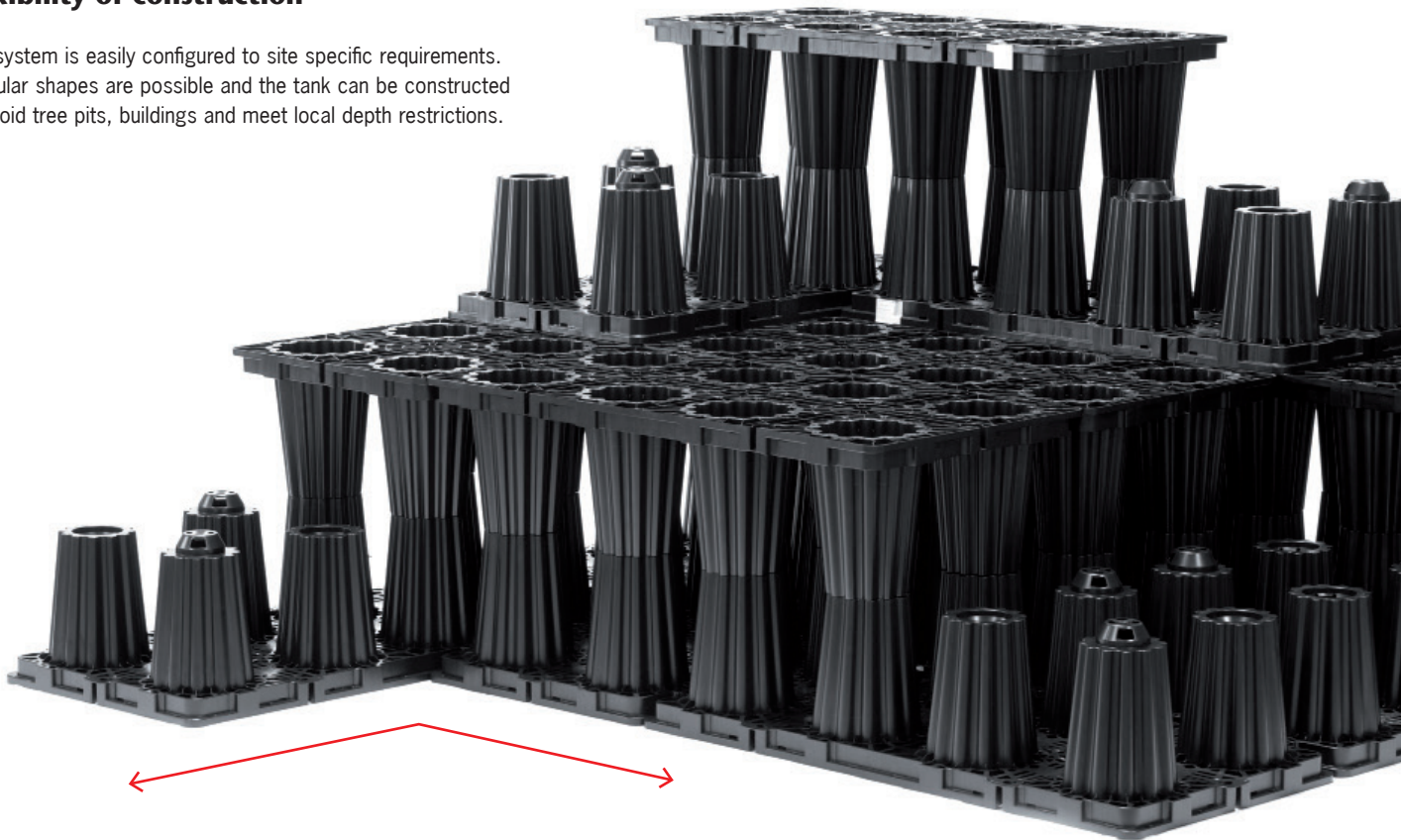
Structural strength

A patented brickbonding and cross bonding feature. When constructed, the load-bearing pillars of the system align exactly above one another, enabling loads to be distributed downwards evenly.



Flexibility of construction

The system is easily configured to site specific requirements. Irregular shapes are possible and the tank can be constructed to avoid tree pits, buildings and meet local depth restrictions.



User-friendly inspection and cleaning

Meeting the need for access

ACO StormBrixx® addresses the fundamental requirement of access and maintenance to retention, detention and infiltration systems. Many councils, utility and conservation authorities now stipulate minimum maintenance regimes when approving the use of geocellular structures. ACO StormBrixx® can address all of these.



Inspection & maintenance

The complete system, including all extremities can be inspected and maintained from a few access points.

From the access points optimum maintenance and inspection of the system is possible in the longitudinal and transverse direction.

Inspection and cleaning equipment can be inserted vertically into the access shafts integrated within the ACO StormBrixx® system.



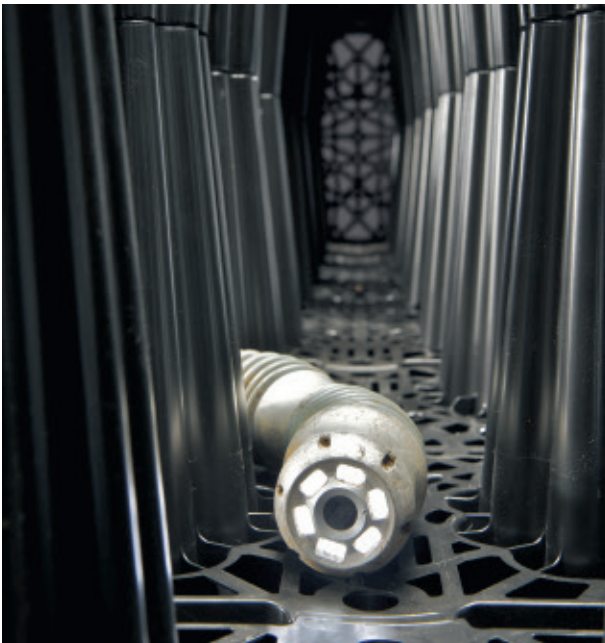
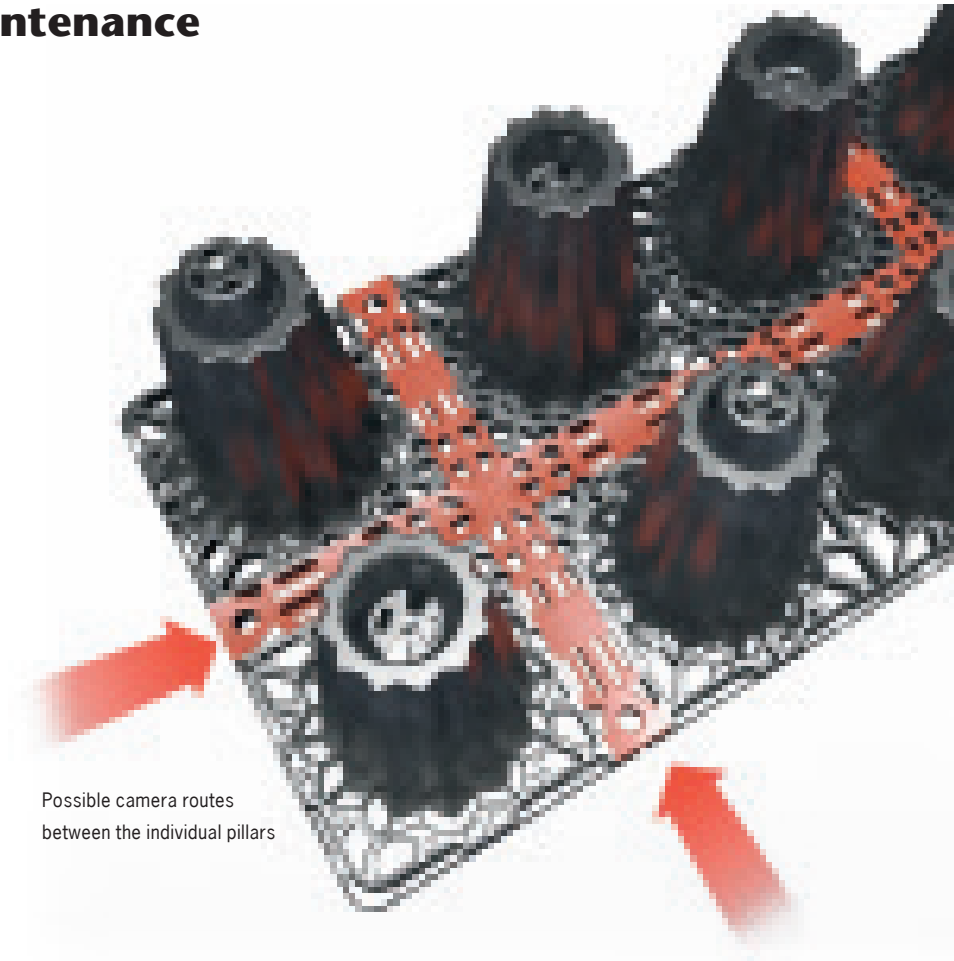
Inspection cameras are introduced into the system through the access shaft.

Fully accessible for maintenance

Open cell structure

The open cell tank structure permits completely free access for CCTV and jetting equipment.

StormBrixx® HD and StormBrixx® SD has a 95% and 97% void ratio available for storage respectively.



Inspection

Cameras can be easily used in the ACO StormBrixx® system.



Cleaning

Deposits that may be in the system can be pressure-jetted and suctioned at the same time with jetting heads.

Optimised logistics and savings

Freight savings

The stackable design of ACO StormBrixx®, where the tank body units nest together, means less vehicles are needed for transportation to site compared with other stormwater tank manufacturers. The side panels and other accessories also nest together.

For each delivery of ACO StormBrixx®, up to 4 truck loads of competitor product may be required, making ACO StormBrixx® 75% more efficient to deliver.

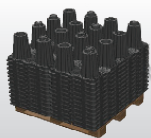
This results in lower freight costs:

- StormBrixx® SD – 347m³ per truck
- StormBrixx® HD – 309m³ per truck

The coordination of deliveries, with multiple trucks needing to park while waiting to unload, is also simplified.

Environmental savings

Having fewer vehicles moving ACO StormBrixx® reduces CO₂ emissions and traffic congestion in urban areas.



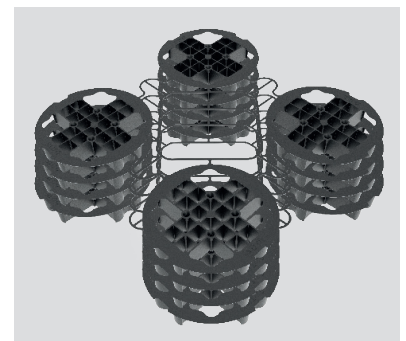
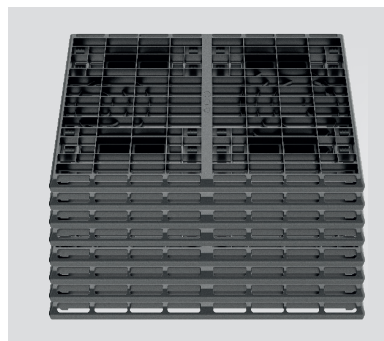
The stackable design reduces transportation costs and improves the carbon footprint of the product.



Example: 280m³ storage volume is required for project A. Using ACO StormBrixx® the project requirement can be transported on a single vehicle whereas up to four vehicles may be required for other comparable systems.

Accessory stacking

Side panels, top covers and other accessories are also stackable for easy delivery and storage.





On site storage and reduced handling

ACO StormBrixx® can be easily unloaded from the vehicle and stored in the same stackable layout on site. Due to the compact arrangement of ACO StormBrixx® compared to other geocellular units, they occupy little room on site and rarely need to be moved out of the way.

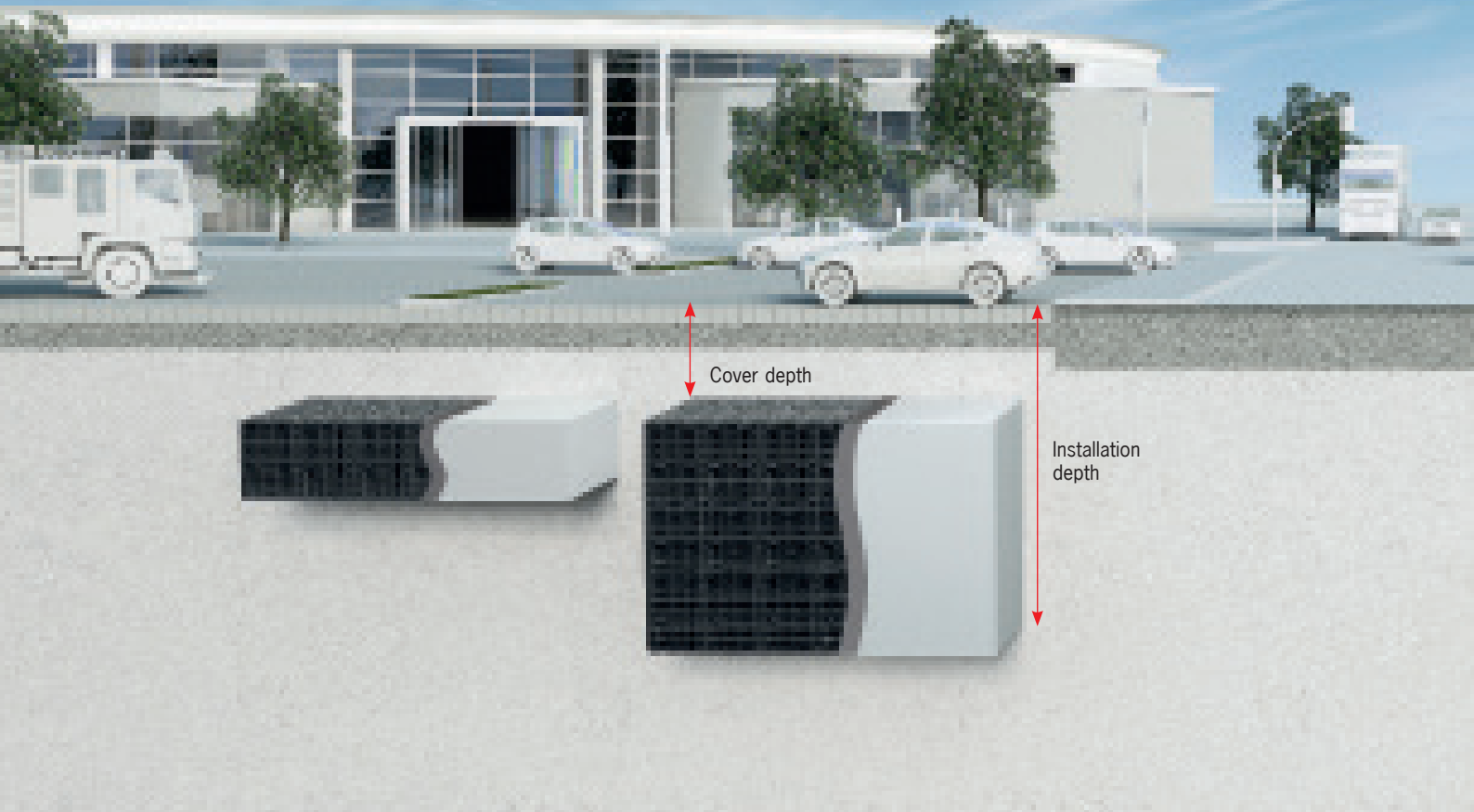
This can save storage time and money as movements around site are reduced by up to 75%.

Time and cost savings

All the benefits of easier logistics, to a site and on-site storage with reduced double handling required, add up to increased time and cost savings for the installer.



Choosing the appropriate ACO StormBrixx® System



StormBrixx® SD – Standard Duty

Applications

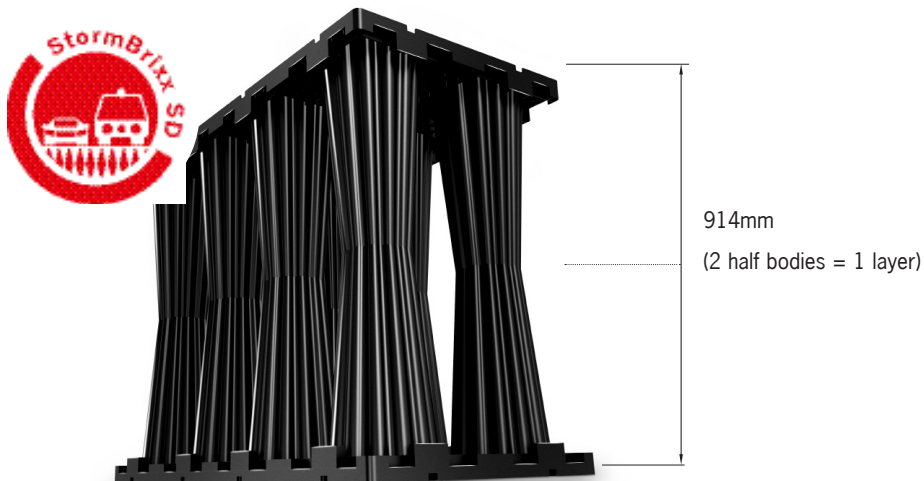
- Landscaped areas, no vehicles
- Landscaped areas with ride on mowers
- Pedestrian areas
- Driveways, car parks, up to 9 tonne vehicles (solid pavement required)
- For applications with semi-trailers and/or high ground water, contact ACO

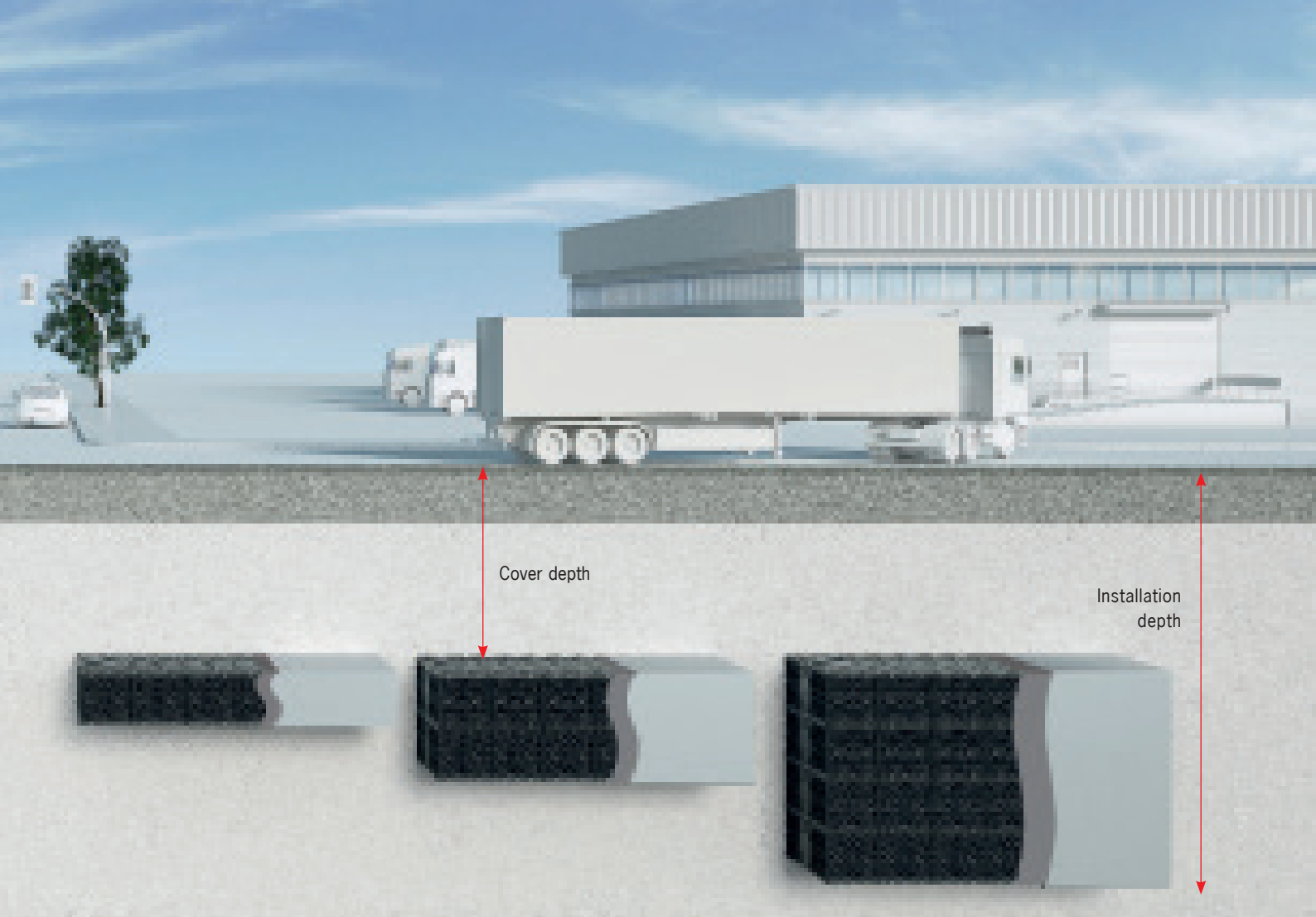
StormBrixx® SD unit parameters

| | |
|------------------------------|-----------------------|
| No. of layers* | 1-3 layers |
| Vertical Strength | 350 kN/m ² |
| Lateral Strength | 70 kN/m ² |
| Design Life | 50 years |
| Minimum Cover – Landscaped | 0.5m |
| Minimum Cover – Car parks | 0.6m |
| Maximum Installation Depth** | 4.5m |

*Extra layers may be suitable in specific applications, contact ACO

**Ground improvements may be required and ground water has not been taken into account. Seek engineering advice.





StormBrixx® HD – Heavy Duty

Applications

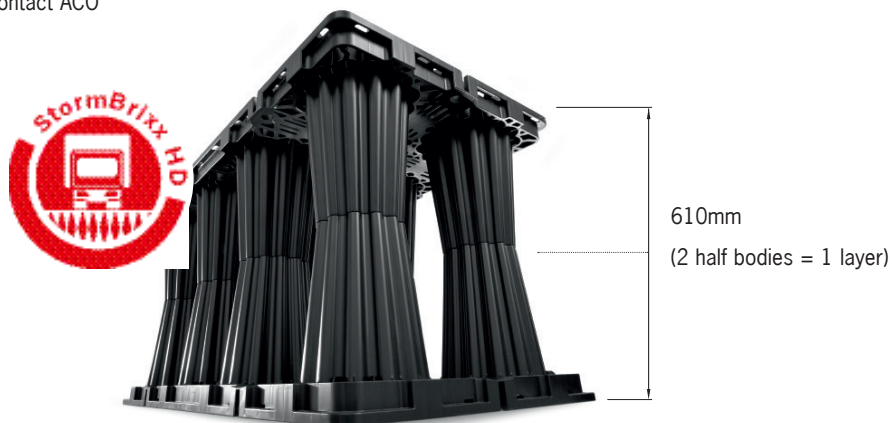
- Landscaped areas, no vehicles
- Landscaped areas with ride on mowers
- Pedestrian areas
- Driveways, parking lots, up to 9 tonne vehicles (solid pavement required)
- Fire trucks, delivery vehicles, semi-trailers (30 tonnes) (solid pavement required)
- For applications with unusually large loads and/or high ground water, contact ACO

StormBrixx® HD unit parameters


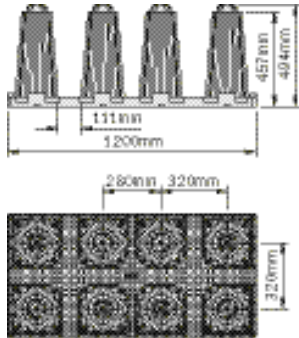

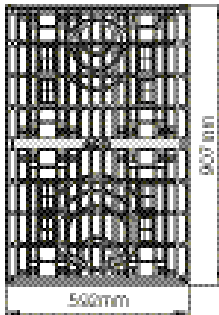
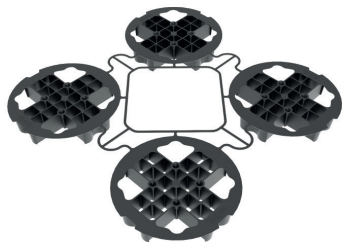
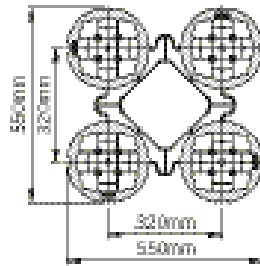


| | |
|-------------------------------|-----------------------|
| No. of layers* | 1-4 layers |
| Vertical Strength | 455 kN/m ² |
| Lateral Strength | 95 kN/m ² |
| Design Life | 60 years |
| Minimum Cover – Landscaped | 0.5m |
| Minimum Cover – Car parks | 0.6m |
| Minimum Cover – Truck traffic | 0.8m |
| Maximum Installation Depth** | 6.0m |

*Extra layers may be suitable in specific applications, contact ACO

**Ground improvements may be required and ground water has not been taken into account. Seek engineering advice.

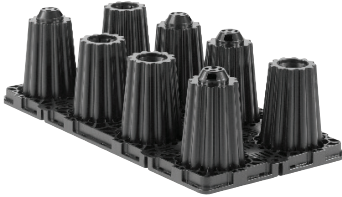
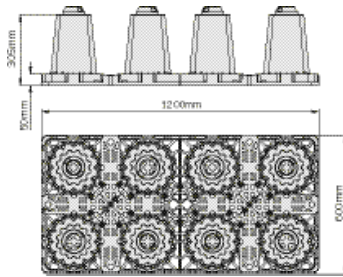
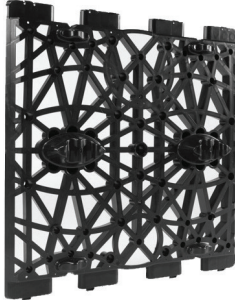
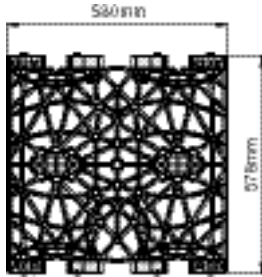

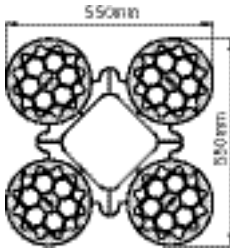




Product details – StormBrixx® SD

| | | Overall Dimensions | | | Weight (kg) | Part No. |
|---|---|--------------------|---------------|---------------|----------------|-------------|
| | | Length (mm) | Width (mm) | Depth (mm) | | |
| StormBrixx® SD tank half body | | | | | | |
|  |  | 1200 | 600 | 494 | 9.5 | 314090 |
| StormBrixx® SD side panels | | | | | | |
|  |  | 907 | 592 | 104 | 3.1 | 314091 |
| StormBrixx® SD top cover (set of 4) | | | | | | |
|  |  | 550 | 550 | 50 | 0.8 | 314092 |
| StormBrixx® SD layer connectors | | | | | | |
|  | | 53 | 44 | 26.5 | 0.1 | 314093 |
| StormBrixx® SD and StormBrixx® HD access plate | | | | | | |
|  | <p>Clear opening 285mm</p> <p>Compatible with StormBrixx® HD</p> | 650 | 650 | 120 | 4.7 | 314075 |

* See page 24 for accessories

Product details – StormBrixx® HD

| | | Overall Dimensions | | | Weight (kg) | Part No. |
|---|--|--------------------|---------------|---------------|----------------|-------------|
| | | Length (mm) | Width (mm) | Depth (mm) | | |
| StormBrixx® HD tank half body | | | | | | |
|  |  | 1200 | 600 | 343 | 10.0 | 314061 |
| StormBrixx® HD side panels | | | | | | |
|  |  | 580 | 578 | 35 | 1.6 | 314062 |
| StormBrixx® HD top cover (set of 4) | | | | | | |
|  |  | 550 | 550 | 43 | 0.8 | 314022 |
| StormBrixx® HD layer connectors | | | | | | |
|  | | 100 | 40 | 46 | 0.1 | 314023 |
| StormBrixx® HD access chamber | | | | | | |
|  | <p>Clear opening 350mm</p> <p>Alternative option use access plate, see opposite page</p> | 594 | 594 | 610 | 32.0 | 27034 |

*See page 24 for accessories

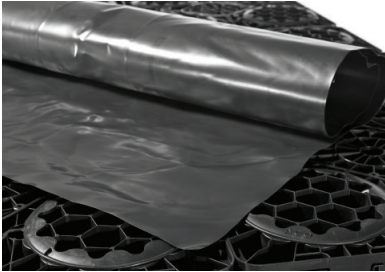
Accessories – StormBrixx® SD and StormBrixx® HD

| | | Overall Dimensions | | | Weight (kg) | Part No. |
|---|-------------------------------|--------------------|---------------|---------------|----------------|-------------|
| | | Length (mm) | Width (mm) | Depth (mm) | | |
| Rhinocast square solid top ductile iron access cover and frame | | | | | | |
| Clear opening – 450 x 450mm | | | | | | |
|  | Class B | 560 | 600 | 55 | 44 | 85249 |
| | Class D | 660 | 660 | 100 | 87 | 89268 |
| Rhinocast square recessed ductile iron access cover and frame | | | | | | |
| Clear opening – 450 x 450mm | | | | | | |
|  | Class B | 560 | 600 | 55 | 47 | 85014 |
| | Class D | 665 | 665 | 100 | 85 | 89013 |
| EzyBrixx™ square rising access shaft | | | | | | |
| Clear opening – 450 x 450mm | | | | | | |
|  | 150mm high shaft | 650 | 650 | 150 | 4.9 | 142832 |
| | 300mm high shaft | 650 | 650 | 300 | 9.8 | 142831 |
|  | Connector clips (set of 4) | 94 | 24 | 26 | 0.05 | 142840 |
| Circular solid top ductile iron access cover and frame | | | | | | |
| Clear opening – 400 diameter | | | | | | |
|  | Class D400 | – | Ø528 | 110 | 38 | 314043 |
| Circular rising access shaft | | | | | | |
| Clear opening – 380 diameter | | | | | | |
|  | 300mm high shaft | – | Ø437 | 350 | 2.6 | 314038 |
| Pipe connectors with flange | | | | | | |
|  | DN100 | 210 | 210 | 200 | 0.6 | 142833 |
| | DN150 | 260 | 260 | 200 | 1.1 | 142834 |
| | DN225 | 350 | 350 | 200 | 2.5 | 142835 |
| | DN300 | 415 | 415 | 200 | 4.0 | 142836 |
| | DN375 | 500 | 500 | 200 | 6.0 | 142837 |

Geomembranes and Geotextiles

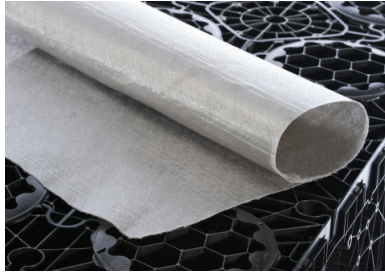
General information

Geomembrane



Impermeable geomembranes are for retention and detention applications. For 'non sensitive' applications taped joints are usually acceptable. ACO recommends installation by professional lining contractors for environmentally sensitive applications to achieve a geomembrane system with 100% watertight welded joints.

Geotextile



Permeable geotextiles are for use in infiltration applications. They permit the passage of water into and out of the ACO StormBrixx® system. Geotextiles are also used to protect the geomembrane from mechanical damage due to ground and thermal movement. They are placed on the outer side of geomembrane.

Selection guide

Non-sensitive retention/detention

Geomembrane
Geotextile
Double sided tape

A taped geomembrane system should only be used where ground conditions can accept minor leakages from the tank.

They are not recommended to be used in sensitive applications such as, but not limited to:

- Within 5m of any building line
- Where there is a high groundwater table
- Where land is contaminated or risk of contamination from surface water is high.

Site-sensitive retention/detention

Welded geomembrane
Geotextile
Double sided tape for geotextile

Correct choice of geomembrane is essential to the overall performance of retention/detention systems. In applications that are site-sensitive, consult a specialist geomembrane supplier, and ensure it is installed by an accredited contractor.

Site sensitive applications include:

- High groundwater table
- Contaminated ground
- Within 5m of any building line
- Where risk of contamination to groundwater from polluted surface waters exists.



Infiltration

Geotextile
Double sided tape

A non-woven geotextile with filtration and drainage properties should be used to minimise sediment build up within an infiltration (soakaway) system. The geotextile should completely wrap the ACO StormBrixx® system.

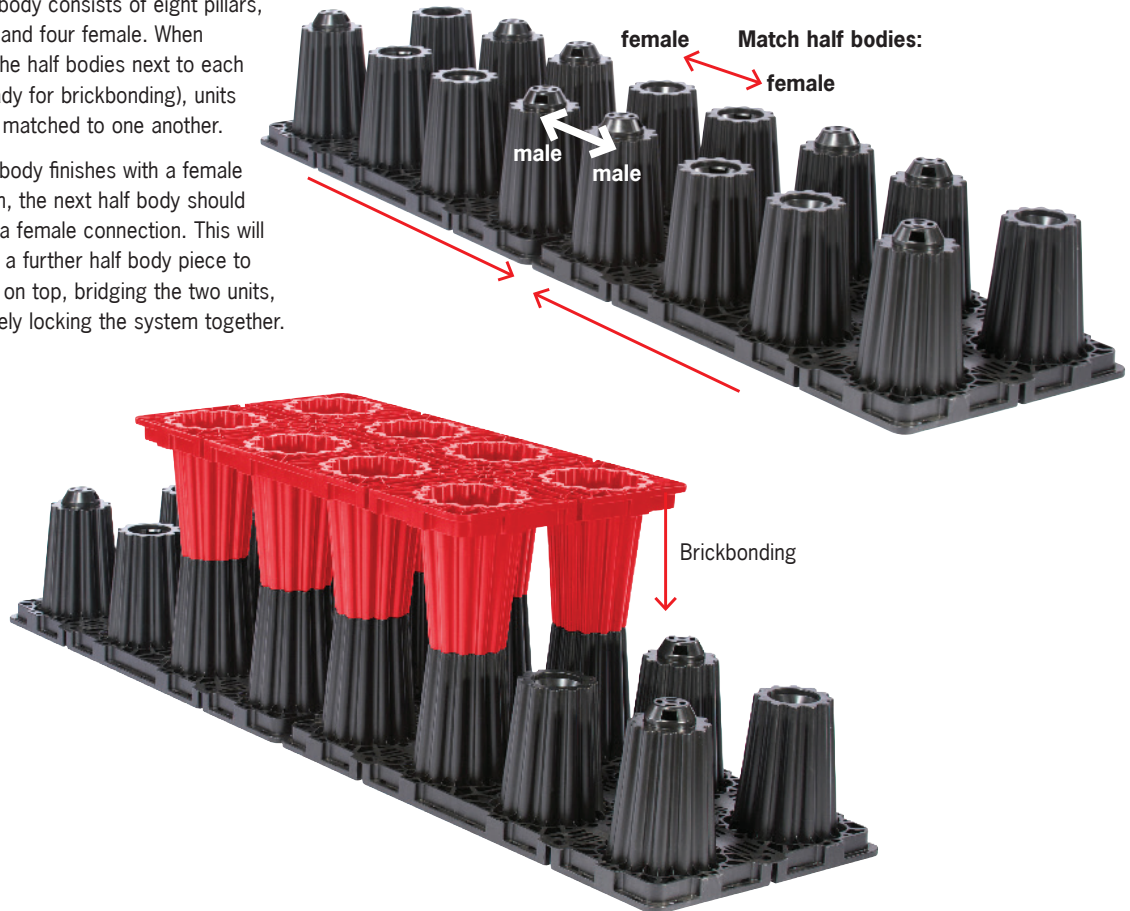


System configuration – Tank body

Column connections

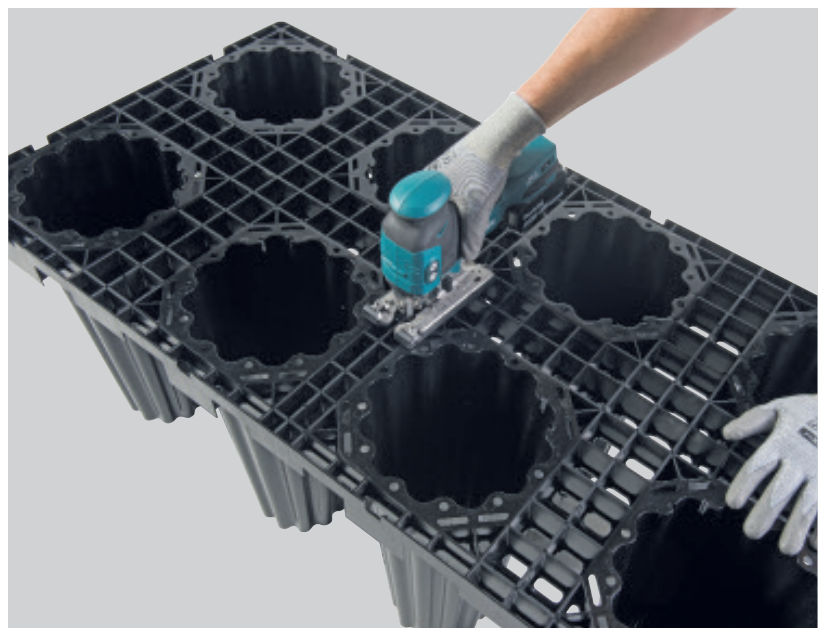
Each half body consists of eight pillars, four male and four female. When installing the half bodies next to each other, (ready for brickbonding), units should be matched to one another.

If the half body finishes with a female connection, the next half body should start with a female connection. This will then allow a further half body piece to be placed on top, bridging the two units, and securely locking the system together.



Cutting the tank body

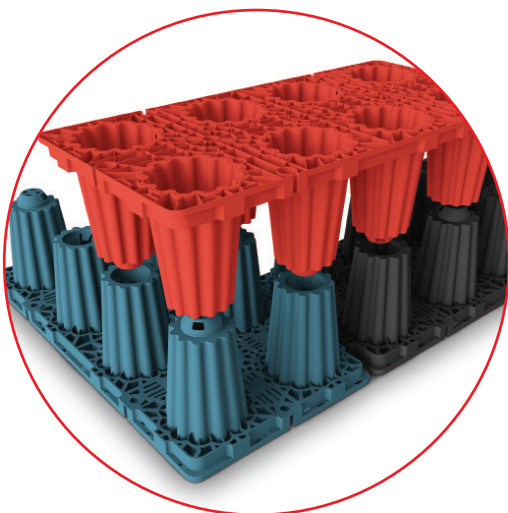
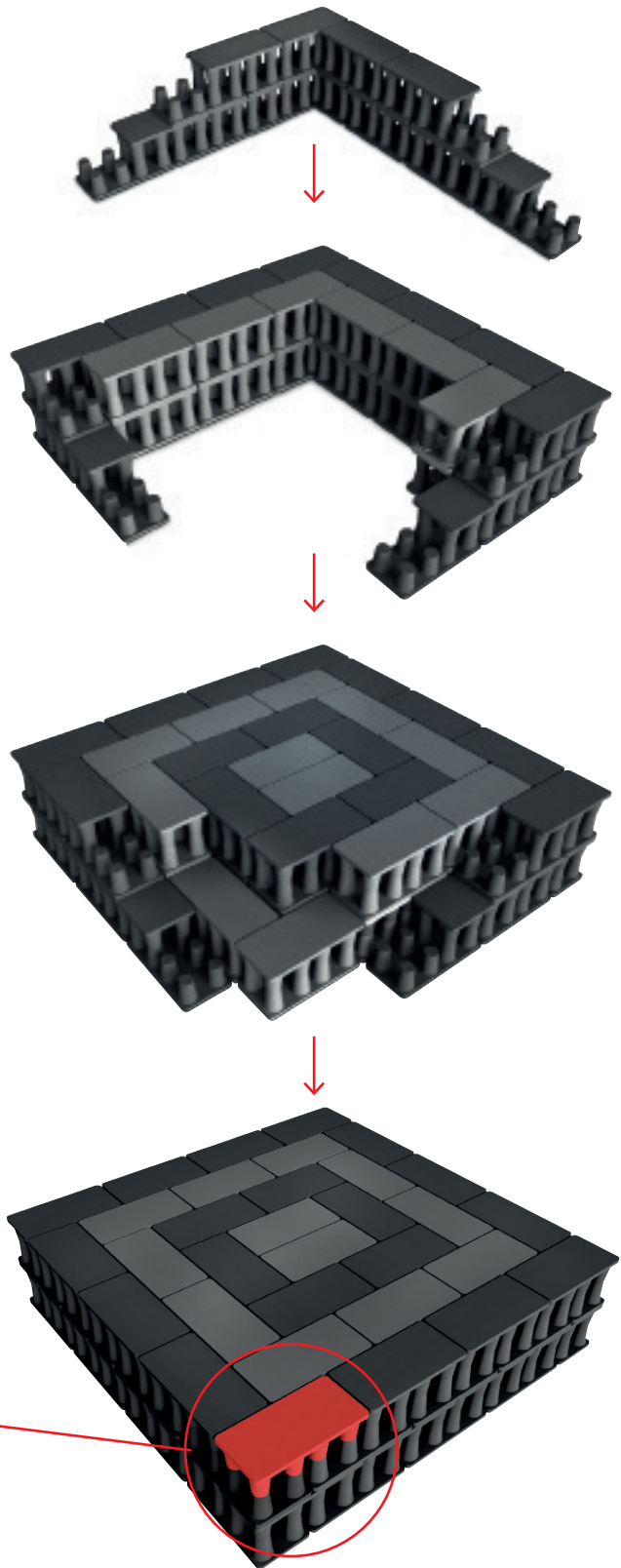
The half body can be cut along the central rib using a handsaw or jigsaw. Each cut piece can be linked to the rest of the system using connectors. Cut surfaces must face into the centre of the tank system to allow side panels to be attached.



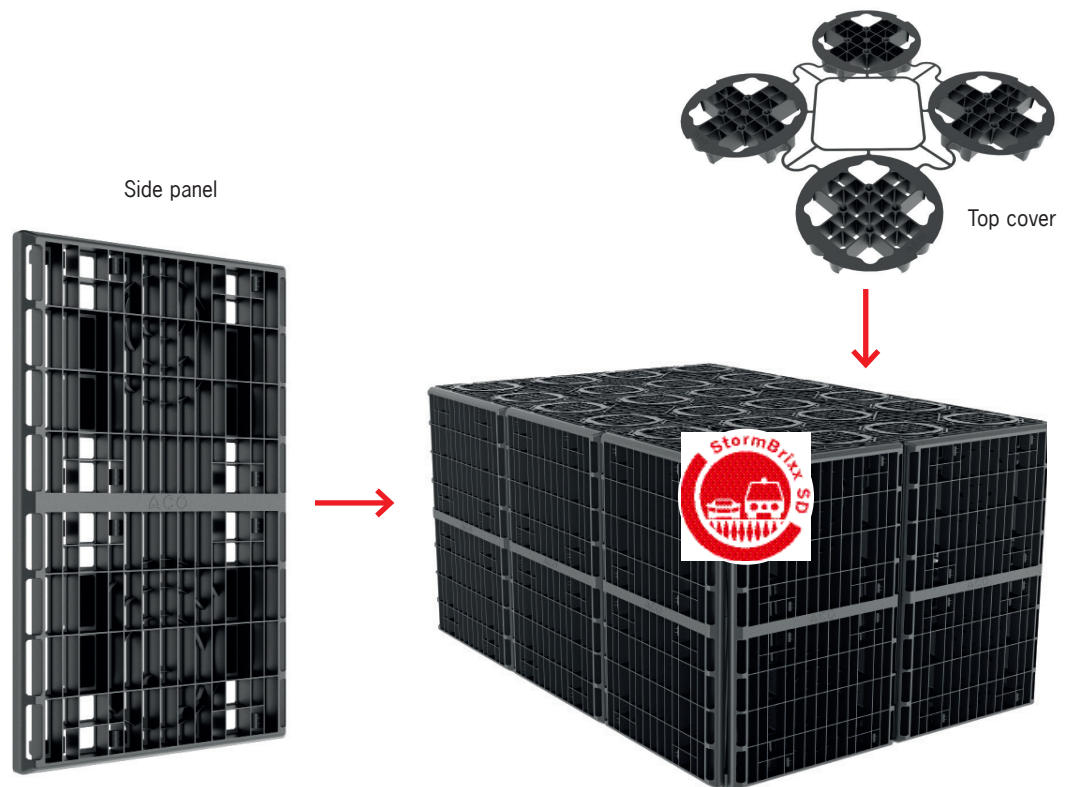
Recommended installation

Concentric ring layout

A series of ever decreasing rings converging towards the centre of the system. Place in a brick bonded method. Repeat for subsequent layers using the connectors to bond layers to one another.



Side panel and top cover – StormBrixx® SD



Installing the side panel



Polypropylene side panels are added to the perimeter of the tank to give lateral support against surrounding soils. The side panels have cutting guides which can be cut out using a jigsaw for the connection of plastic pipes.

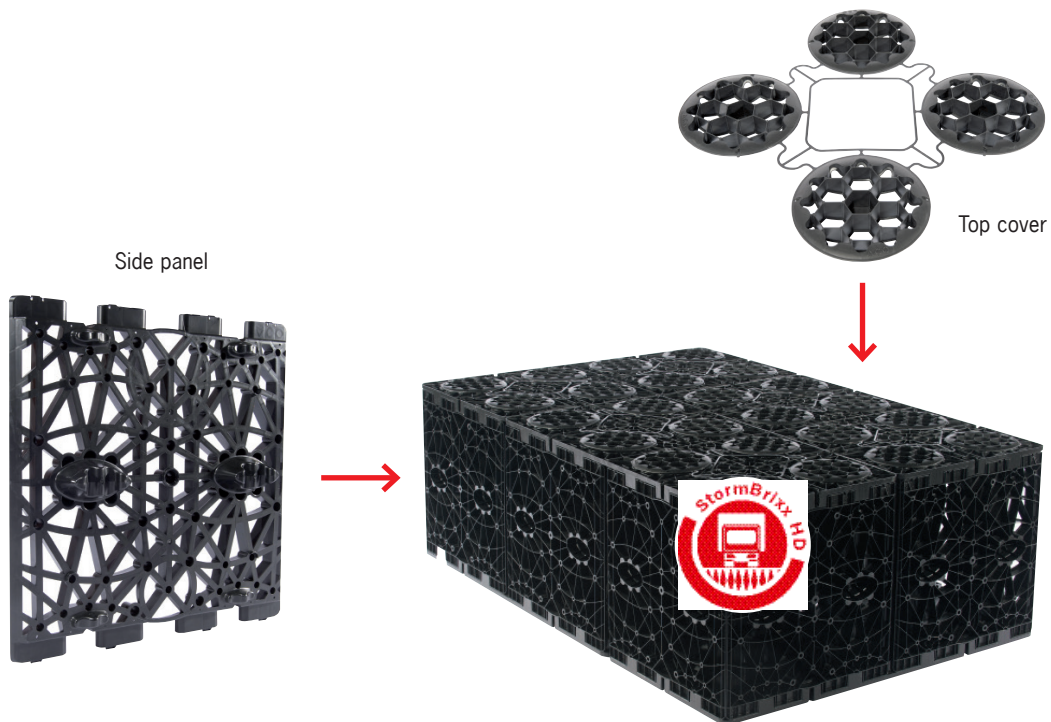
Installing the top cover



Polypropylene top covers are added to the top layer of the tank to fill the openings of the pillars and to ensure consistent support for the cover fill material.

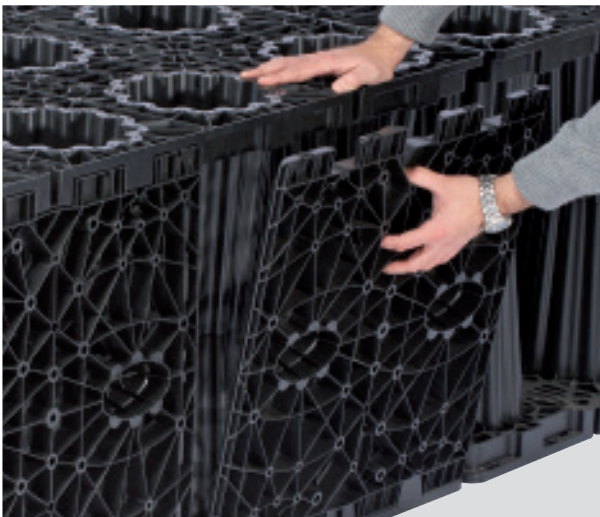
Note: Top covers are only placed in the top layer of the tank before the geomembrane and/or geotextile is wrapped around them.

Side panel and top cover – StormBrixx® HD



Installing the side panel

When installing the side panels you must ensure that the positioning tab is inserted into the base of the tank body first.



The outsides of the tank must be covered with side panels that click into place. These are inserted into the openings provided in the tank body elements. The side panels create a perimeter for the entire system offering a consistent surface for the geomembrane or geotextile. If needed, a pipe connection point can be cut out along the cutting guides in locations provided. Side panels have cutting guides for the connection of plastic pipes.

Installing the top cover

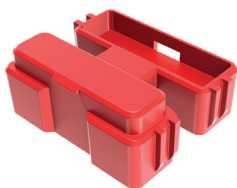
A single top cover closes off four pillar openings.



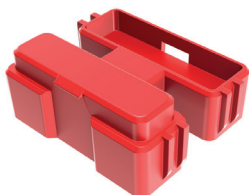
To ensure the geomembrane or geotextile can be wrapped around the tank snugly, covers should only be inserted in the top layer of the ACO StormBrixx® system. They prevent the geomembrane or geotextile being forced into the necks of the pillars during backfilling.

Note: Top covers are only placed in the top layer of the tank before the geomembrane and/or geotextile is wrapped around them.

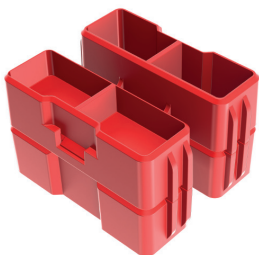
Layer connectors for multiple layer configuration



Invert connector
shown above



Insert and snap together



StormBrixx® SD
layer connector

Each layer requires two
connectors per 1.44m²
(2 modules)



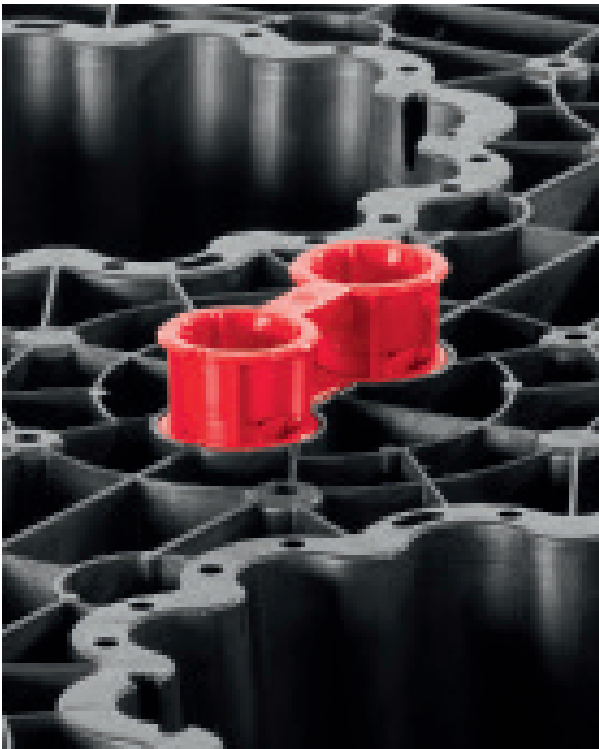
Rounded side forwards



Flattened side forwards
and insert together



StormBrixx® HD
layer connector



Installing the connectors

Installation of connectors

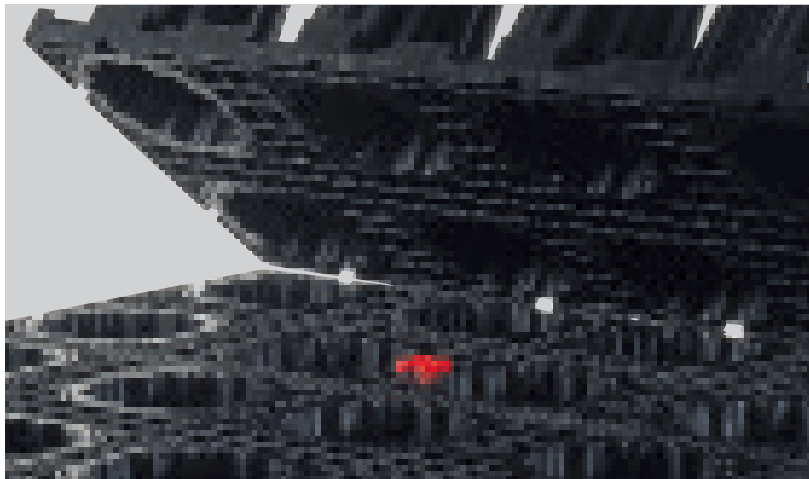
When installing a **single layer** of brick bonded tank, connectors are **not an essential requirement**. If the units are fully brick bonded, the structure will not need the connectors to hold the tank together. Connectors are provided as a precaution to give additional stability during installation.

This is unique to ACO StormBrixx® as other stormwater control systems require these units to ensure structure is fully stable during backfill and to ensure their design life can be achieved.



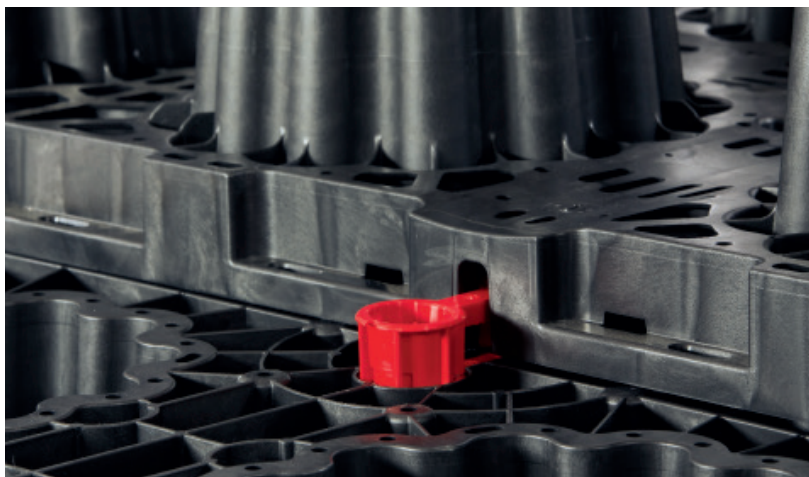
Installing multiple layers

When installing a second layer, connectors will be required. Layer connectors should be installed at the top face close to the outside edge perimeter and randomly throughout the centre. Further connectors should then be installed into the first layer to create locators for the second layer. (see opposite)



Minimise lateral movement

These layer connectors should protrude from the top of the bottom layer by approximately 30 to 50mm, depending on which unit is used (see opposite). These protruding units fit into the base of the layer above and are key to minimising lateral movement during backfill and overall installation.



Access – StormBrixx® SD



Enter via the Access Plate

The Access Plate can be used to allow access to the StormBrixx® SD tank. The plate requires a half body cut piece (4 pillars) to be removed creating the free area within the structure. (See page 26)

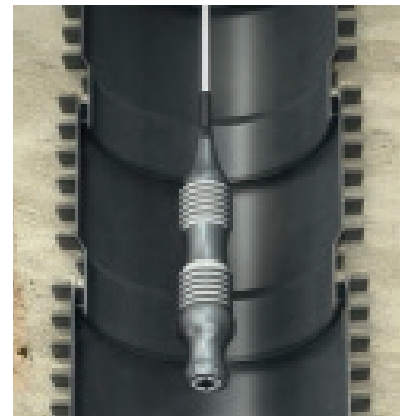
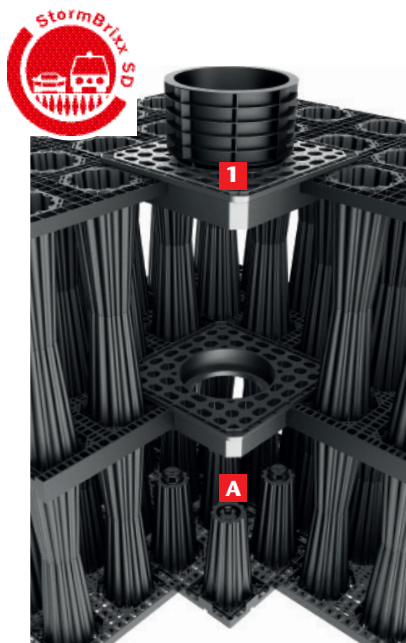
With the Access Plate, an easy installation is possible at any desired position, except along the perimeter.

Access Plates (A) are to be connected to circular rising shafts as shown (1) or EzyBrixx square rising shafts.

Caution: Ensure the Access Plate is not installed on the perimeter edge of the tank but at least one unit (4 pillars) away from the edge.

Inspection cameras or jetting heads can be inserted vertically into the access shaft.

The Access Plate can also be used with StormBrixx® HD.



Access – StormBrixx® HD



Enter via the Access Chamber

This Access Chamber is only suitable for StormBrixx® HD. Access can be gained to the tank using the Access Chamber (B), or the Access Plate (see opposite). The Access Chamber can be installed both within the structure and along the outer edges. They require half the StormBrixx® cell (4 pillars) to be removed giving full access to the system. (See page 26)

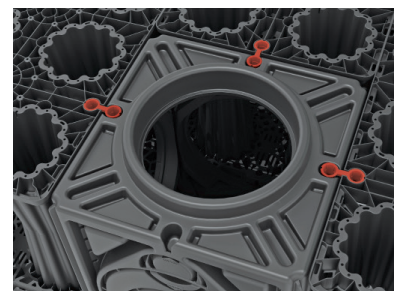
For multi-layer systems, the chambers stack on top of each other and clip to the tank using the connectors. (See below)

Each Access Chamber can be cut out as required to accommodate various sizes of pipe up to DN300. Use a drill to get the saw blade inserted when creating the openings in the lower shaft section.

Access Chambers extend to the surface using circular rising shafts (1) or EzyBrixx square rising shafts.



Cannot be used with StormBrixx® SD



Designing an ACO StormBrixx® system

Consultation should begin with the relevant council or planning authority to determine the requirements surrounding retention, detention and infiltration systems, as this may affect the choice of product required.

These authorities can approve ACO StormBrixx® systems where appropriate.

To design and install ACO StormBrixx®, specifiers need to consider three factors:

- 1 Hydraulic Design
- 2 Structural Design
- 3 Maintenance (See page 38)



1. Hydraulic design

Hydraulic design deals with surface runoff as well as the temporary storage of water in storm events. The objective is to reduce the volume, speed, and frequency of surface water runoff. Factors will be site specific and calculations for hydraulic design may be undertaken using locally accepted and approved methods.

CIRIA C697 offers design guidelines. CIRIA stands for Construction Industry Research and Information Association. It is a non-profit body that provides guidance on the planning, design, construction and maintenance of Water Sensitive Urban Design (WSUD) to assist with effective implementation within developments.

2. Structural design

Structural design considers the load bearing capacity of the ACO StormBrixx® system to ensure it can safely carry the loads it will be subjected to. The initial decision must be made on the type of system required - retention, detention or infiltration and then the design parameters shown below should be considered.

- Soil type
- Vertical loading (including site traffic movement)
- Groundwater
- Depth of cover and total installation depth
- Surface finish
- Horizontal loading

Consideration must be given to the maximum surface deflections allowable for the pavement above the tank. Although excessive deflections may not lead to tank failure, they will cause localised pavement deterioration. ACO can provide structural deflection results for specific live loads. Creep (long term deflections under permanent dead loads) should also be investigated to ensure the durability of the tank.

Structural calculations should be carried out using methodology detailed in CIRIA C680 – “Structural design of modular geocellular drainage tanks”. For further advice please contact ACO Technical Services.

Guide to installing ACO StormBrixx® systems

Installation dimensions and methodologies will vary by site. Local ground conditions and council design requirements should be adhered to.

Step 1

Excavate hole, or trench, to required dimensions to accommodate ACO StormBrixx® tank. Allow additional 300mm on all sides for access, necessary pipework and any inspection chamber(s) and/or silt trap(s).

Step 2

Ensure base of excavation is flat, level and capable of withstanding required design loads, angle sides of excavation to prevent collapse, and ensure safe access/conditions for site workers.

Step 3

Lay 100mm compacted bedding layer for retention/detention systems or 100mm coarse sand for infiltration systems.

Step 4

Lay geotextile along the base and sides of the excavation with minimum 300mm overlap at joints.

Step 5

For retention/detention tank lay geomembrane on top of geotextile. Note, infiltration tanks do not require geomembrane.

Step 6

Assemble StormBrixx® units to required size and configuration and place on geotextile or geomembrane. Ensure loose units are fixed together using layer connectors.

Step 7

Form hole(s) in side panels using hole saw/jigsaw to receive pipe (inlet/outlet/inspection/vent pipe as required). Fit side panels and pipe connectors. Ensure top covers are installed on the top layer of the tank.

Step 8

Carefully cut geotextile and/or geomembrane around pipe protrusions. Seal geomembrane around pipe connections. Test joints for leaks.

Step 9

Continue wrapping the tank with geotextile and/or geomembrane.

Step 10

Connect inlet/outlet/vent pipe and access chamber/access plate with rising shafts. Only one DN100 vent pipe is required per 7500m².

Step 11

Backfill evenly around excavation sides using sub-base or selected granular material in layers of 150-300mm and compact.

Step 12

Use a 100mm minimum coarse sand protection layer over the top of the tank and then backfill. There should be a minimum 500mm backfill cover before compaction equipment is used.

Step 13

The area should then be compacted using suitable compaction equipment.

Step 14

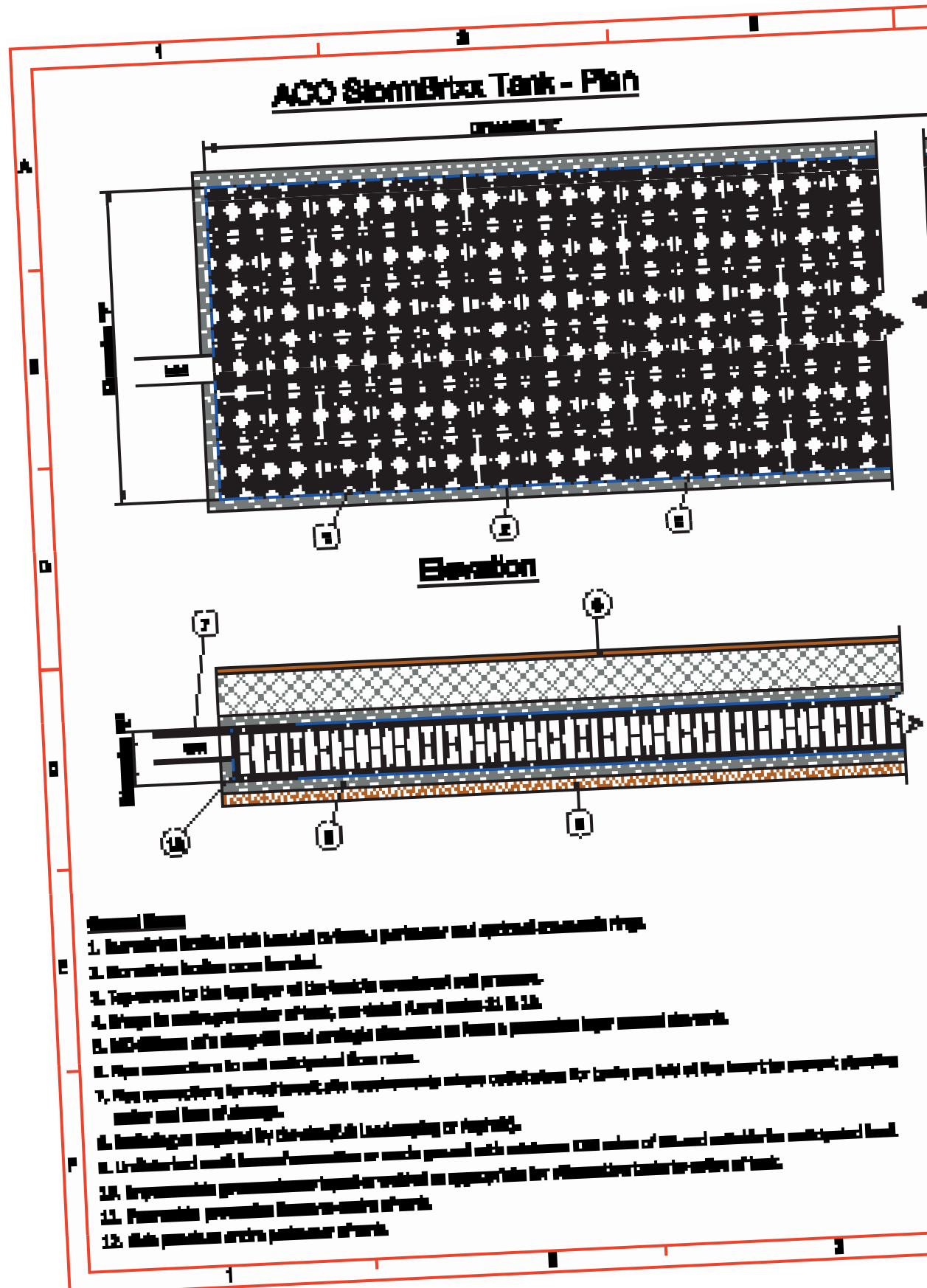
Complete the pavement construction or landscaping over the ACO StormBrixx® tank.

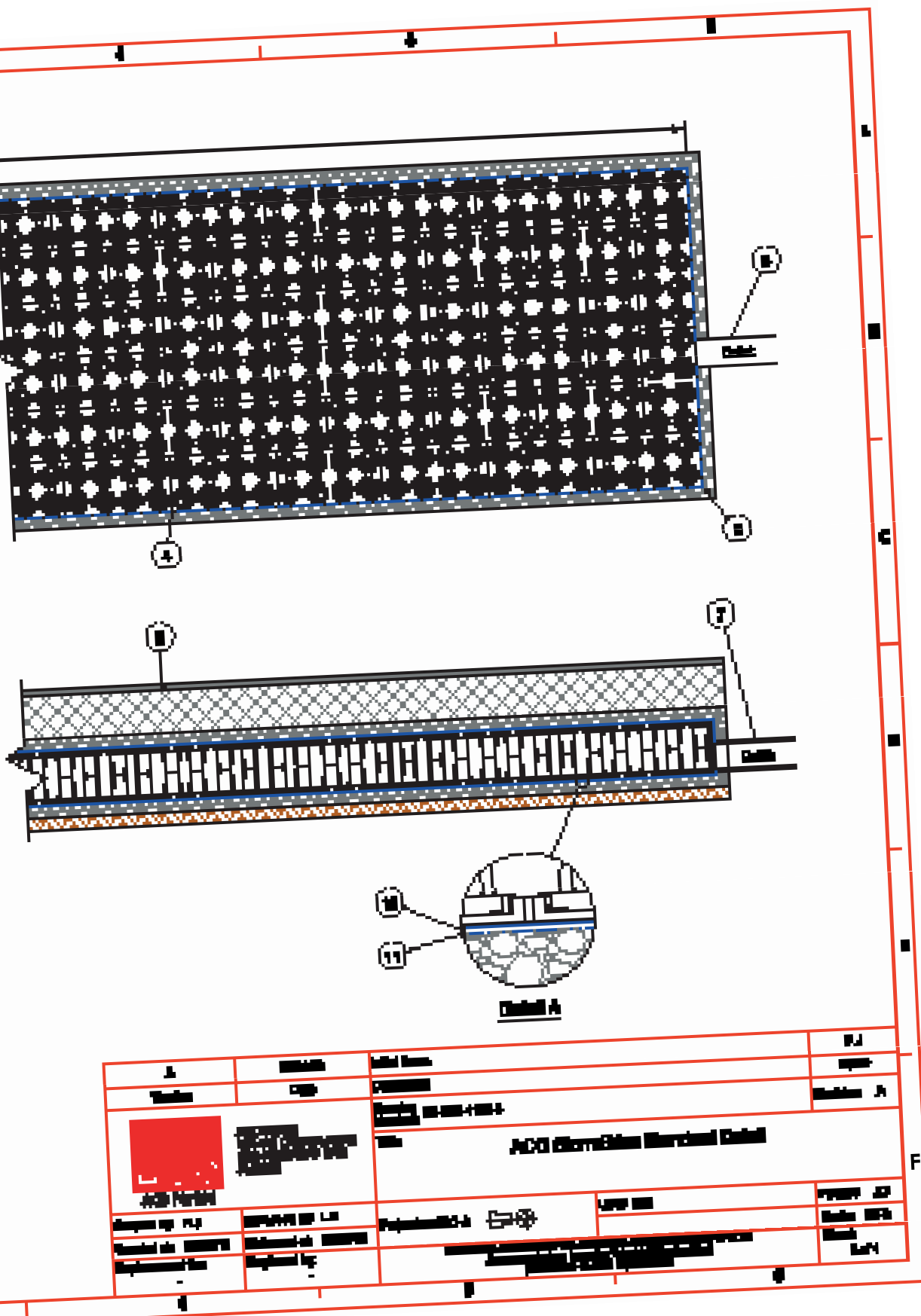
Prior to final surfacing, tank area should be fenced off and traffic prohibited from using the area above the tank. ACO StormBrixx® is not designed to withstand loads from construction traffic.



Technical support

ACO will provide general installation drawings, addressing key requirements.





Maintenance and inspection guidance

Maintenance procedures

It is important to note that failure to control and remove sediment build-up in stormwater tanks is the largest cause of system failure. Incorporation of a sediment bay in a StormBrixx® infiltration system, or a silt trap in a StormBrixx® retention/detention system, can ensure the effective management of silt.

The open design of ACO StormBrixx® allows the system to be inspected by remote CCTV either through the inlet connection, access chambers, inspection points or pipes at the sides of the ACO StormBrixx® system. This allows the system to be inspected for sediment build-up and enables collected sediment to be removed from the infiltration system or flushed through a retention/detention system.

In the event that a sediment bay, or silt trap, has not been incorporated with the ACO StormBrixx® system, please contact ACO Technical Services for further advice.



Infiltration systems

In order to periodically check the effectiveness of the StormBrixx® infiltration system, a percolation test can be carried out on the tank and compared with the original data. If there is a significant decrease in the infiltration rates, the infiltration tank should be filled via the inspection chamber to the invert level of the inlet pipe. It should then be flushed through with water in order to remove sediment and unblock the geotextile.

As sediment has the potential to carry high levels of pollutant, it is important that any sediment removed from the system is disposed of by a licensed contractor and in accordance with local regulations and codes.

Retention/detention systems

In order to clean the ACO StormBrixx® system, if a silt trap has not been incorporated, it will be necessary to block the outflow control device, not the overflow pipe, before filling the tank to the invert of the vent pipe. The tank should be filled and flushed as above and the water effluent removed and disposed of by a suction truck with vacuum pump.

If a silt trap has been installed, lift the access chamber cover and using a suction truck remove all water in the silt trap and jet the sump channel as required to remove all sediment.

The frequency of a maintenance procedure for the tank will be determined by the inspection regime. A recommendation is not less than twice-yearly inspections, and during the first year after every significant storm event.

In order to minimise silt build-up, ACO recommends the use of pretreatment systems upstream of the retention/detention system.

ACO StormBrixx® Testing

Product performance tests carried out on the ACO StormBrixx® system have been conducted using the methods recommended by CIRIA C680 "Structural design of modular geocellular drainage tanks". Data supplied is supported by qualified third party independent certification.

Ultimate load bearing capacity has been established under laboratory test conditions during short and long term load testing.



Recycled content

ACO aims to incorporate as much recycled material or waste material as is practicable in its products without compromising performance. Typically PP materials can contain up to 50% plus recycled plastic and ductile iron materials contain 40% to 90% recycled iron.

ACO StormBrixx® products are intended for a long life with low maintenance. After its design life, the materials can be recycled or disposed with a low risk of pollution to the environment.

Flow control systems



ACO StormBrixx® represents the 'Hold' element of the ACO System Chain; the final stage is 'Release'. In order to manage the 'Release' stage, ACO has a range of flow control systems that regulate stormwater flow before it discharges into the watercourse or sewer networks. ACO Q-Brake flow controls and ACO Q-Plate orifice plates are capable of regulating any flow for surface water applications and can be used in conjunction with detention systems, such as ACO StormBrixx®, as part of a Water Sensitive Urban Design (WSUD) scheme.

What is an ACO Q-Brake?

ACO Q-Brake is a horizontal vortex flow control unit designed to regulate stormwater flows.

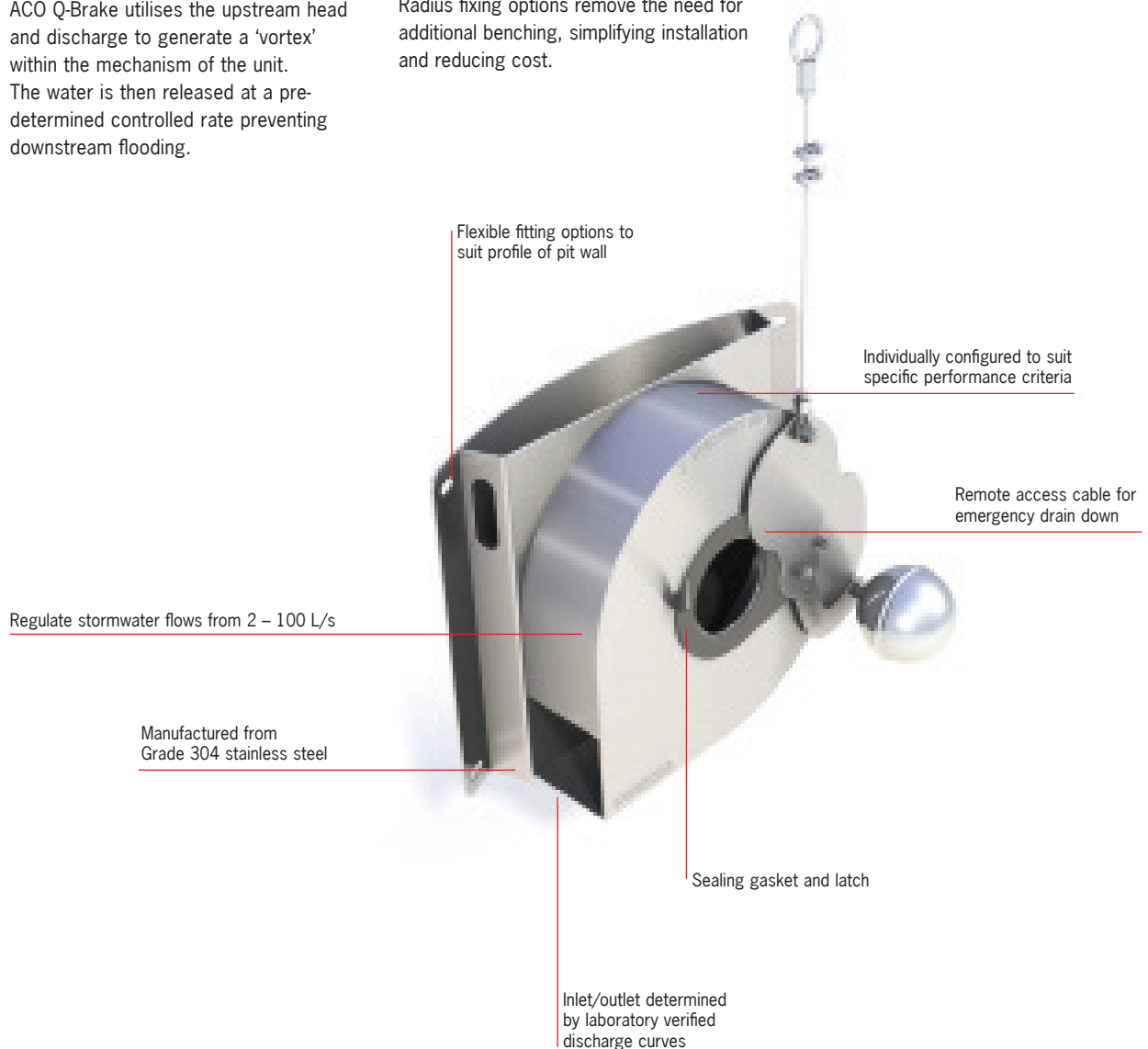
The design of a vortex flow control is based on the fluid mechanics principle of the 'forced vortex', which permits flow regulation without any moving parts.

ACO Q-Brake utilises the upstream head and discharge to generate a 'vortex' within the mechanism of the unit.

The water is then released at a pre-determined controlled rate preventing downstream flooding.

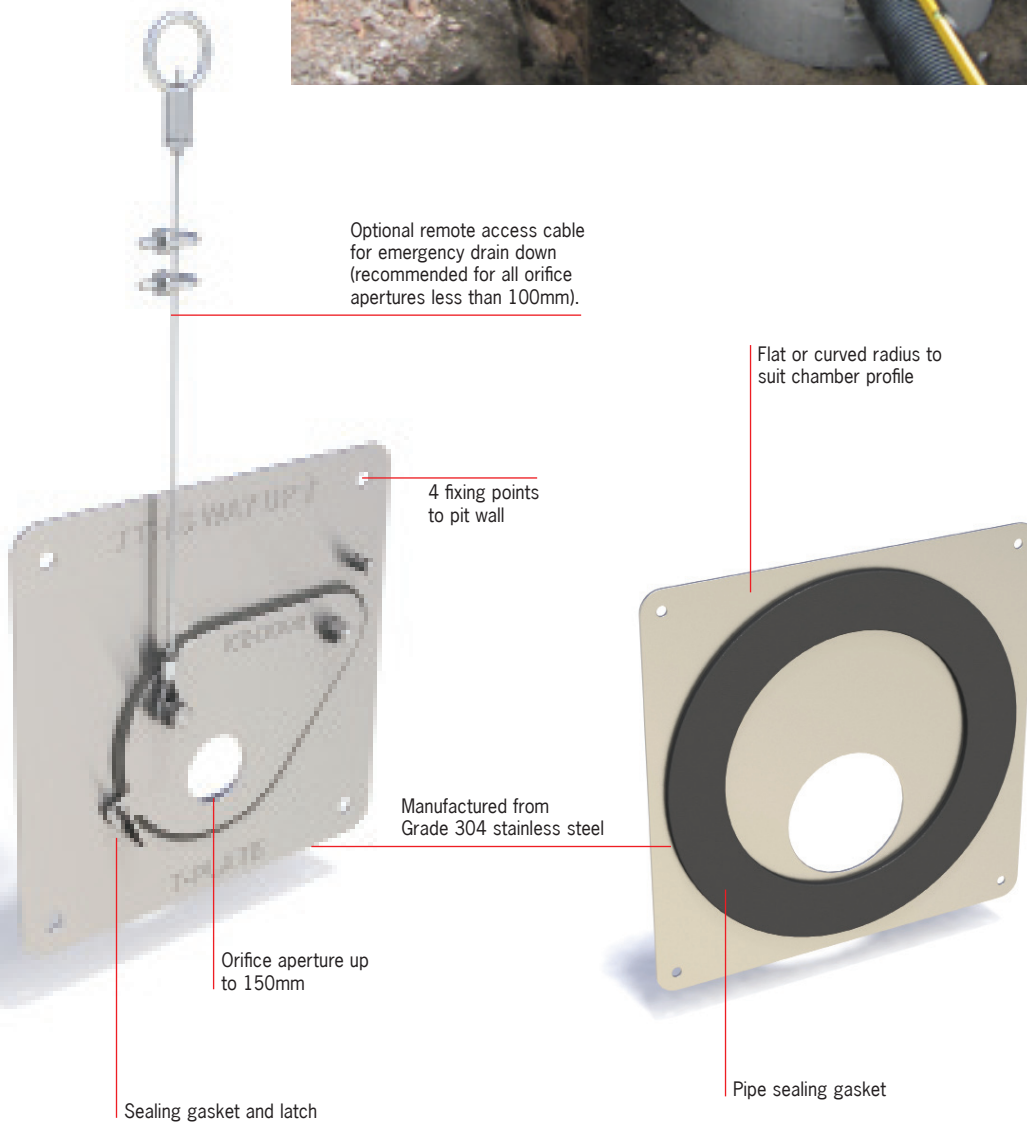
Unlike conventional products, ACO Q-Brake is less prone to blockage and permits higher flow at a lower head of water. This is because the vortex control allows an equivalent outlet size 4 to 6 times larger in cross-sectional area to be used.

Each ACO Q-Brake Vortex unit is custom built to suit the profile of the chamber. Radius fixing options remove the need for additional benching, simplifying installation and reducing cost.



What is an ACO Q-Plate?

If a more conventional product is required, ACO Q-Plate orifice plates are perfect for all flow rates and can be used for a number of applications. Due to the systems custom construction, any pit size, pipe diameter, orifice opening can be accommodated.



Benefits of using a surface water flow control system

Storage and the controlled release of clean water into the natural environment is an important aspect of managing surface water in the WSUD approach. Councils have overall responsibility to impose, where appropriate, the discharge rate of a surface water flow control system.

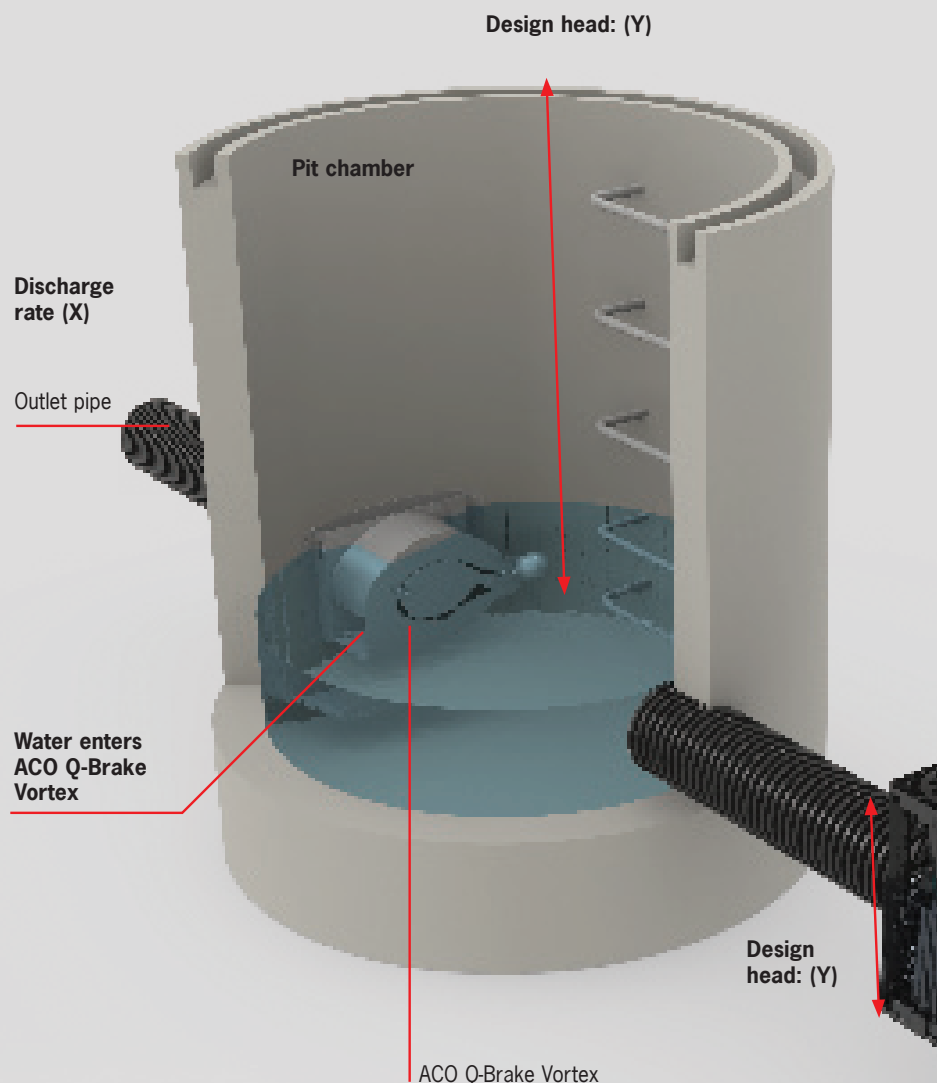
ACO's range of flow control systems can be used in conjunction with ACO StormBrixx®, to provide a fully integrated and compliant solution.

This diagram shows how the ACO StormBrixx® system is used to provide stormwater detention, as the ACO Q-Brake is used to regulate the rate of discharge from the development into the watercourse or stormwater network.

This benefit is best demonstrated in the example opposite, where the upstream storage can be reduced by 32m³ compared to a traditional flow control system.

Example:

There is a development project with a catchment area of 9,000m². The project has predefined design criteria of a 1 in 25 year storm, with a 10% increase in rainfall intensity over the lifetime of a development, due to climate change, and runoff from the site must not exceed 5 L/s at a design head of 1.3m.



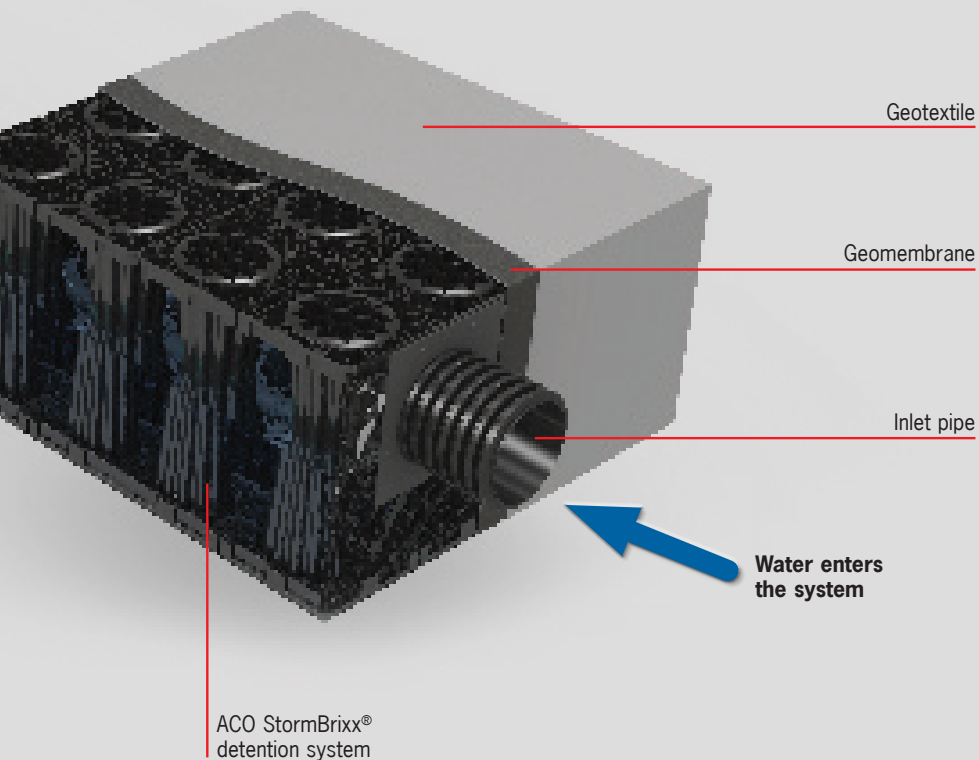
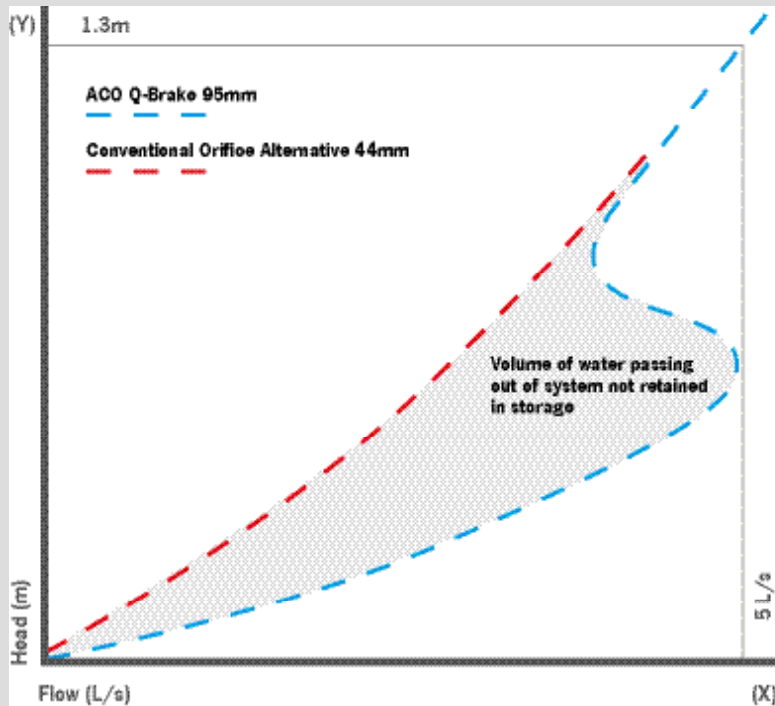
Discharge characteristics

Results:

Using drainage software, ACO has identified the potential saving in upstream storage requirements when using a Q-Brake instead of a traditional orifice plate. Results are summarised below:

- An ACO Q-Brake system would require a 95mm diameter orifice to best manage the design head and flow, which lead to 301m³ upstream storage being required.
- An equivalent orifice plate system would require a 44mm diameter orifice and lead to 333m³ upstream storage being required to deliver against the same design criteria.
- ACO Q-Brake would therefore reduce upstream detention requirements by approximately 32m³ relative to a traditional orifice plate system. This equates to a reduction in storage of 10%.

The increased orifice diameter also means the Q-Brake orifice has a cross-sectional area 4.6 times that of the equivalent traditional orifice plate. Therefore, it is less prone to blockage than a traditional orifice plate flow controller.





Other ACO Civil Construction Products

- **ACO Drain**
A range of grated trench drainage systems and pits made from 'Polycrete' polymer concrete. Grates are available in all materials and finishes.
- **ACO Infrastructure**
A range of trench drainage systems for roads, ports, airports and rail.
- **ACO Sport**
A range of surface drainage systems and ancillary products for sports fields, running tracks and stadiums.
- **ACO Self**
A range of economical domestic drainage products, ideal for homes, gardens and landscaped areas.
- **ACO Access**
A range of ductile iron, galvanised steel and composite access covers in a wide range of sizes and configurations from single to large multi-parts units.
- **ACO Cablemate**
A range of electrical, communication cable jointing pits and surface ducting systems.

ACO Limited

Head Office

Int: +64 9 815 9500

Tel: 0800 448 080

Unit F/6 Percival Gull Place
Mangere, Auckland 2020
New Zealand

Email: sales@aconz.co.nz

Web: www.aconz.co.nz

Follow us on



© October 2020 ACO Limited. All reasonable care has been taken in compiling the information in this document. All recommendations and suggestions on the use of ACO products are made without guarantee since the conditions of use are beyond control of the company. It is the customer's responsibility to ensure that each product is fit for its intended purpose and that the actual conditions are suitable. ACO Limited pursues a policy of continuous product development and reserves the right to amend specifications without notice



CA0037
(2018-3000)