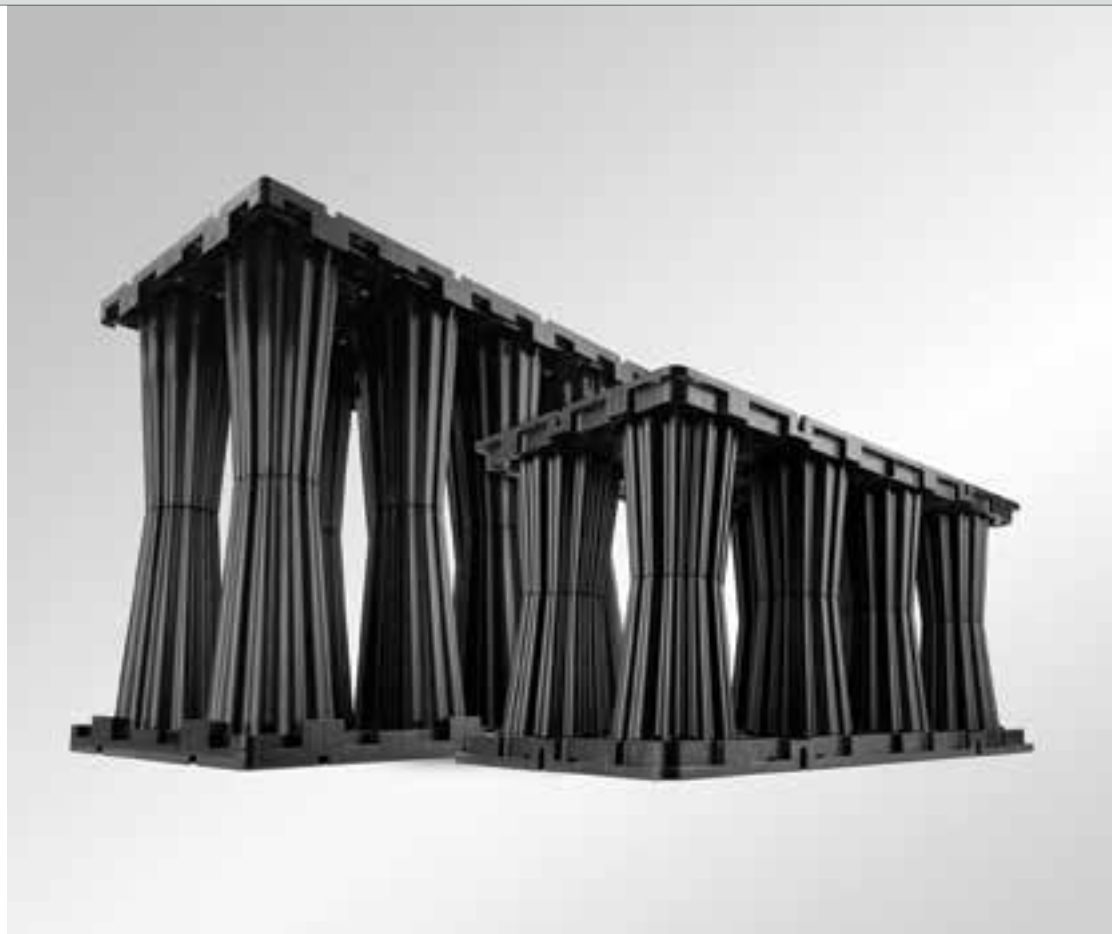
ACO Water Management:
Civils + Infrastructure

Uniclass L2123 + JR12 + JS10 + L71121 + L731	EPIC J3413
CI/SfB (52.5)	

ACO StormBrixx









EXTENDED RANGE

ACO StormBrixx - Stormwater attenuation and infiltration range

Specification and technical data

Introduction to the ACO Group

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

Today 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 applications, meeting the need for high performance, sustainable products that deliver optimum value throughout their operational life.











ACO Technologies plc

ACO operates as ACO Technologies plc in the United Kingdom. Founded over 30 years ago, the company has grown quickly on a reputation for design innovation and customer service.

There are now two core divisions, ACO Water Management and ACO Building Drainage, that serve every sector of the construction industry, providing solutions for applications as diverse as rail, highways, airports, landscaping, retail, distribution centres and environmentally sensitive projects.



To help architects, designers and contractors meet the legal requirements that now tightly control the way surface water is managed, ACO has created its unique 'Surface Water Management Cycle' – Collect, Clean, Hold, Release – the four core processes now required for the complete and sustainable management of surface water drainage.



The ACO Group / www.aco.com

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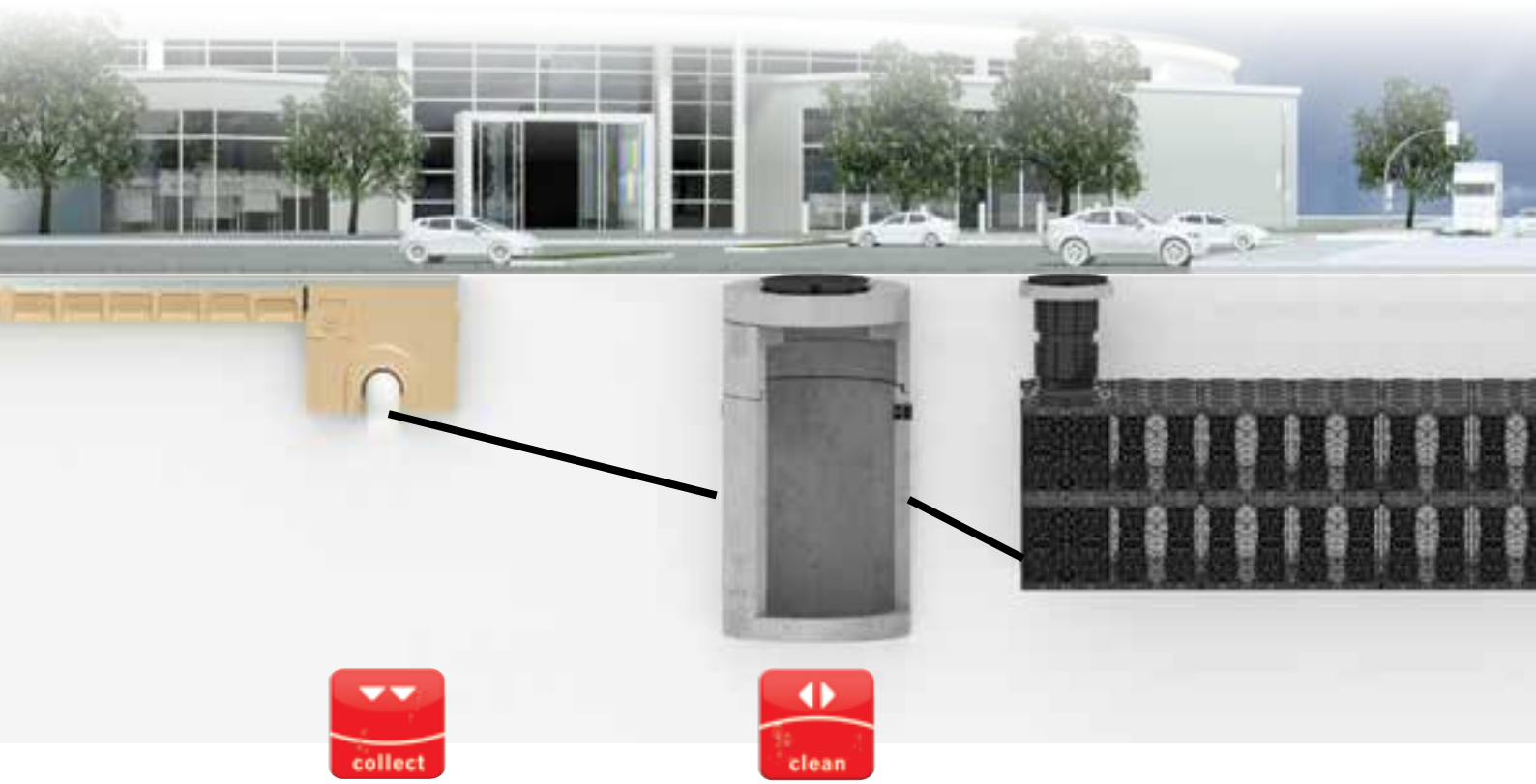
The Surface Water Management Cycle



Where surface water management and water protection begins

Surface water management begins with an assessment of the hydrological demands on the landscape of the project; the rainfall and topography from which a surface water solution can be devised. ACO provides expertise in both the assessment, product solutions and optimum layouts to collect the surface water across the site.

In hard surfaced areas the extensive range and capacity of ACO channel drainage products offer a high intercept performance across the total length of the channel run, and reduce the occurrence of ponding or streaming across site.

The safety and convenience of people, buildings and traffic is assured 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 because surface water run-off is at increasing risk of contamination from the greater urbanisation and transportation demands on the environment. Policy and planning guidelines require water quality is taken into account to prevent contamination of surface and groundwater resources and if the untreated water is discharged into the natural surroundings it could endanger plant and wildlife, so therefore preventative methods must be put in place.

These 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 within winter months.

ACO offer a number of treatment units to deal with water quality including heavy metal separators and petrol/ oil interceptors. These have even been combined with swales, so the 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 and so the risk of flooding increases. The natural water cycle of infiltration, evaporation and evapotranspiration is hindered and solutions such as ACO StormBrixx can be used to store and control the surface water runoff rate down to more natural levels. The geocellular system can be used for infiltration and attenuation, as well as Sustainable urban drainage (SuDS).

ACO StormBrixx can help support the sewer network by providing capacity to meet these higher risk flooding scenarios, and its use in SuDS schemes has allowed it 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 struggling capacity of sewer networks and natural waterways, water discharge rates are addressed on each site, with Orifice plate and Vortex flow controllers as the two main methods of discharge control.

ACO have solutions for both, with units usually sized to match the previous run-off rates or a greenfield equivalent to ensure that the infrastructure and environment are not put under strain. Another product that controls the discharge rate is the ACO SuDS Swale Inlet with a flared and bobble design, which protects the outfall area from erosion by slowing the speed of water entering here.

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 an integrated sustainable urban drainage (SuDS) scheme.

What is ACO StormBrixx?

Plastic geocellular systems are a widely accepted method of creating infiltration and attenuation systems throughout the UK. They have been installed in a variety of applications for a number of years.

One drawback of these types of systems is an overall lack of accessibility for maintenance. Improving accessibility would enable Local Authorities and Water Companies to adopt them. ACO StormBrixx was developed to satisfy these adoption needs and the ongoing maintenance requirements of private drainage installations.

Amendments to the planning process in April 2015 make it mandatory for local planning authorities to require sustainable surface water management as an integral part of any major planning application, consistent with the requirements of the National Planning Policy Framework.

Consideration will be given to management of both the quantity and quality of any water discharged off-site, along with the ongoing maintainability.

Adoption of constructed SuDS systems or components by the local authority is not mandatory and ownership of most approved schemes will rest with the developer after construction.

Maintainability of SuDS systems, beyond that of most current geocellular systems, will be a key factor in determining whether planning approval for a development or redevelopment is given.

Specifiers for projects in Scotland should refer to Sewers for Scotland 3rd Edition and SEPA for guidance on the specification of Sustainable Drainage Systems.

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

The system can form part of the design of any integrated drainage scheme, such as open parking areas, commercial premises, retail or residential developments.



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's unique pillar configuration gives a high void ratio of 95%-97%. This minimises the excavation required to achieve a specified storage capacity, reduces the aggregate needed for backfilling, and improves the flow characteristics of runoff through the installed 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 the 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, geotextiles and geo-membranes, as well as a range of chambers including man access for full inspection and maintenance.

ACO StormBrixx can be configured to minimise silt accumulation and has the added feature of a low flow and drain down facility ensuring that the system can be properly maintained throughout its life.

Why choose ACO StormBrixx?

Structural Integrity

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

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

Access and maintenance

ACO StormBrixx addresses the fundamental requirement of access and maintenance for SuDS Approval Boards (SABS) and water companies. 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 just a few access points.

Simplified handling and 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.



ACO StormBrixx SD



ACO StormBrixx HD

System benefits

- Brick bonded and cross bonding stacking for optimum stability
- Low flow, draindown and silt management facility
- Man access and 3D inspection access to the 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 including highways

If you need help with specification, design or installation, or just wish to learn more about this and other Surface Water Management products from ACO, contact our free, no obligation ACO Water Management Design Services Team who can provide advice and dedicated design support for your project – call 01462 816666 or visit www.aco.co.uk.

ACO StormBrixx Applications and Case Studies

ACO StormBrixx SD

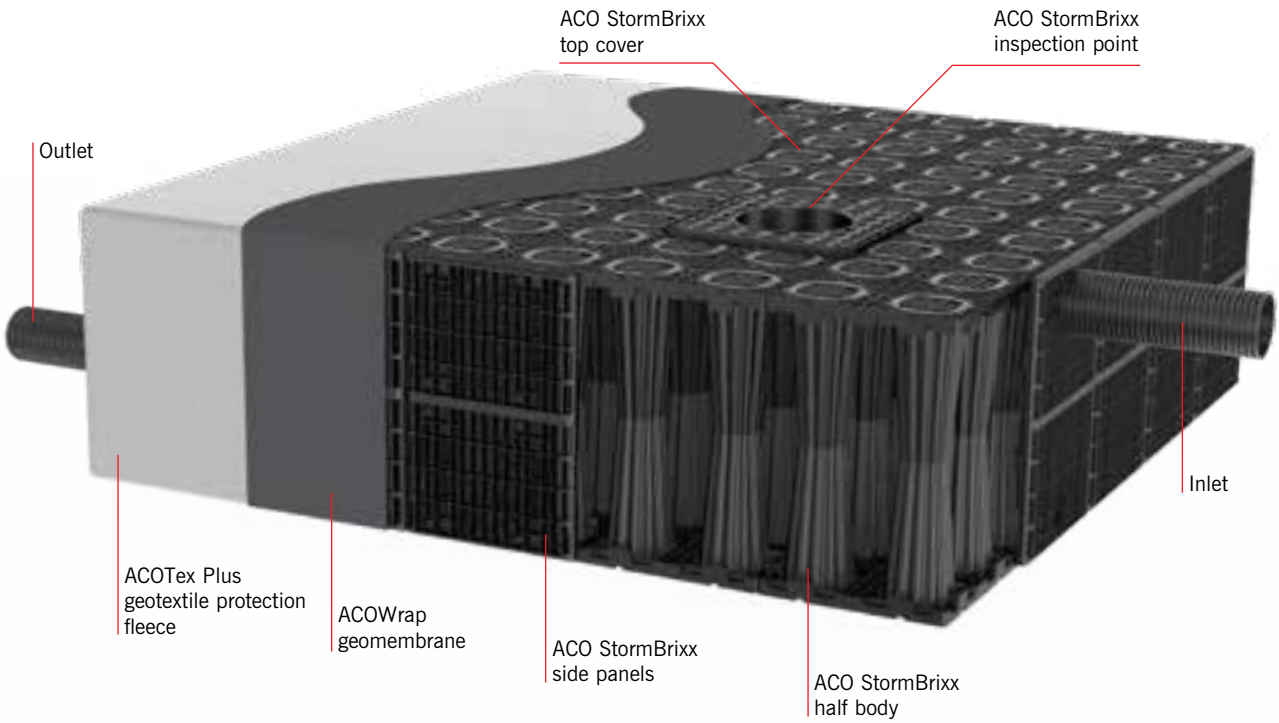
The new ACO StormBrixx SD (Standard Duty) range broadens the scope of installations to the more varied attenuation and infiltration requirements in the Civils environment. System benefits such as stackability can reduce congestion on site.

Typical applications



Basic car park requirements | **Educational installations** | **Housing developments** | **SuDS applications**

ACO StormBrixx SD arrangement



Project requirement: Logistics

Project name: Three Bridges railway maintenance depot.

Client & design engineer:
Siemens, with Hyder Consulting

Contractor:
Volker Fitzpatrick

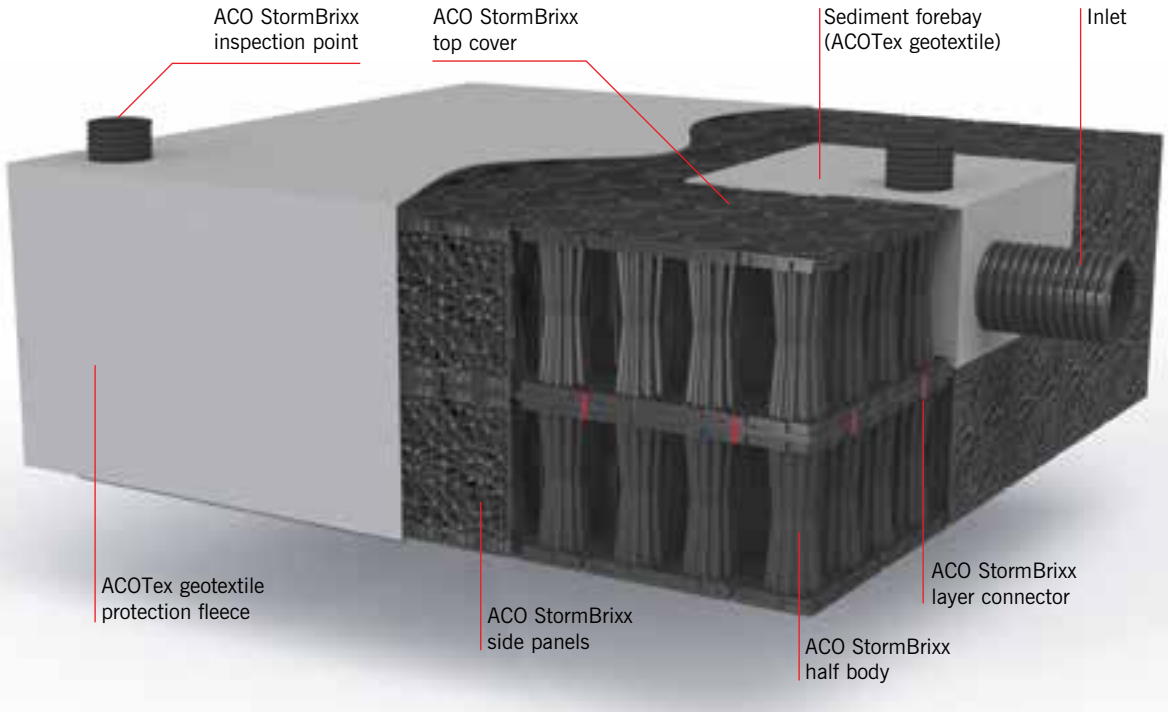


ACO Water Management has provided a complete surface water management solution at Network Rail's Three Bridges railway maintenance depot near Crawley. By utilising products from its permanent way and rail infrastructure range, ACO was able to meet the project's specification and help overcome challenging on-site logistics, including a low bridge that restricted large vehicle access. There was also a six day installation time frame that ACO StormBrixx overcame.

The new rail depot is part of the Thameslink rolling stock project, which is an initiative to provide additional passenger capacity and remove bottlenecks on the London commuter network.

For the full case study go to www.aco.co.uk/products/stormbrixx

ACO StormBrixx with sediment forebay – ideal for soakaway/offline applications – SD and HD



ACO StormBrixx Case Studies

Project requirement: Access and maintenance

Project name: Telford Co-Operative Academy.

Client & design engineer:
Telford and Wrekin Council

Contractor:
Shepherd Construction



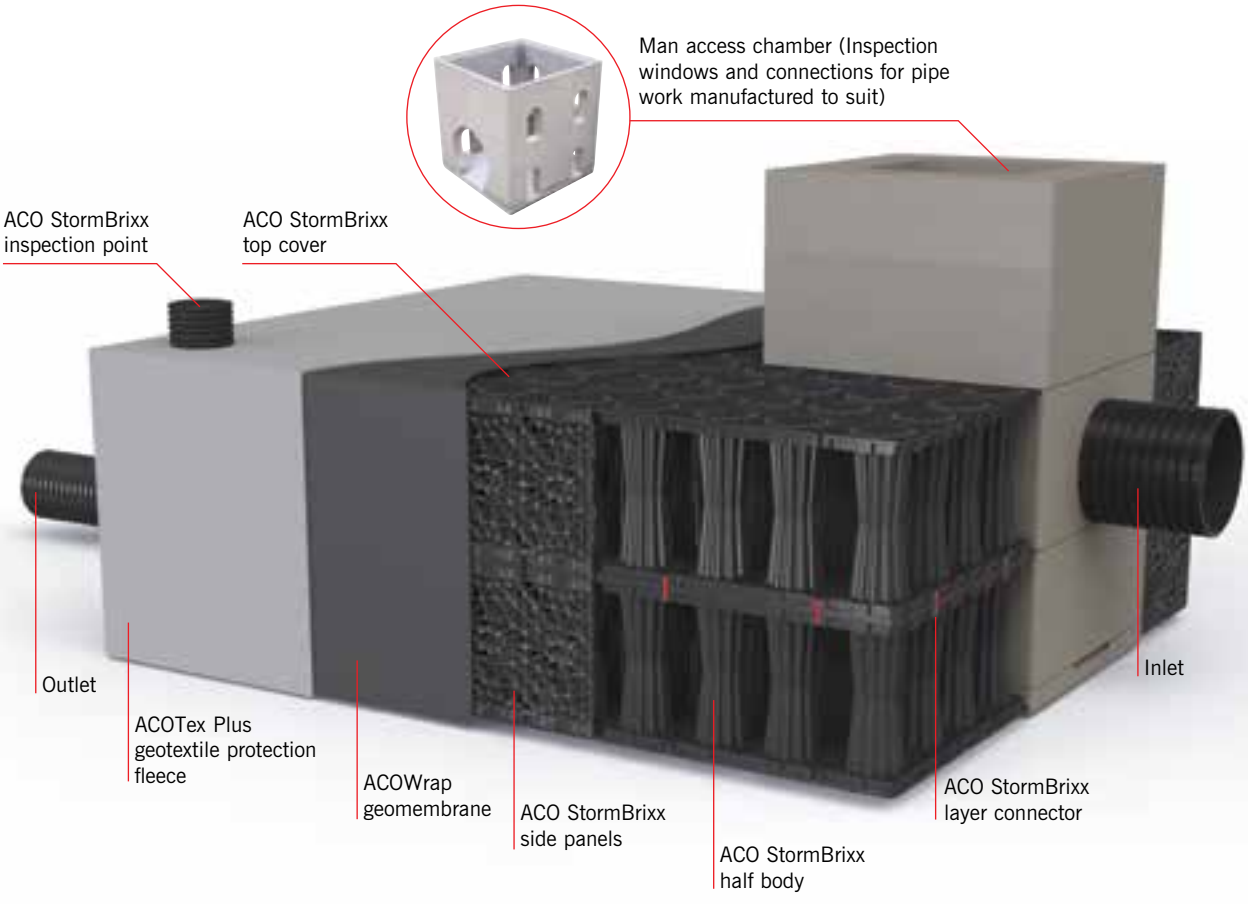


ACO Water Management's ACO StormBrixx system has been utilised as part of an exemplar SuDS design for exceedance. ACO worked closely with the project engineers for Telford Co-Operative Academy, to develop a multi-functional solution able to manage a 1:100 year event plus an uplift of 30% for climate change - equating to around 1000m³ of surface water.

The Telford Co-Operative Academy's main building, all weather sports field and car park form three substantial drainage elements, which threw up a number of challenges for Telford and Wrekin Council and the project contractor Shepherd Construction.

For the full case study go to www.aco.co.uk/products/stormbrixx

ACO StormBrixx with man access – ideal for adoptable applications – HD



Project requirement: Logistics and attenuation

Project name: Upminster Depot

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

Contractor:
Vinci Construction UK Ltd

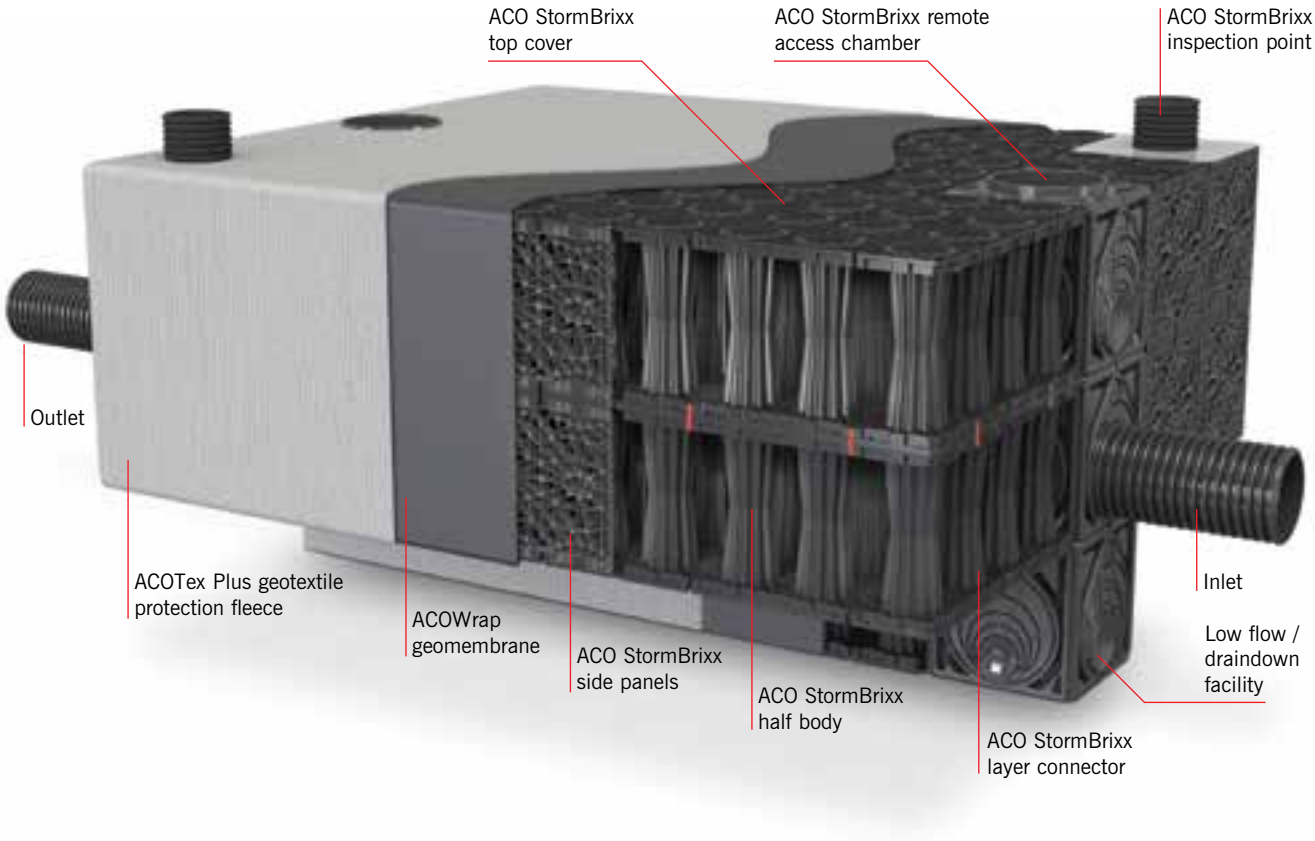
ACO Water Management used the ACO StormBrixx HD system in the Upminster, London Underground depot, working closely with Taylor Woodrow, the Design Engineers, to install a 15x9.6x0.61m tank to meet the attenuation requirement of the busy depot.

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 an issue but, the ACO StormBrixx stackable system meant the product could be delivered and more crucially stored in a small area before construction began.



ACO StormBrixx with draindown - ideal for online/adoptable applications – HD



ACO STORMBRIXX FEATURES OVERVIEW

ACO StormBrixx SD

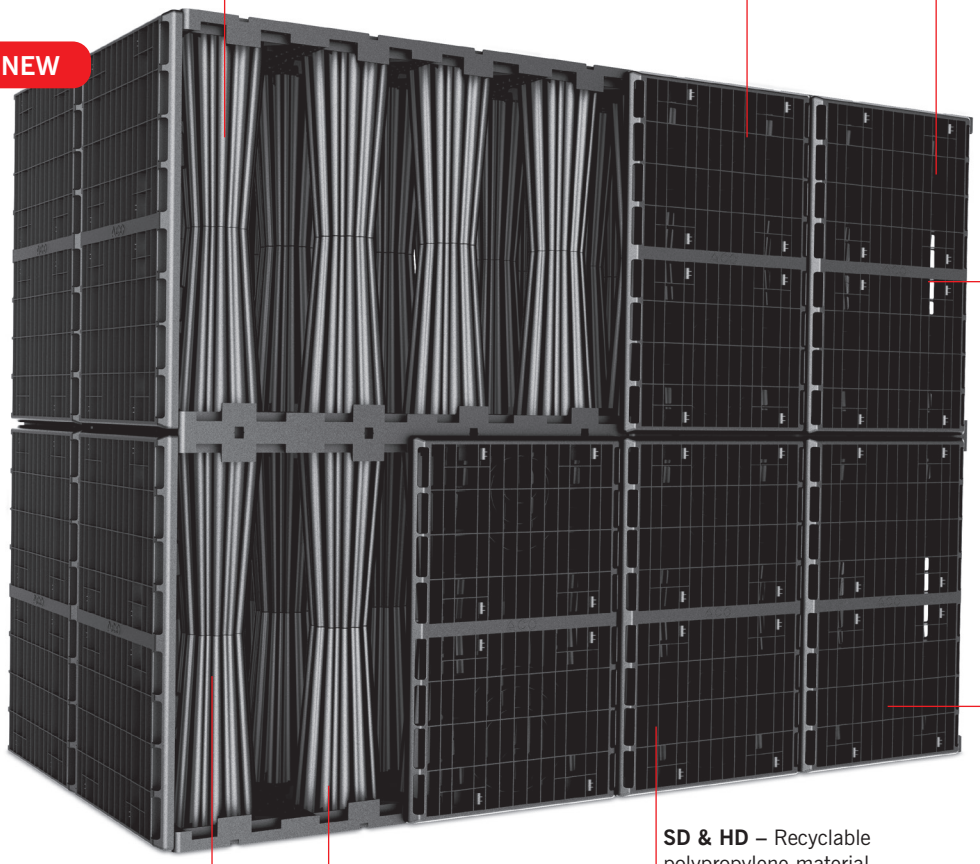


SD & HD – Functional design combined with an intelligent snap-lock system make for easy handling and rapid installation

Porosity: 97%

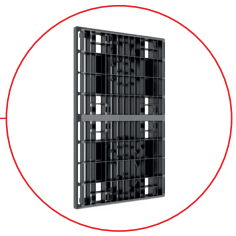
Height of 1 layer: 914mm

NEW



Min. cover depth: 0.6m

50 YEARS
DESIGN LIFE



SD & HD – Side panels are used on the outer walls of the structure. This allows for textiles and membranes to be installed

Half bodies/m³: 3

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



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 high void ratio

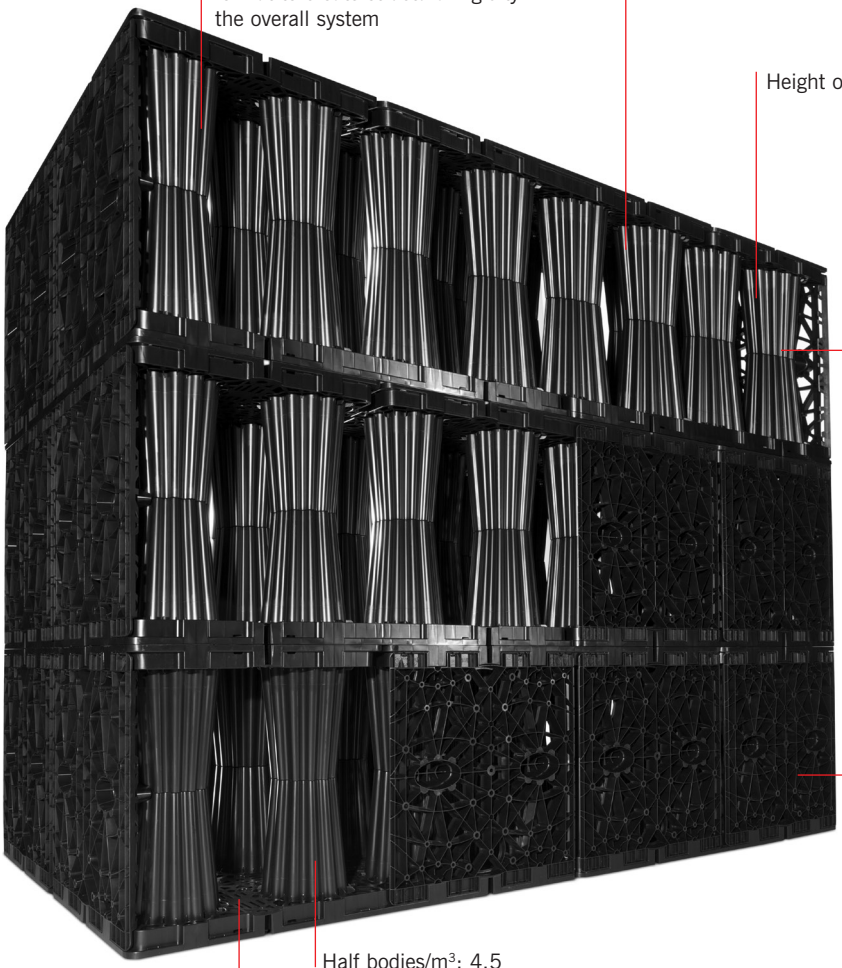
ACO StormBrixx HD



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

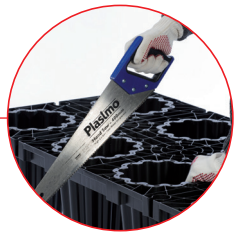
Porosity: 95%

Height of 1 layer: 610mm



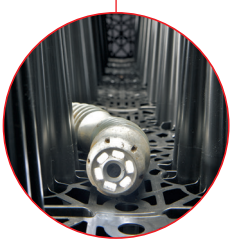
Min. cover depth: 0.5m

60 YEARS
DESIGN LIFE



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

Half bodies/m³: 4.5



SD & HD – Thanks to the open structure of ACO StormBrixx, inspection cameras and cleaning devices can have free passage through the system

Optimised logistics and savings with ACO StormBrixx

Transportation and logistics savings

The stackable design of ACO StormBrixx, where the base units precisely fit together, means less vehicles are needed for transportation to site compared with other stormwater tank manufacturers. This extends to the side panels and other accessories which are also nestle together.

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

- ACO StormBrixx SD – 347m³/lorry
- ACO StormBrixx HD – 309m³/lorry

The logistics of deliveries, with multiple lorries needing to park while waiting to unload, is thus reduced.



Environmental savings

Having fewer vehicles moving ACO StormBrixx can reduce the CO_2 emissions, and with the increasing trend of congestion charges for central urban areas, that particularly affects HGVs, savings can be made from the lesser number of deliveries.



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.









Double pallet with basic ACO StormBrixx elements



On site storage and reduced handling

ACO StormBrixx can be easily offloaded from the vehicle and stored in the same stackable layout on site. Due to the compact arrangement of our product compared to other geo-cellular units, they can be stored more discretely and drastically reduce double-handling.

This can save building sites time and money as movements around site are reduced by approximately 75%.

Time and cost savings

All the benefits of easier logistics, to a site and on-site, with less handling required, all add up to increased time and cost savings for the installer to allow them to get on with the project.



If you need help with specification, design or installation, or just wish to learn more about this and other Surface Water Management products from ACO, contact our free, no obligation ACO Water Management Design Services Team who can provide advice and dedicated design support for your project – call 01462 816666 or visit www.aco.co.uk.

Stability thanks to brickbonding

The Modular system

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

- Robust
- High integral strength
- Modular





Two half bodies equal one layer

Ease of installation

Installation is easy with a snap-lock system consisting of male and female connectors that audibly lock into place during assembly. This in turn provides an exceptional level of structural solidity throughout the overall system.



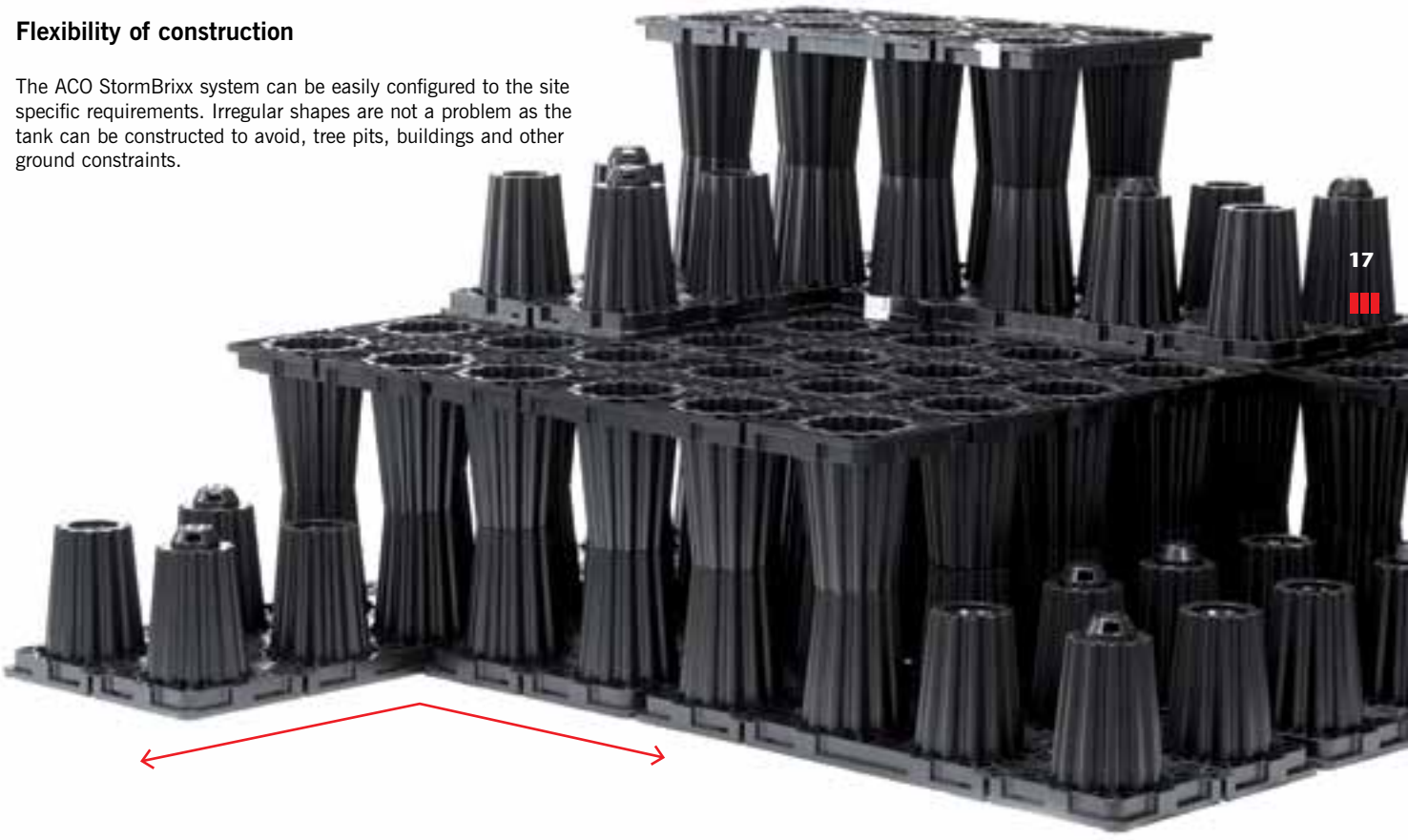
Structural strength

ACO StormBrixx has a patented brick-bonding and cross bonding feature, and when constructed the load-bearing pillars of the system precisely align above one another, so that loads are distributed downwards evenly.



Flexibility of construction

The ACO StormBrixx system can be easily configured to the site specific requirements. Irregular shapes are not a problem as the tank can be constructed to avoid, tree pits, buildings and other ground constraints.



Open Structure for user-friendly inspection and cleaning

Meeting the needs for access

ACO StormBrixx addresses the fundamental requirement of access and maintenance to attenuation and infiltration systems. Many governing bodies including SuDS Approval Boards (SABS), Water Authorities and Highway Agencies now stipulate minimum maintenance regimes when approving the use of geo-cellular structures, ACO StormBrixx can address all of these.



Inspection & maintenance

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

The inspection camera or jetting head is inserted vertically into the access shafts integrated within the ACO StormBrixx structure. From a few access points optimum maintenance and inspection of the system is possible in the longitudinal and transverse direction.



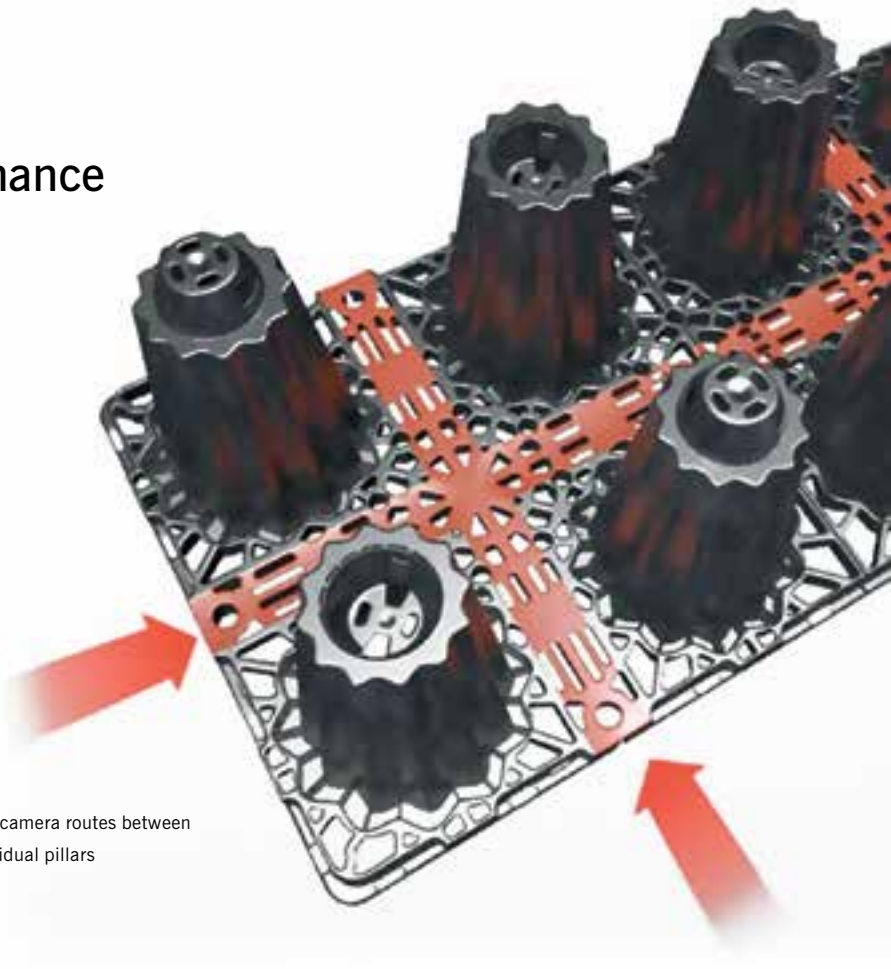
The inspection camera is introduced vertically into the infiltration system via ACO StormBrixx upper parts and intermediate/bottom shaft sections.

Fully accessible for maintenance

Open cell structure

With a 95% and 97% void capacity, for ACO StormBrixx HD and ACO StormBrixx SD respectively, the open cell structure permits completely free access for CCTV and jetting equipment.

For more information on maintenance and inspection go to page 40.



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.

Designing an ACO StormBrixx system

Under the Flood and Water Management Act 2010 it is a planning requirement for any drainage scheme submittal to be approved by a local authority SuDS Approval Board (SAB).

Therefore consultation should occur with the relevant planning or adopting authority at the outset in order to determine their policy on the adoption of different SuDS systems, as this may fundamentally affect the choice of sustainable urban drainage systems (SuDS) available.

The local authority, highways authority and water authority all have powers to adopt ACO StormBrixx systems where appropriate, and therefore early consultation with the relevant authority is strongly advised.

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

1 Hydraulic Design

2 Structural Design

3 Maintenance





1. Hydraulic design

Hydraulic design looks at the temporary storage of water in storm events and its flow path, seeking to reduce the volume, speed, and frequency of surface water runoff. All of these factors will be site specific. Calculations for hydraulic design should be undertaken using the methods highlighted in CIRIA C697 The SuDS manual.

2. Structural design

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

Structural calculations should be carried out using the methodology detailed in CIRIA C680 – “Structural design of modular geocellular drainage tanks”. For further advice please consult ACO Water Management Design Services Team.

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

For further advice, please contact the ACO Water Management Design Services Team - Tel: 01462 816666
Email: suds@aco.co.uk

Geotextiles and geomembrane selection guide

This chart below provides guidance on the selection of wrapping required depending on the system design and the application requirement.

Attenuation for non-sensitive site	Attenuation for sensitive site	Infiltration
ACO Wrap ACOTex Plus Double side butyl mastic tape Flexible top hat Pipe connector	Welded geomembrane	ACOTex Pipe connector

A non-sensitive site attenuation system

ACOWrap is a self-install taped geomembrane system which should only be used where ground conditions can accept minor leakages from the tank. ACOWrap should NOT 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 there is a risk of contamination to groundwater from polluted surface waters

ACOWrap accessories:

Tape: A double sided butyl mastic tape used to join sheets of ACOWrap (Product code 27044, see page 26 for details).

Top Hats: Flexible membrane pipe connectors used in conjunction with ACOWrap to form pipe seals (see page 24 onwards for details).

ACOTex Plus is a heavy duty non-woven protection fleece used to protect ACOWrap against punctures. ACOTex Plus completely envelops the ACO StormBrixx system and the ACOWrap. ACOTex Plus can be used with ACOWrap and any other geomembrane system.

A sensitive site attenuation system

The correct choice of geomembrane is essential to the overall performance of any attenuation system. In applications where there are site-sensitive issues, a geomembrane with properties similar to those outlined in the table below should be used and installed by a lining contractor with UKCAS CSWIP accreditation.

Site Sensitive applications include, but are not limited to:

- High groundwater table
- Contaminated ground
- Within 5m of any building line
- Where land is contaminated or the risk of contamination from surface water is high.



An infiltration system

ACOTex is a non-woven polypropylene geotextile with excellent filtration and drainage properties used to minimise sediment build up within an ACO StormBrixx infiltration (soakaway) system. ACOTex completely envelops the ACO StormBrixx system as well as the sediment forebay or tunnel where specified.

ACOTex is suitable for infiltration systems only.

ACOTex is simple to install – fitting does not require a specialist contractor.

Design Supply and Fix Contractors

ACO work closely with supply and install contractors. We have completed many projects successfully providing the customer with a fully installed tank with many of the added benefits listed below;

- Provision of suitable membranes
- Professional Indemnity
- Welding/Membrane Warranties
- Full Installation Warranties
- Speed of Installation
- Site Support and Guidance
- A full holistic drainage consultancy

For further advice, please contact the ACO Water Management Design Services Team -
Tel: 01462 816666
Email: suds@aco.co.uk

Welded geomembrane: recommended specification

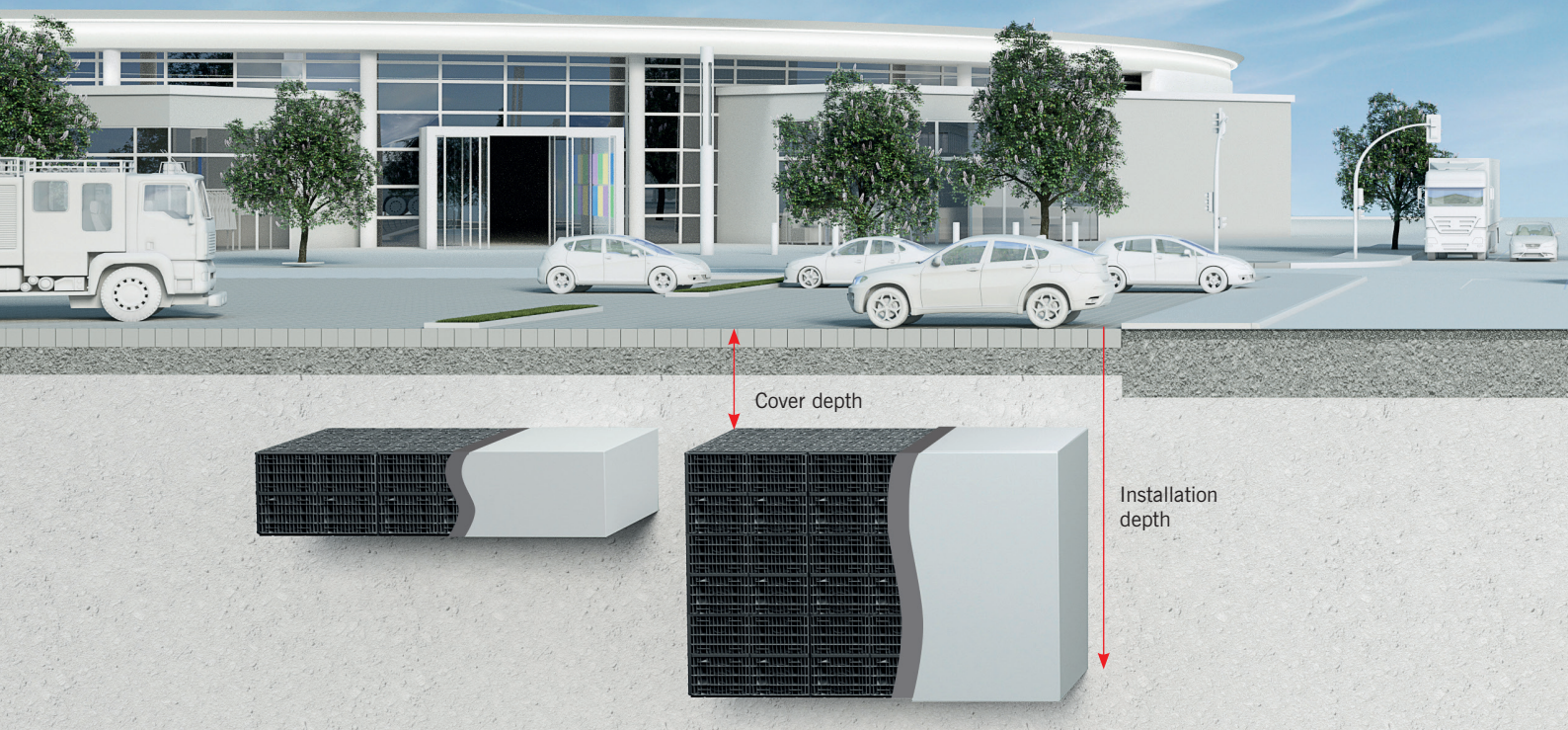
Tested Property	Unit	Test Method	Minimum Values*
Thickness**	mm	ASTM D 5199	1.0
Density (max)	g/cm^3	ASTM D 792 / 1505A	≤ 0.939
Tensile properties (each direction)		ASTM D 6693, Type IV, Speed: 50mm/min	
Strength at break	N/mm^2		27
Elongation at break	%	G.L. = 50mm	800
Tear resistance	N	ASTM D 1004	100
Puncture resistance	N	ASTM D 4833	250
Carbon black content	%	ASTM D 1603	2.0
Carbon black dispersion	Category	ASTM D 5596	1/2†

*** Value at 95% confidence interval**

**** Average value of 10 specimens taken across roll width. No value to be less than 90% of average value**

† Dispersion only applies to near spherical agglomerates. 9 of 10 views should be category 1 or 2. No more than 1 view from category 3.

Find the appropriate ACO StormBrixx Unit



ACO StormBrixx SD

Applications

- Landscaped areas, no vehicles
- Landscaped areas with sit on mowers
- Pedestrian areas
- Driveways, car parks, up to 9,000kg rigid vehicles
- For applications with HGVs and/ or high ground water please contact ACO

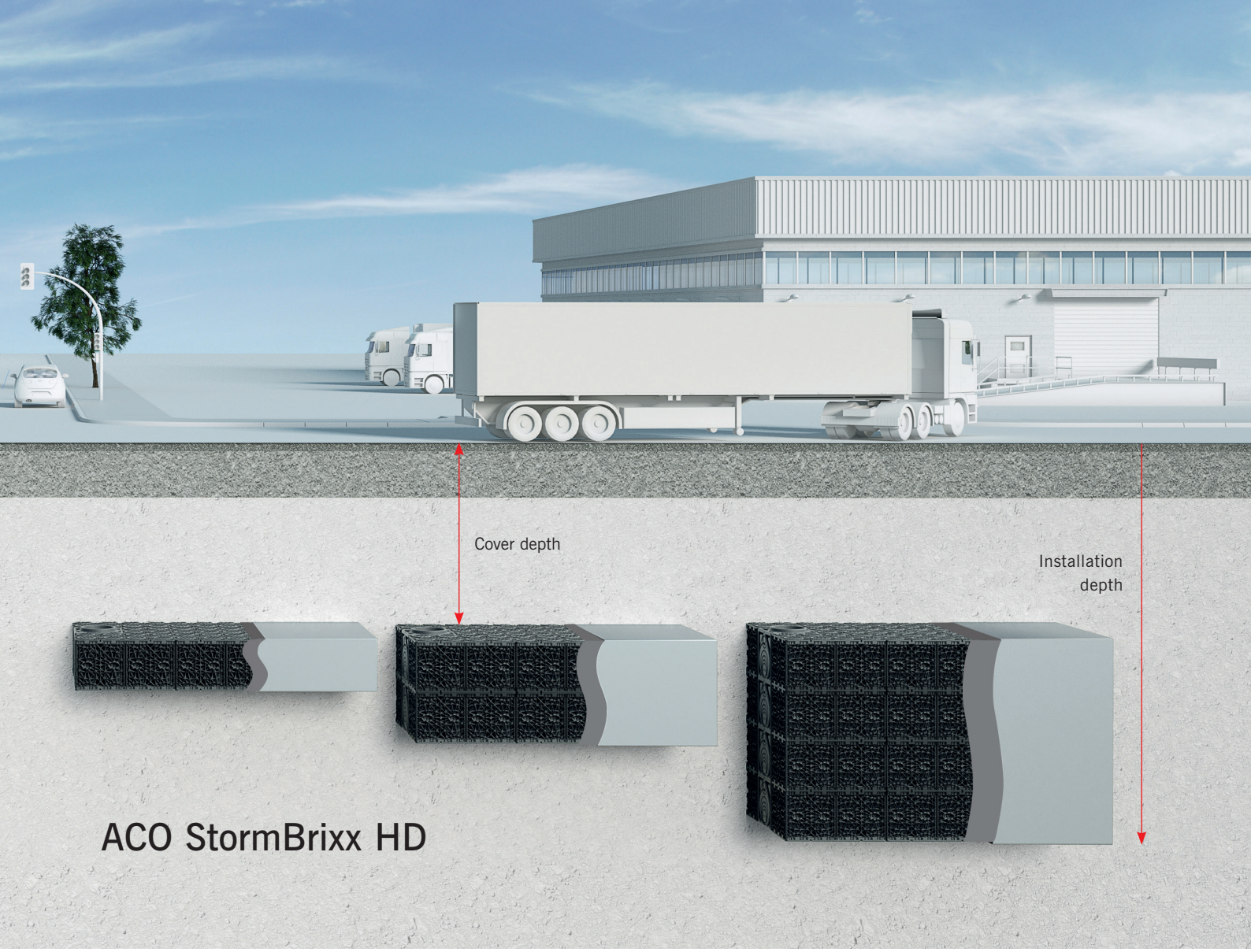
ACO StormBrixx SD unit parameters	
No. of layers*	1-3 layers
Vertical Strength	350 kN/m²
Lateral Strength	70 kN/m²
Design Life	50 years
Minimum Cover - Landscaped	0.5m
Minimum Cover - Car Park (2,500kg)	0.6m

*Extra layers may be suitable in specific applications, please consult ACO
**Ground improvements may be required and ground water has not been taken into account



914mm

(2 half bodies = 1 layer)

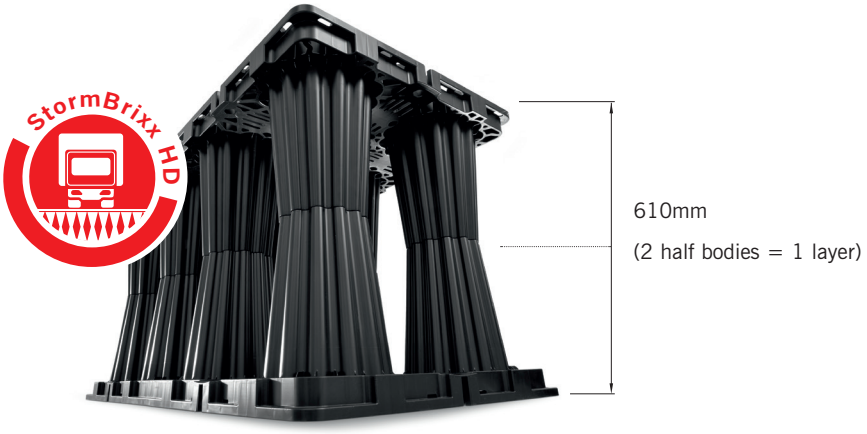


Applications

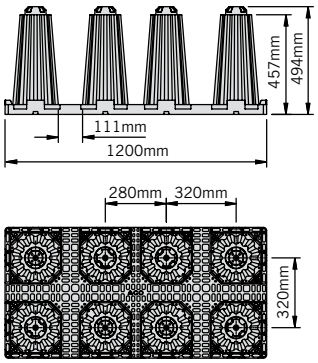
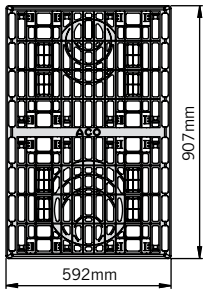
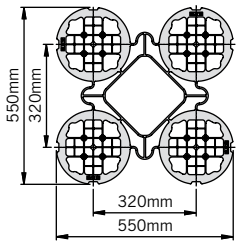
- Landscaped areas, no vehicles
- Landscaped areas with sit on mowers
- Pedestrian areas
- Driveways, car parks, up to 9,000kg rigid vehicles
- Fire trucks, delivery vehicles, HGVs (30,000kg)
- For applications with unusually large loads and/or high ground water please contact ACO

ACO StormBrixx HD unit parameters	
No. of layers*	1-4 layers
Vertical Strength	455 kN/m²
Lateral Strength	95 kN/m²
Design Life	60 years
Minimum Cover - Landscaped	0.5m
Minimum Cover - Car Park (2,500kg)	0.6

*Extra layers may be suitable in specific applications, please consult ACO
**Ground improvements may be required and ground water has not been taken into account

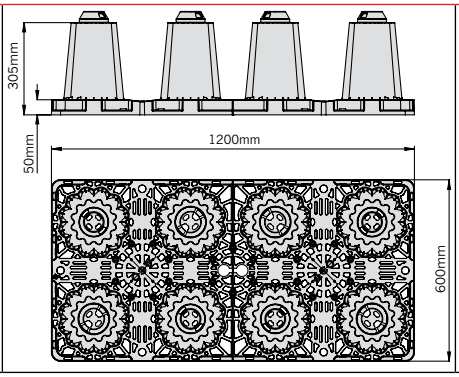
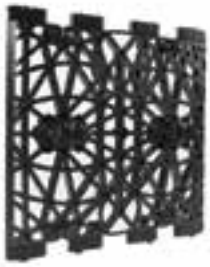
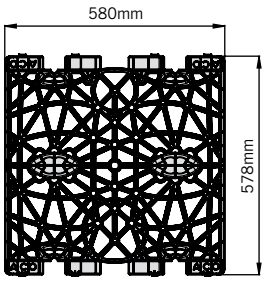
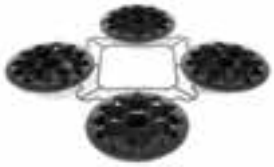
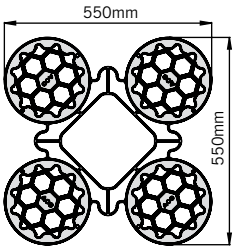


Technical details - ACO StormBrixx SD

Picture	Dimensional drawing	Length (mm)	Width overall (mm)	Depth overall (mm)	Weight (kg)	Product code
Half body/Layer piece manufactured from polypropylene (PP)						
		1200	600	494	9.41	314090
Side plate made from polypropylene (PP)						
		907	592	104	3.13	314091
Top cover made from polypropylene (PP) – set of four						
		550	550	45	0.76	314092
Layer connectors						
		53.4	44.2	26.5	0.1	314093
Horizontal pipe connectors*						
		595	Ø375**	910	5.4	27262
		595	Ø400**	910	6.0	27263
		595	Ø450**	910	6.84	27264
		595	Ø500**	910	7.44	27265

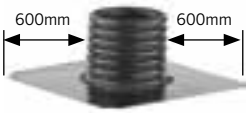
*Other ancillaries can be found on page 26
** Internal width shown here

Technical details - ACO StormBrixx HD

Picture	Dimensional drawing	Length (mm)	Width overall (mm)	Depth overall (mm)	Weight (kg)	Product code
Half body/Layer piece manufactured from polypropylene (PP)						
		1200	600	305	10.0	314020
Side plate made from polypropylene (PP)						
		580	578	35	1.6	314021
Top cover made from polypropylene (PP) – set of four						
		550	550	43	0.8	314022
Layer connectors						
		100	40	46	0.1	314023
Remote access chamber module						
		594	594	610	32	27034
Horizontal pipe connectors*						
		595	Ø375**	605	4.5	27105
		595	Ø450**	605	5.7	27101
		595	Ø500**	605	6.2	27102

*Other ancillaries can be found overleaf
** Internal width shown here

Ancillaries- ACO StormBrixx SD and ACO StormBrixx HD

	Length (mm)	Width overall (mm)	Depth overall (mm)	Weight (kg)	Product code
Horizontal pipe connectors					
	-	Ø100*	-	0.75	27056
	-	Ø150*	-	1.25	27057
	-	Ø225*	-	1.40	27058
	-	Ø300*	-	1.75	27059
Vertical connector for inspection point					
	-	Ø225*	200	2.5	27018
Access chamber Ø450mm ductile iron cover Load Class D 400					
	-	Ø528	110	38	314056
Access chamber 450mm ductile iron vented cover Load Class D 400					
	-	Ø528	110	38	314055
Inspection point Ø225mm ductile iron cover Load Class D 400					
	410	410	180	52	314045
Remote access plate					
	650	650	120	4.74	314075
Inspection/rising shaft					
	-	437	350	2.6	314038

ACO StormBrixx

Product code	Description	Length (m)	Nominal width overall (mm)	Thickness (mm)	Mass per unit area (g/m²)	Weight (kg)
27044	ACO double sided butyl mastic tape	15	100	1.5	-	3.70
27045	Ø110 flexible top hat	-	Ø110	0.9	-	0.10
27046	Ø160 flexible top hat	-	Ø160	0.9	-	0.10
27047	Ø225 flexible top hat	-	Ø225	0.9	-	0.10
27048	Ø300 flexible top hat	-	Ø300	0.9	-	0.10

ACO StormBrixx geomembranes listed above sold per roll. For details on specification, performance and functionally see page 27
***Internal width shown here**

Geotextiles and geomembranes: specification and performance data

ACOTex plus protection fleece 27041

Product code	Unit	27041
Description		Mechanically bonded continuous filament non-woven sheet
Material		100% UV stabilised polypropylene
Sheet dimensions	Length (m)	100
	Width (m)	4
Material thickness (for 2 kPa)	(mm)	2.9
Material mass per unit area	(g/m²)	325
CBR puncture resistance	(N)	3850
Strip tensile strength (md)	kN/m	24
(cd)	kN/m	24
Elongation at maximum load	(md)	100%
(cd)		40%
Cone drop test	(mm)	15
Opening size	µm	90
Permeability vertical	l/m²/s	60



Manufactured from polypropylene this thick non-woven protection fleece is used to protect a geomembrane from mechanical damage due to ground and thermal movement. The protection fleece is placed on the outer side of the geomembrane. ACOTex Plus can be used with ACOWrap or with a welded geomembrane system.

ACOWrap 27042

Product code	Unit	27042
Description		Geomembrane suitable for taped joints
Sheet dimensions	Length (m)	12.5
	Width (m)	4
Material mass per unit area	(g/m²)	460
Colour		Black



An impermeable self-install geomembrane using taped joints for 'non sensitive' attenuation applications.

For sensitive applications ACO recommends the ACO StormBrixx system is installed by ACO recommended lining contractors using a geomembrane system with 100% watertight welded joints.

ACOTex infiltration geotextile 27038

Product code	Unit	27038
Description		Mechanically bonded continuous filament non-woven sheet
Material		100% UV stabilised polypropylene
Sheet dimensions	Length (m)	100
	Width (m)	4.0
Material thickness (for 2 kPa)	(mm)	1
Material mass per unit area	(g/m²)	125
CBR puncture resistance	(N)	1500
Strip tensile strength (md)	kN/m	9
(cd)	kN/m	10
Elongation at maximum load	(md)	90%
	(cd)	65%
Cone drop test	(mm)	24
Opening size	µm	105
Permeability vertical	l/m²/s	115



A polypropylene permeable non-woven geotextile, for use in infiltration applications. ACOTex permits the passage of water into and out of ACO StormBrixx system, and also prevents the entry of sediment into tanks incorporating sediment forebays.

System configuration

Column connections

Each half body consists of eight pillars, four male and four female. When installing the bodies next to each other, ready for brick bonding, you will need to match the units to one another. So if the layer finishes with a female connection, the next layer should start with a female. This will then allow you to place a further layer piece on top, bridging the two units, locking the system together securely.





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.



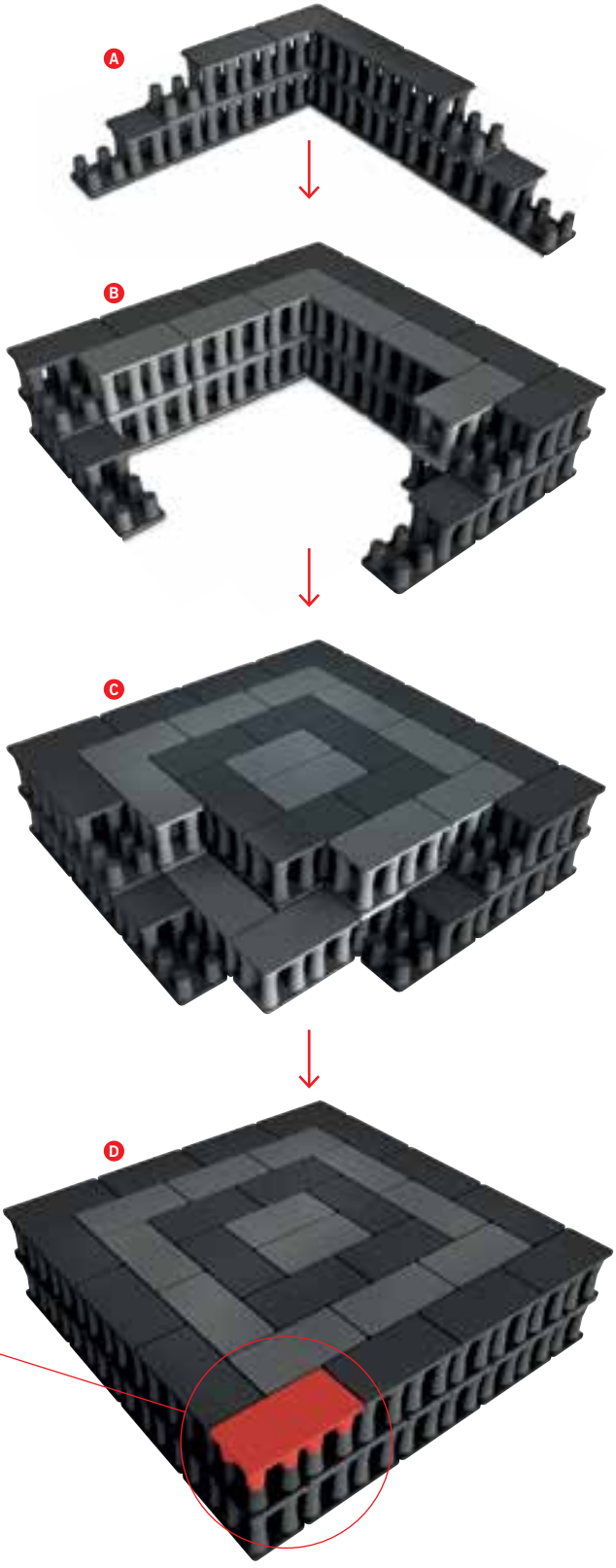


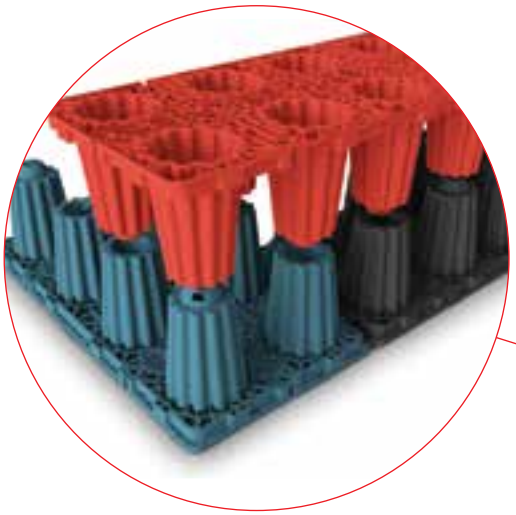
Recommended installation

Concentric ring layout

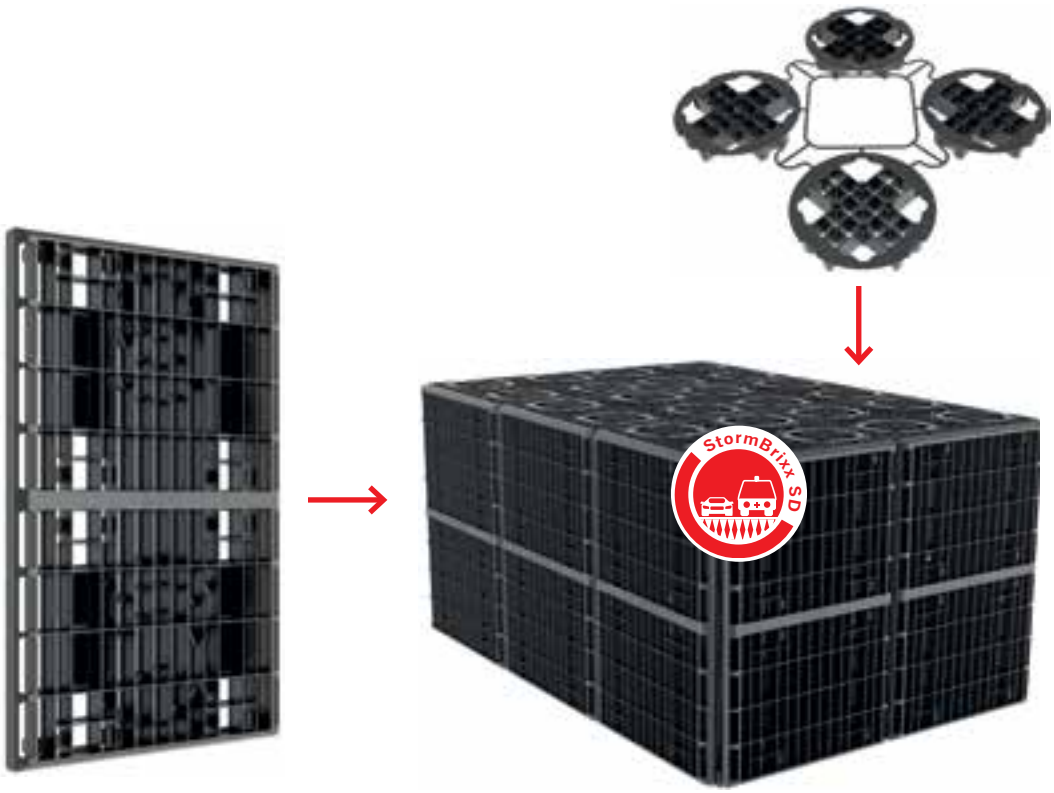
A series of ever decreasing rings converging towards the centre of the system. Place in a brick bonded method. Repeat for subsequent layers using the connectors to bond layers to one another.







Side panel and top cover - ACO StormBrixx SD







Installing the side panel

Polypropylene side panels are added to the perimeter of the system to give lateral support against surrounding soils. Polypropylene top covers are added to the top layer of the system to fill the openings of the pillars and to ensure consistent vertical support for the cover fill material. This creates a connected infiltration block system but does not provide structural support. The side walls have a predefined saw matrix for the connection of plastic pipes of Ø110 to 315, which can be cut out using a jigsaw.

Installing the top cover

If needed, a pipe connection point of Ø110, 160, 200, 250, 300 or 315 can be cut out along the cutting/sawing marks in the locations provided. The side walls have a predefined saw matrix for the connection of plastic pipes of Ø110 to 315, which can be cut out using a jigsaw.

Note: Covers are only built into the top layer of the basic elements, before the fleece is wrapped around them.

Side panel and top cover - ACO StormBrixx HD



Bottom first:

When installing the side walls you must ensure that the positioning tab is inserted into the base element first

Fast mounting:

A single ACO StormBrixx cover closes off four pillar openings





Installing the side panel

The outsides of the infiltration system must be covered with the help of the side walls, which are inserted into the openings provided in the basic elements and click into place. The side walls create a perimeter for the entire system offering a clean base surface for the geotextile wrapper. If needed, a pipe connection point of Ø110, 160, 200, 250, 300 or 315 can be cut out along the cutting/sawing marks in the locations provided. The side walls have a predefined saw matrix for the connection of plastic pipes of Ø110 to 315, which can be cut out using a jigsaw.

Installing the top cover

To ensure the geotextile wrapped around the system fits snugly, covers may only be inserted in the top layer of the infiltration block. They prevent the fleece being forced into the necks of the pillars.

Note: Covers are only built into the top layer of the basic elements, before the fleece is wrapped around them.

Double safety - layer connectors



Squared side forwards +



Flattened side forwards



Each layer requires two clips per 1.44m²



Rounded side forwards +



Flattened side forwards







If you need help with specification, design or installation, or just wish to learn more about this and other Surface Water Management products from ACO, contact our free, no obligation ACO Water Management Design Services Team who can provide advice and dedicated design support for your project – 01462 816666, email technical@aco.co.uk or visit www.aco.co.uk.

Installing the connectors

Installation of connectors

When installing a single layer of brick-bonded ACO StormBrixx, connectors are not an essential requirement. If the units are fully brick-bonded, the structure will not need the clips to hold the system together. Clips will be provided as a precaution and extra installation strength.

This is unique to our system as other competitor StormWater control systems require these units to ensure the structure is fully stable during backfill and to ensure their design life can be achieved.



Installing multiple layers

When installing a second layer to an ACO StormBrixx construction, clips will be required. Clips should be installed around the outside of the structure and sporadically through the centre. Further clips should then be installed into the first set to create a locator for the second layer.



Minimise lateral movement

These two clips should protrude from the top of the structure by approximately 30-50mm, depending on which unit is used. These protruding units fit the base of the second layer and are key to minimising lateral movement during backfill and overall installation.



Access - SD



Entrance via the Remote Access Plate

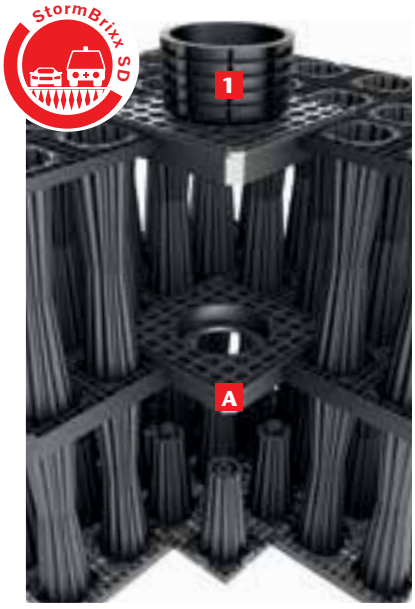
To obtain access to the ACO StormBrixx SD unit the remote access plate can be used. This plate is located (as below) and layer pieces are removed to create the free movement required with the structure.

With the access plate an easy installation is possible at any desired position.

The access plates (A) are finished using the ACO Combi-point rising shafts as demonstrated (1).



Caution: Please ensure the access plate is not used on the edge of the structure. This unit must be used at least one unit inside the structure.



Inspection cameras or jetting heads can be inserted vertically into the remote access units integrated within the ACO StormBrixx structure.



Access - HD



ACO StormBrixx man access specification and design process

Manufactured from reinforced concrete, each man access unit is 1200mm x 1200mm and is available in two heights; 610mm and 1210mm. Connections for 300mm through to 900mm pipes can be added along with inspection windows on 1, 2 or 3 sides of the chamber. Please specify when ordering the product.



Entrance via the Remote Access Unit

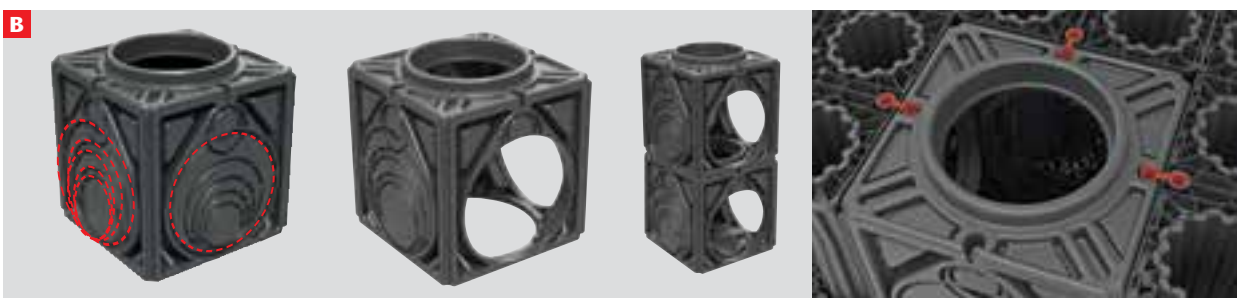
This unit is only suitable for the ACO StormBrixx HD. Access can be gained to the ACO StormBrixx HD unit using the Remote Access Unit as well as the Access Plate. These units can be installed both within the structure and on the outer edges. They replace the ACO StormBrixx layers and when all four walls are removed, full access to the system can be achieved.

For multi-layer systems, the units simply stack on top of each other and as shown clip in with the ACO StormBrixx units.

Each access chamber can be cut out as required by local conditions to accommodate various sizes of pipe (Ø110, 160, 200, 315, 400). (Use a drill to get the saw blade inserted when creating the openings in the lower shaft section.)

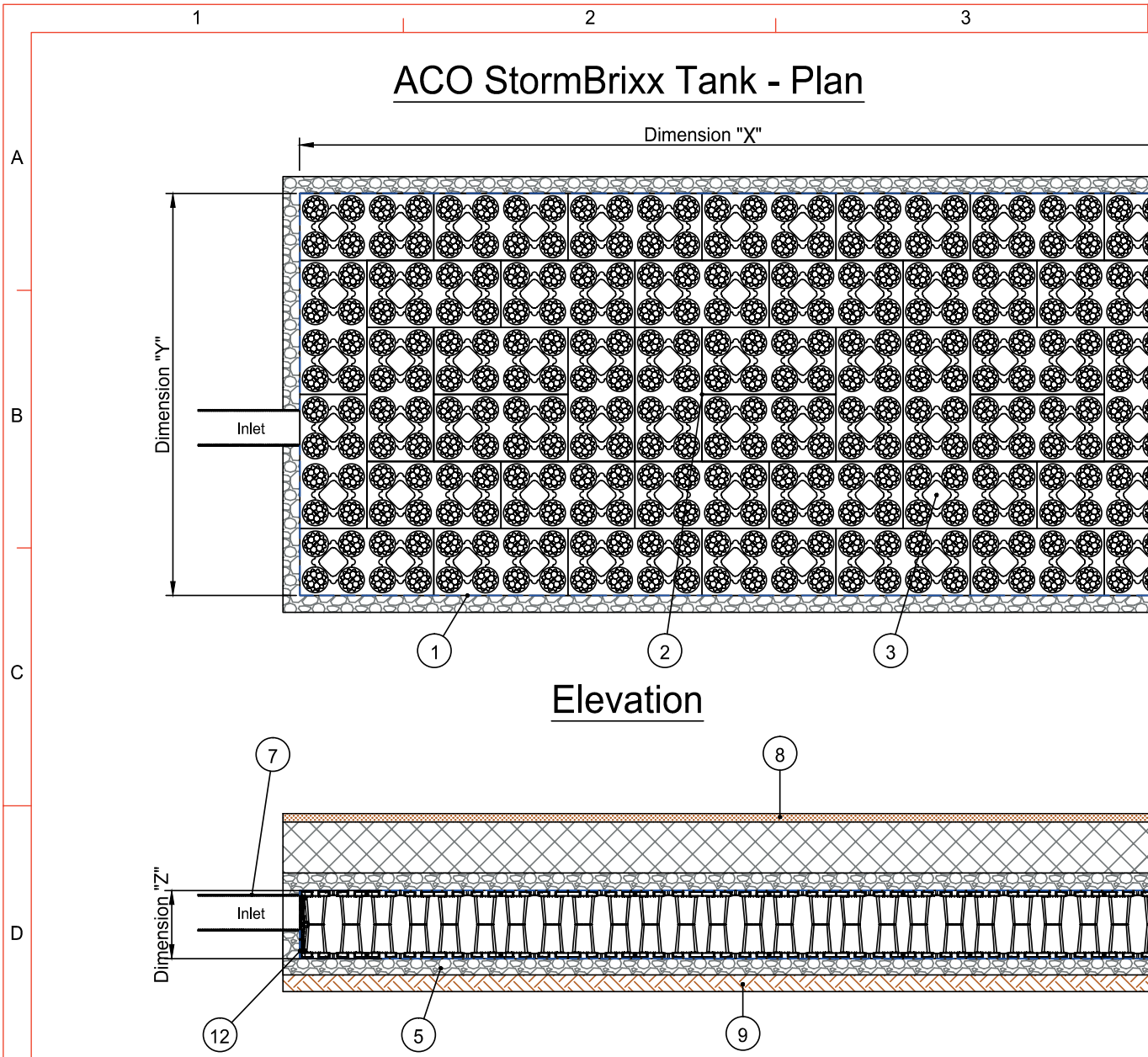
The access chamber are extended to the surface using the ACO Combi-point shafts or by using a 450dia twinwall pipe cut to suit.





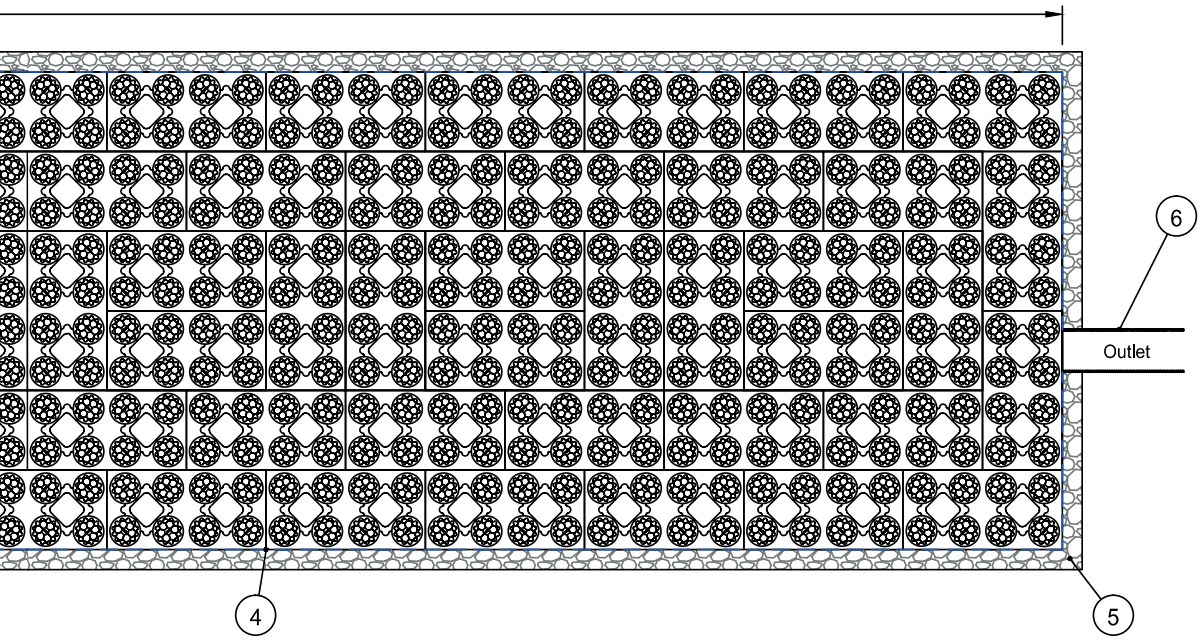
Only usable with ACO StormBrixx HD

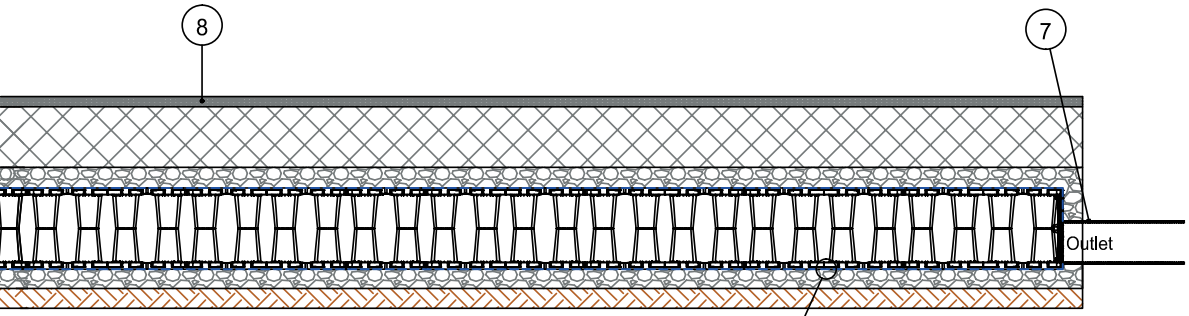
Installation details

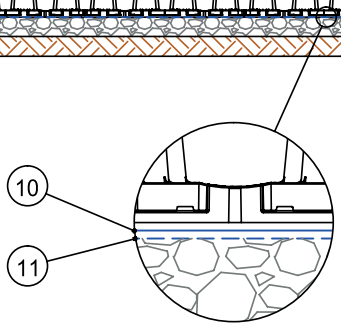


General Notes

1. StormBrixx bodies brick bonded to form a perimeter and optional concentric rings.
2. StormBrixx bodies cross bonded.
3. Top covers to the top layer of the tank to counteract soil pressure.
4. Wraps to entire perimeter of tank, see detail A and notes 11 & 12.
5. 100-150mm of a sharp 6H sand or single size stone to form a protection layer around the tank.
6. Pipe connections to suit anticipated flow rates.
7. Pipe connections formed to suit site requirements where outlet pipes for tanks are laid at the invert to prevent standing water and loss of storage.
8. Surfacing as required by the site (E.G Landscaping or Asphalt).
9. Undisturbed earth base of excavation or made ground with minimum CBR value of 5% and suitable for anticipated load.
10. Impermeable ACOWrap geomembrane taped or welded as appropriate for attenuation tanks to entire of tank.
11. Permeable ACOTex (Infiltration) or ACOTex Plus (Attenuation) protection fleece to entire of tank.
12. Side panels to entire perimeter of tank.







Detail A

A	08/08/17	Initial Issue	P.J
Version	Date	Description	Name
ACO Technologies plc ACO Business Park Hitchin Road Shefford Bedfordshire SG17 5TE, UK Tel: 01462 816666 www.aco.co.uk		Drawing Number: E1-E01-1108-3	Revision: A
		Title: ACO StormBrixx Standard Detail	
Created by: P.J	Released by: L.D	Projection: ISO-A	Units: mm / Format: A3
Created at: 08/08/17	Released at: 08/08/17		Scale: NTS
Replacement for: -	Replaced by: -	Information contained in this drawing is copyright property of ACO Technologies plc. Any reproduction in part or whole without written permission of ACO Technologies plc is prohibited	Sheet: 1 of 1

Guide to installing ACO StormBrixx systems

General advice

If the ACO StormBrixx system is to be located in areas of high groundwater table, contaminated land, close proximity to buildings, or where the risk of contamination from surface water is high, ACO strongly recommend that the lining system is installed by a competent, qualified geomembrane lining contractor. Please consult the ACO Water Management Design Services Team for further advice.

Installation guidance

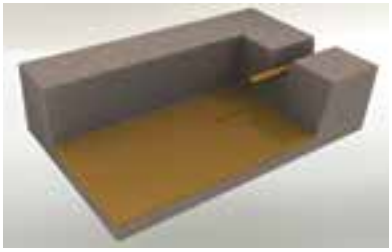
ACO can give guidance with respect to the most suitable methods of installation for the ACO StormBrixx range. ACO StormBrixx should be installed using acceptable levels of workmanship and according to the National Code of Practice (BS 8000-14:1989).

Detailed installation statements and methodologies will vary for all sites as each will have different aspects deserving particular consideration, consequently the relevant approvals should be sought from the consulting engineer and/or the installer.

Manhole and inspection covers should be fitted in accordance with the relevant section from the Manual of Contract Documents for Highways Work (MCHW), and ACO's installation recommendations.

Step 1

Excavate the pipe trench and lay the inlet pipe to the required fall and invert level, install silt traps in appropriate locations in the pipe run or use the ACO StormBrixx access chamber.





Step 2

Excavate the hole or trench to the required dimensions to receive the ACO StormBrixx tanks, and any external inspection chamber(s) and/or silt trap(s).

Step 3

Ensure that the base plan dimensions of the hole allow 300mm working space on all sides for the site operatives to manoeuvre the ACO StormBrixx units, geotextile and geomembrane into position. Ideally mark out the plan area with spray paint or chalk line.

Step 4

Ensure that the base of the excavation is smooth and level and capable of withstanding the design loads, batter back the sides of the excavation to a safe angle, and ensure that safe access is provided for the site operatives. The excavation should be carried out in accordance with

BS 6031:2009 with particular attention paid to safety procedures.

Step 5

Ensure that ground bearing capacity at formation level is adequate for design loads. Remove any soft spots from the excavation and replace with compacted granular material.

Step 6

Lay 100-150mm of 10/20mm single size stone to the base of the excavation and level. This stone is to be free of fines. It is essential that the bedding layer is correctly levelled and smoothed, and that the base ground bearing capacity is adequate for design loads.



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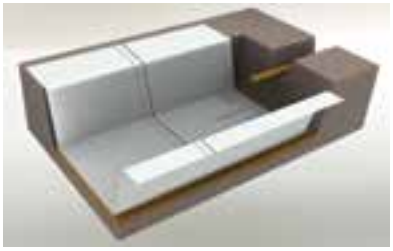
Step 7

Lay the geotextile, to the specification on pages 21 and 27, over the single sized stone bedding layer. Please make sure the correct geotextile is being used depending on whether the tank is to be used for attenuation or infiltration. Pull this geotextile up the sides of the excavation with a minimum 300mm overlap on the joints between strips. Inspect geotextile for damage. If you are constructing a Soakaway/Infiltration tank, skip to step 9.





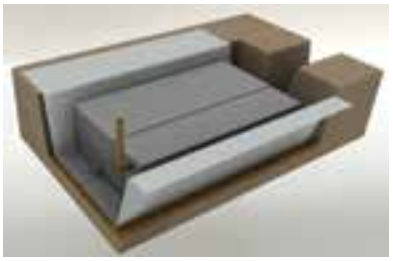
Step 8

Fabricate the geomembrane liner, bearing in mind the general advice above and the specifications on page 21 and 27, and ensure all joints or welds are tested. If in doubt please consult the ACO Water Management Design Services Team for further advice.



Step 9

Assemble the ACO StormBrixx modular units to the plan size and unit configuration required and place on the geomembrane. Ensure any loose complete units are fixed together using the ACO StormBrixx layer connector.



Step 10

Check for leaks if attenuation and general damage to membranes and fleeces.

Step 11

Continue with the geotextile encapsulating the ACO StormBrixx system. Fold the corners of the fleece over-run at the end of the tank.





Step 12

Connect inlet/outlet/vent pipe and access chambers using appropriate adaptors.

Attenuation Tanks – Only one 110mmø vent pipe is required per 7500m² of contributing area drained.

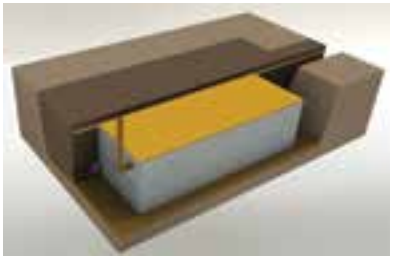
Infiltration Tanks – No vents are typically required. If you wish to add a vent, please refer to the attenuation comments.

Step 13

Backfill evenly around the excavation using a 10/20mm single size self compacting stone.

Step 14

Use either 150mm 6H Sharp sand of 10/20mm single size stone to cover the exposed surface of the tank. This acts as a further protection layer and following completion of this, selected backfill material should be installed in layers of 150mm. These layers should not be vibrated until 450mm from the soffit of the tank is reached. Within 450mm of tank a small roller or excavator may be used to gently compact the materials.



Step 15

The area should then be compacted using suitable compaction equipment in accordance with the Manual of Contract Documents for Highway Works (MCHW) volumes 1 & 2:

- **Trafficked areas (eg restricted access car parks):** Type 1 or 2 sub-base material compacted in 150mm layers in accordance with MCHW Volumes 1 & 2. Compaction plant over top of system should not exceed 2300kg per metre width. Where the units are to be installed beneath a paved area the pavement sub-base may form part of the backfill material provided minimum cover depths are maintained (refer to page 22-23).
- **Landscaped and non-trafficked areas:** selected as-dug material with size of particles less than 40mm within 300mm of the top of the units. Above this level selected as-dug material may be used. Place backfill and compact in layers no greater than 300mm. Compaction plant over top of system must not to exceed 2300kg per metre width.

Maintenance and inspection guidance

Maintenance guidance

The definition of ownership and the responsibility for maintenance of conventional pipe drainage system is provided in 'Sewers for Adoption 7th Edition' and 'Sewers for Scotland 3rd Edition'. However guidance for Sustainable Drainage Systems is a little less obvious, particularly where it relates to geocellular structures.

Therefore ACO would advise that the relevant potential adopting authority should be contacted and consulted before submitting planning applications if the intention is to have the ACO StormBrixx system adopted.



Maintenance procedures

It is important to note that failure to control and remove sediment build-up in SuDS is the single largest cause of system failure. The incorporation of a sediment forebay in an ACO StormBrixx infiltration system, or a sediment tunnel and / or draindown feature in an ACO StormBrixx attenuation 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 edges of the ACO StormBrixx system. This allows the system to be inspected for sediment build-up and for the collected sediment to be removed from a soakaway or flushed through in the case of an attenuation system.

In the event that a sediment forebay or tunnel has not be incorporated with the ACO StormBrixx system, please contact ACO Water Management Design Services Team for further advice.



Infiltration systems

In order to periodically check the effectiveness of the ACO StormBrixx infiltration system, a BRE 365 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 unblind the geotextile.

Attenuation systems

In order to clean the ACO StormBrixx system, if a sediment draindown sump has not been incorporated, it will be necessary to block the outflow control device, but not the overflow pipe, before filling the attenuation tank to the invert level of the vent pipe. The tank should then be filled and flushed as above and the water effluent removed and disposed of by a pumped tanker.

If a draindown facility has been installed, simply lift the access chamber cover and using a gully sucker remove all water in the draindown sump and jet the sump channel as required to remove all sediment.

The frequency of the maintenance procedure for the tank will be determined by the inspection regime, however CIRIA C697 recommends that a programme of not less than twice-yearly inspection is carried out, and during the first year after every significant storm event.

In order to minimise silt build-up CIRIA C697 recommends the use of pretreatment systems upstream of the attenuation device.

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.

ACO StormBrixx Specification

The Stormwater attenuation/infiltration system shall be ACO StormBrixx by ACO Technologies plc. The system shall have been tested in accordance with CIRIA C680 guidelines.

*The ACO StormBrixx HD shall be 1.20m (L) x 0.600m (W) x 0.610m (H) and cross and brick bonded throughout. Ultimate vertical strength should be 455 kN/m^2 and ultimate lateral strength 95 kN/m^2.

***delete as appropriate**

*The ACO StormBrixx SD shall be 1.20m (L) x 0.600m (W) x 0.914m (H) and cross and brick bonded throughout. Ultimate vertical strength should be 350 kN/m^2 and ultimate lateral strength 70 kN/m^2.

The units shall allow for free access for CCTV / jetting equipment and be configured to allow for the management of silt utilising a sediment forebay/sediment tunnel/low flow and draindown facility*.

NBS Specification

ACO StormBrixx should be specified in NBS section R17:315. Assistance in completing this clause can be found in the ACO Technologies entry in NBS Plus or a model specification can be downloaded from www.aco.co.uk. For further assistance, please contact the ACO Water Management Design Services Team.

PRODUCT TESTING

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

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

Please contact the ACO Water Management Design Services Team on 01462 816666 for advice when designing ACO StormBrixx schemes.







Recycled content

ACO Technologies aim to incorporate as much recycled material or waste material as is practicable in their manufactured products without compromising performance. Typically we use PP materials containing 50% plus recycled plastic and ductile iron materials containing 40% to 90% recycled iron.

ACO StormBrixx products are themselves intended for a long life with low maintenance, to reduce the need to recycle, but when eventually they are no longer needed, their materials can be readily recycled with a very low risk of pollution to the environment.

Complementary surface water flow control systems

ACO StormBrixx has a range of flow control systems that work with it to regulate storm water 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 retention and attenuation systems, such as ACO StormBrixx, as an integrated sustainable urban drainage (SuDS) scheme.

What is an ACO Q-Brake?

ACO Q-Brake is a horizontal vortex flow control unit designed to regulate storm water flows from 2-100 litres per second. Manufactured from grade 304 stainless steel, each ACO Q-Brake is individually configured to suit specific performance criteria.

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

Unlike more conventional methods, ACO Q-Brake is less prone to blockage, and permits higher flow at a lower head of water, as a vortex control allows an outlet 4-6 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.

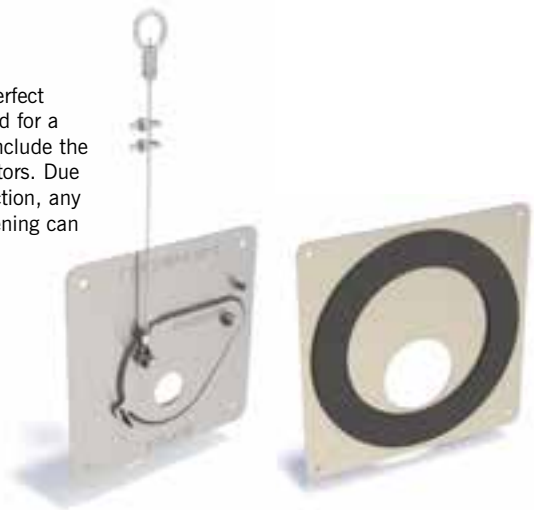






What is an ACO Q-Plate?

ACO Q-Plate orifice plates are perfect for all flow rates and can be used for a number of applications. These include the private and adoptable water sectors. Due to the systems bespoke construction, any manhole size, pipe ø, orifice opening can be accommodated for.



ACO Q-Plates with and without draindown

Q-Brake & Q-Plate Features

- Available with a drain down door
- Manufactured from 304 Stainless steel
- Easy to install
- Available with a flat or curved back
- Large orifice sizes minimise blockages
- Integrated into many hydraulic software packages

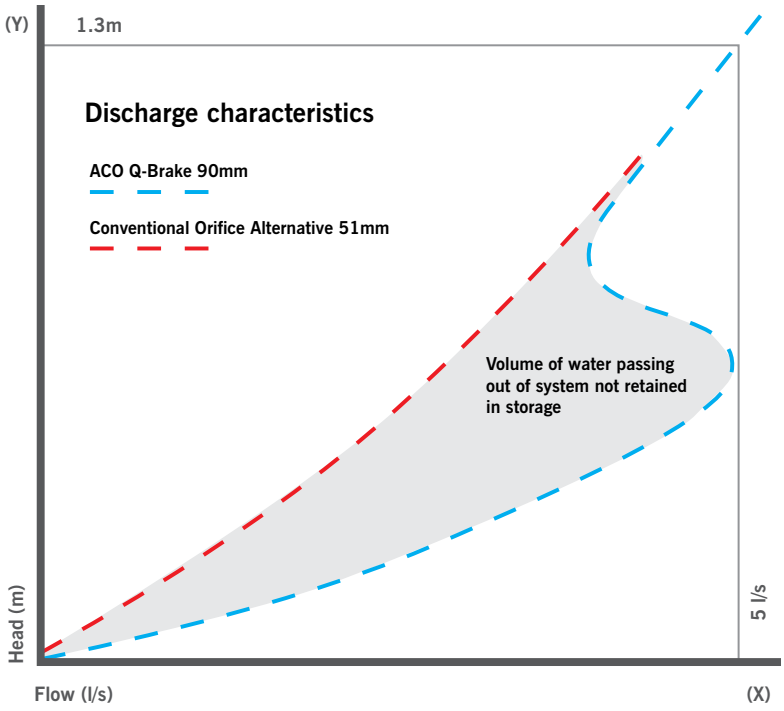
Benefits of using a surface water flow control system

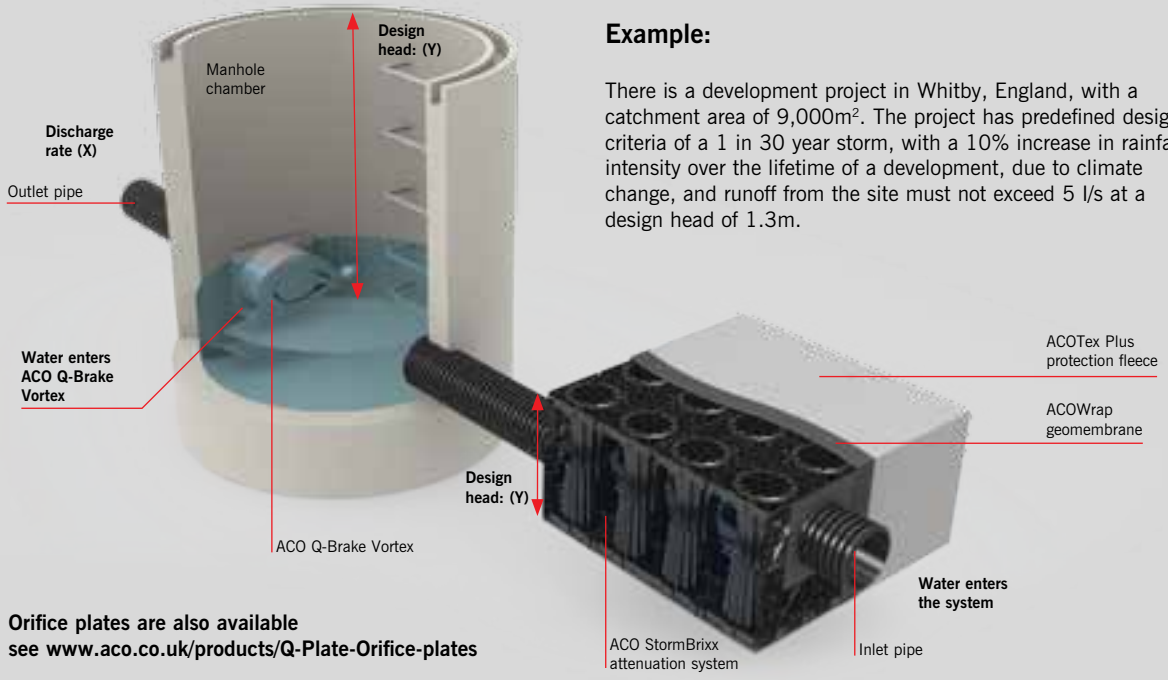
Storage and the controlled release of clean water into the natural environment is an important aspect of managing surface water in the SuDS approach. The Floods and Water Management Act now gives overall responsibility to the local regulatory body to impose, where appropriate, the discharge rate of a surface water flow control system.

ACO's range of flow control systems can be used in conjunction with ACO's award-winning attenuation and infiltration system, ACO StormBrixx, to provide a fully integrated storm water control system meeting the requirements of the regulations.

This diagram simulates how the ACO StormBrixx system is used to provide storm water attenuation, whilst the ACO Q-Brake is used to regulate the rate of discharge from the development into the watercourse or sewer network.

This benefit is best demonstrated in the example opposite. The conclusion of the example means that upstream storage can be reduced by 32m³ compared to using a traditional flow control system.





Example:

There is a development project in Whitby, England, with a catchment area of 9,000m². The project has predefined design criteria of a 1 in 30 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.

Orifice plates are also available see www.aco.co.uk/products/Q-Plate-Orifice-plates

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. The 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 upsteam 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 attenuation requirements by approximately 32m³ (10%) relative to a tradional orifice plate system.

The increased orifice diameter also means the Q-Brake orifice has a cross sectional area >4.6 that of the equivalent traditional orifice plate.

- The Q-Brake is therefore less prone to blockage than a traditional orifice plate flow controller.

ACO Technologies plc

- ACO Water Management
  Civils + Infrastructure
  Building + Landscape
- ACO Building Drainage
- ACO Technic
- ACO Sport
- ACO Wildlife

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The ACO Group: A strong family you can depend on.

ISO 9001
FM 13502

ISO 14001
EMS 538781

OHSAS 18001
OHS 524145

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