



# ACO RoofBloxx

## Product Overview

Blue Roof Attenuation Systems for a Sustainable Urban Environment



## ACO RoofBloxx Blue Roof Attenuation System

ACO RoofBloxx offers architects, engineers and property owners an environmentally sustainable, efficient and cost-effective method to reduce rainwater run-off, enabling water storage and irrigation of blue/green roofs in urban environments.

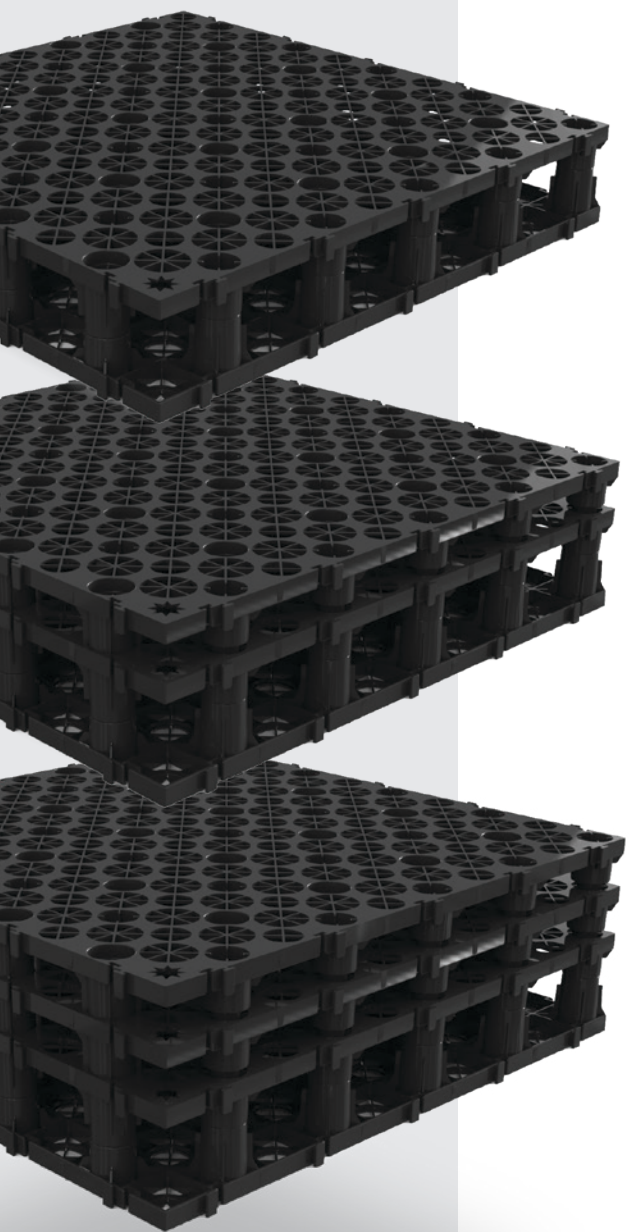
### ACO RoofBloxx

Geocellular unit



### ACO Blue Roof Flow Restrictor

The restrictor has been designed for use with the ACO range of HP Vertical spigot and screw 45 and 90 degree roof outlets and accessories.



## **ACO RoofBloxx**

Introducing our blue roof attenuation system.

<b>1</b>	<b>ACO. creating the future of drainage</b>	<b>04</b>
	ACO Technologies plc	
	ACO Building Drainage	
<b>2</b>	<b>What is a blue roof?</b>	<b>06</b>
	Why specify a blue roof attenuation system	07
	What is ACO RoofBloxx	08
	Technical specifications	10
	ACO Blue Roof Flow Restrictor	11
<b>3</b>	<b>System Products</b>	<b>12</b>
	ACOTex plus protection fleece	
	ACOTex infiltration geotextile	
	Geomembrane specification	
	ACO Flat Roof Outlets	13
	ACO RoofBloxx Reservoir Tray	
	Capillary Wick	
	Threshold Drain	
	ACO Pipe™	
<b>4</b>	<b>Design considerations</b>	<b>14</b>
	ACO Design Services	
	Hydraulic design	
	Structural design	
	Building fabric design requirements	
	Surface finishing	15
	Prevention of Fire under surface finishing	
<b>5</b>	<b>Typical installation details</b>	<b>16</b>
	Warm roof construction	
	Inverted roof construction	17
	Inverted ballasted roof	18
	Podium deck construction	
<b>6</b>	<b>Installation guide</b>	<b>19</b>
	Installation of RoofBloxx / RoofBloxx Cell	
	ACO Blue Roof Flow Restrictor	20
	Maintenance considerations	
<b>7</b>	<b>Further learning</b>	<b>22</b>
	Design support services	
	ACO Professional Development	
	Sustainability & SuDS	23

## ACO. creating the future of drainage

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 spans 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 and Ireland. 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 stringent legal requirements which 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.

### ACO Building Drainage

With the introduction of ACO RoofBloxx, ACO can offer a complete and comprehensive solution for rainwater management within the building envelope. When specified with the existing range of ACO Water Management and ACO Building Drainage products, ACO RoofBloxx provides building owners and specifiers with the sustainable drainage systems required to make greener urban environments a reality.



ACO Group  
in Rendsburg/Büdeltsdorf





**5,000**

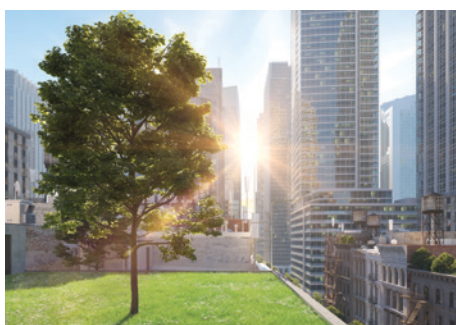
5,000 employees in  
more than 40 countries  
(Europe, USA, Asia,  
Australia, Africa)

**900**

Sales 2019:  
€900 million

**30**

30 production sites in  
15 countries



Iver Ahlmann and Hans-Julius Ahlmann



## What is a Blue Roof?

A blue roof is a roof attenuation design which is explicitly designed to store rainfall. Normally featuring a flat roof design, a blue roof is intended to temporarily store stormwater on the roof (attenuate) to alleviate flooding in sewer systems. In its simplest form, a blue roof is an open storage area but it can also form part of a podium deck or a green roof system.

In dense urban environments blue roofs form an increasingly important part of a development's SuDS strategy as the opportunity for underground storage is limited and increasingly costly. Blue Roofs are designed to drain down from full to half empty or fully empty within a 24 hour period depending on the drainage specification of the blue roof.

Blue roof attenuation systems can be designed in conjunction with a green roof to offer the added benefit of permanent water storage for passive irrigation for planting. These systems are commonly called blue green roofs.



### Blue Roof

A blue roof is a roof attenuation design that is explicitly intended to store rainfall. Blue roofs that are used for temporary rooftop storage can be classified as “active” or “passive” depending on the types of control devices used to regulate water drainage from the roof.



### Green Roof

A green roof or living roof is a roof of which is partially or completely covered with vegetation and a growing media which has been planted over a waterproof membrane. It may also include additional layers such as a root barrier and drainage and irrigation systems.



### Blue/green Roof

A blue/green roof is a roof design that combines the benefits of both a blue roof and a green roof. It can have the added benefit of providing passive irrigation to the green element of the roof. The irrigation reservoir can sit on the roof membrane or be above the storage layer.



## Why specify a blue roof attenuation system?



Planning requirements and guidance across the UK commonly requires engineers to use SuDS techniques wherever feasible. This ensures that the potential for flooding is mitigated and that due consideration is given to climate change and sustainability. In some parts of the UK, local planning guidance recommends the use of blue green infrastructure wherever suitable, for example, The London Plan and The National Planning Policy Framework.

Blue green roof systems provide numerous benefits, particularly in urban environments:

- Climate change – flood control
- Urban heat island mitigation
- Amenity space
- Passive rainwater harvesting and irrigation
- Energy efficiency through improved insulation
- Prolongs life of roofing membrane
- Reduces noise and air pollution
- Biodiversity
- Carbon sequestration

Blue green roofs can also help to achieve BREEAM credits for energy, land use and ecology, management, health and wellbeing, materials and waste.

One of the main reasons for specifying a blue roof attenuation system is the space it saves on below ground attenuation. In an urban setting, due to the lack of external space around the development and poor ground conditions, the attenuation storage may have to be within the building footprint itself and is often part of the basement construction. This is expensive to construct and may have ongoing running costs.

Therefore, it is logical to temporarily store water in the area where it falls and where gravity can gradually drain the water to the sewer. In addition, it means that valuable space could be freed up within the building for other uses, for example, car parking, plant rooms etc.

# What is ACO RoofBloxx?

ACO RoofBloxx is a complete roof water attenuation system for blue and blue/green roofs. It enables you to create a drainage platform which gives architects the design flexibility required to create imaginative, multi-functional open green spaces at roof or podium level.

## Overview of current design practice

Conventional blue roof design looks to provide the rainwater attenuation within the build-up of a normal roofing system as a single solution in a similar way to that of a green roof. Ultimately this has led to a degree of confusion and differing interpretation as to how a blue roof should be designed given that its purpose and function is very different from flat roof drainage design.

In simple terms a standard flat roof is designed to drain quickly in the worst case event – a short intense summer storm lasting minutes, whereas a blue roof is designed to drain slowly – to mitigate the effects of downstream flooding that can be a duration of hours. Designing a roof drainage system to cater for both extremes is a difficult challenge.

Current design dilemmas associated with blue roofs include, drain down times, roof falls, number of roof outlets, pipe gradients, roof construction - most notably with inverted designs, and not least a lack of standards, all of which lead to issues with design liability and warranties.

## ACO Blue Roof Attenuation System (patent pending)

The ACO solution separates the competing drainage requirements by engineering an elevated structural attenuation system that operates independently of the flat roof drainage system, allowing both storm eventualities and systems to be engineered to known standards and best practice.

Separating the design issues ensures that compromise is not needed. The attenuation system can drain slowly in normal use and in an unforeseen eventuality the attenuation system can be bypassed if necessary and the flat roof drain quickly.

The system operates by creating a structural drainage void between the top of the roof waterproofing and the underside of the attenuation lining membrane that surrounds ACO RoofBloxx. As the blue roof tank sits inside the roof area a weir overflow is created at the perimeter of the tank and above the ACO roof outlets ensuring free flow of rainwater if the blue roof tank is full. The design of the system allows the blue roof tank to be controlled through as few ACO blue roof flow restrictors as needed and integrates with the ACO range of roof outlets.

The system can be incorporated under a wide range of roof finishes from soft landscaping to trafficked areas, new build and retrofit, and with a variety of roof construction types including inverted roofs and podium decks.





## A closer look at the system

The ACO RoofBloxx system comprises a shallow, high-strength, height variable geocellular storage void, structural drainage cell and blue roof flow restrictor. This can be combined with ACO roof outlets, downpipes and surface water drainage systems to give a complete SuDS solution.

ACO Design Services can provide you with free guidance on the hydraulic design of blue roof and surface drainage systems. See page 14 for further information.

ACO RoofBloxx Tank is an interlocking geocellular drainage system ranging in depth 85mm – 165+mm. It has been designed for shallow, high-strength roof attenuation systems and is also ideal for intensive green roof designs.

ACO RoofBloxx Cell is a 30mm high strength structural drainage sheet for use with a drainage void in blue and green roof constructions.

ACO RoofBloxx modularity and high-void structure makes it an ideal system to be incorporated into complex on-structure landscapes.

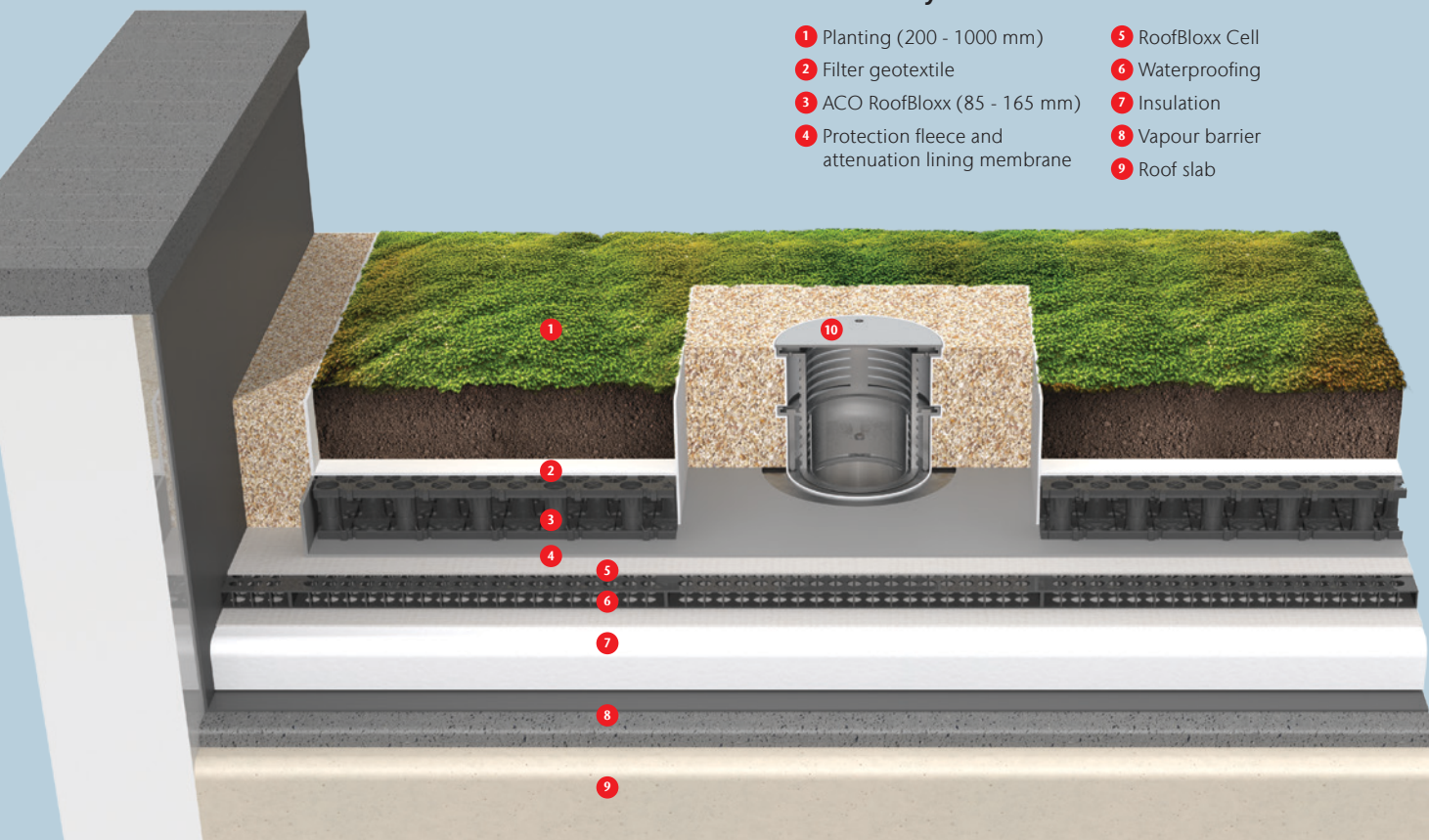
When combined with the ACO Blue Roof Flow Restrictor, the geocellular unit can store rainwater at source and control the run-off to mitigate impact from pre to post development rates.

The system can be designed to permanently store a percentage of the captured water above or within the ACO RoofBloxx geocellular unit (see technical section for further information). This enables passive irrigation and re-use of water at source during prolonged dry periods.

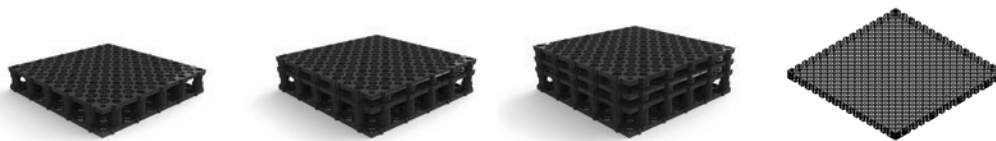
Features	Benefits
High strength (800kN/m <sup>2</sup> )	Suitable for pedestrian and vehicular areas Minimal cover reduces structural load
Interlocking units	Forms a structural raft
Stackable units (40mm increments)	Adjustable storage depth No additional shear connections required

### Number Key

- |   |                  |
|---|------------------|
| 1 Planting (200 - 1000 mm)                          | 5 RoofBloxx Cell |
| 2 Filter geotextile                                 | 6 Waterproofing  |
| 3 ACO RoofBloxx (85 - 165 mm)                       | 7 Insulation     |
| 4 Protection fleece and attenuation lining membrane | 8 Vapour barrier |
|   | 9 Roof slab      |



# Technical Specifications



Model	RoofBloxx 85	RoofBloxx 125	RoofBloxx 165	RoofBloxx Cell
Product Code	110001	110002	110003	110008
Size (mm)	500 x 500 x 85	500 x 500 x 125	500 x 500 x 165	500 x 500 x 30
Material	Polypropylene	Polypropylene	Polypropylene	Polypropylene
Colour	Black	Black	Black	Black
Top surface void area	~53%	~53%	~53%	~62%
Internal void ratio	~90%	~90%	~90%	~95%
Gross volume	~0.021m <sup>3</sup>	~0.031m <sup>3</sup>	~0.041m <sup>3</sup>	0.0075m <sup>3</sup>
Net water volume	~0.019m <sup>3</sup>	~0.028m <sup>3</sup>	~0.037m <sup>3</sup>	0.0071m <sup>3</sup>
Unit weight	~2.2kg	~3.3kg	~4.4kg	~2.5kg
Compressive strength	Max. 800kN/m <sup>2</sup>	Max. 800kN/m <sup>2</sup>	Max. 800kN/m <sup>2</sup>	Max. 800kN/m <sup>2</sup>
Discharge capacity				
- @ 0% gradient	6.4l/m/s	12.2l/m/s	16.9l/m/s	-
- @ 1% gradient	7.5l/m/s	13.4l/m/s	17.9l/m/s	16.5 l/m/s
- @ 2% gradient	8.5l/m/s	14.1l/m/s	18.8l/m/s	-
Biological/chemical resistance	Unaffected by moulds and algae, soil borne chemicals, bacteria and bitumen			

## Key Features

- Modular structure allows for design flexibility
- Interlocks in any orientation
- Stackable without additional shear connectors
- Stormwater attenuation at shallow depth
- Passive irrigation attainable with capillary wick
- Suitable for use beneath both permeable and impermeable surfaces
- High loading bearing capacity in excess of 800 kN/m<sup>2</sup>
- 100% recyclable
- 90% void volume for maximum water discharge or storage
- Nested packing for easy storage and delivery





# ACO Blue Roof Flow Restrictor

ACO offers a Blue Roof Flow Restrictor as a means of controlling the rate of runoff from a blue roof.

The restrictor has been designed for use with the ACO range of HP vertical spigot and screw, 45 and 90 degree roof outlets and accessories.

The design of the restrictor is individually tailored to suit the site-specific requirements for each blue or blue green roof. The design of the flow restrictor(s) can be carried out with tailored roofs designed to BS EN 12056-3:2000 or to attenuation sizing principles.

To size the restrictor, ACO Design Services will need to know:

- The desired flow rate from the roof (l/s)
- The maximum design storage depth (mm)
- The number of roof outlets and overflows
- Water Reservoir depth (mm) if required

ACO Design Services can also assist and provide guidance on the design and sizing of the blue roof storage – please see page 14 for further information.



Product Type	Diameter (mm)	Depth	Overflow
50/75 HP Vertical Aperture	300	3	Height to suit max storage depth
100/150 HP Vertical Aperture	380	3	Height to suit max storage depth
50/75 Horizontal Aperture	300	3	-
100/150 Horizontal Aperture	380	3	-

## Features

- 1 Manufactured from corrosion-resistant 304 grade stainless
- 2 Built-in overflow with vertical orifice option – provides a failsafe drainage solution
- 3 The orifice height can be positioned so water can be retained on the roof for passive irrigation of a green roof.
- 4 Larger single orifice is less prone to blockages – applies to vertical and horizontal orifices if the system is designed using attenuation principles
- 5 Wide flange allows a secondary liner (if needed) to be dressed and sealed around the outlet without disturbing the roofing membrane seal.
- 6 The position of the orifice ensures that the roof membrane clamp ring seal is not subjected to prolonged periods of hydrostatic pressure when surcharged.
- 7 Coded solid cover (with vent) ensures the restrictor position is easily identified and prevents debris from entering and potentially blocking the outlet.

## Note

The ACO Blue roof drainage system is designed to comply with the requirements of BS12056-3:2000 whilst also meeting the site discharge parameters required under planning conditions.



# System Products

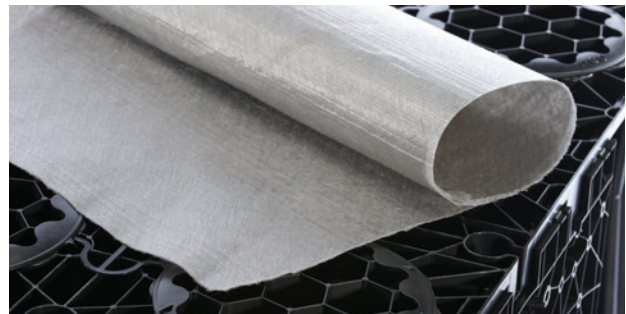
## ACOTex plus protection fleece



ACOTex Plus is used underneath the ACO RoofBloxx system to provide additional protection to the roofing membrane.

Product code	Unit	27041
Description		Mechanically bonded continuous filament non-woven sheet
Material		100% UV stabilised polypropylene
Sheet dimensions - Length	Length (m)	100
Sheet dimensions - Width	Width (m)	4.0
Material thickness (for 2 kPa)	(mm)	2.9
Material mass per unit area	(g/m <sup>2</sup> )	325
CBR puncture resistance	(N)	3850
Strip tensile strength (md)	kN/m	24
Strip tensile strength (cd)	kN/m	24
Elongation at maximum load	(md)	100%
Elongation at maximum load	(cd)	40%
Cone drop test	(mm)	15
Opening size	µm	90
Permeability vertical	l/m <sup>2</sup> /s	60

## ACOTex infiltration geotextile



ACOTex is used on top the ACO RoofBloxx system to act as a separation layer between the ACO RoofBloxx system and the green roof substrate or landscaping.

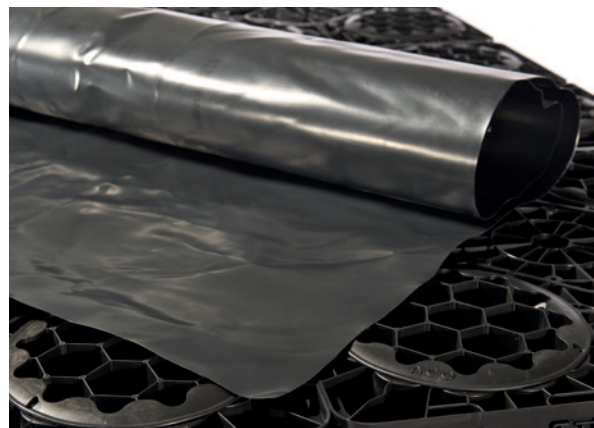
Product code	Unit	27038
Description		Mechanically bonded continuous filament non-woven sheet
Material		100% UV stabilised polypropylene
Sheet dimensions - Length	Length (m)	100
Sheet dimensions - Width	Width (m)	4.0
Material thickness (for 2 kPa)	(mm)	1
Material mass per unit area	(g/m <sup>2</sup> )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

## Welded Geomembrane

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





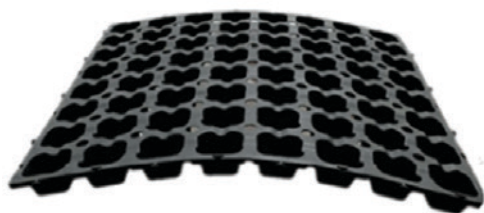
## ACO Flat Roof Outlets

ACO offers a full range of flat roof outlets including vertical 45 and 90 degree spigot and threaded outlets, balcony, gully, two-way and overflow outlets. All ACO Building Drainage high performance rainwater outlets are manufactured from die-cast marine-grade LM6 aluminium silicon alloy. This grade of aluminium alloy is highly corrosion resistant, weather-proof and resistant to ultra-violet radiation.



## ACO RoofBloxx Reservoir Tray

ACO RoofBloxx Reservoir Tray is a lightweight interlocking modular green roof tray designed for versatility. Its flexibility means it can easily be cut-to-fit different shapes. Its easy-to-interlock feature facilitates the connection of adjacent trays for stability. It can be used in conjunction with ACO RoofBloxx 85 - 165 mm to provide a green roof reservoir above the blue roof storage layer. See typical installation details page 16.



Product Code	110010	110007
Material	Recycled Polypropylene	Recycled Polypropylene
Size	500 mm x 500 mm	500 mm x 500 mm
Height (overall)	30 mm	60 mm
Vertical Compressive Strength kN/m <sup>2</sup>	470	618
Reservoir capacity l/m <sup>2</sup>	11.6	18

## Capillary Wick

ACO offers a wicking rope to assist with the irrigation of a green roof where the storage reservoir is contained within the RoofBloxx geocellular unit. See typical installation details page 16.



Product Code	110011
Material	Cotton
Roll Length	170 mm
Thickness	4 mm

## Threshold Drain

Manufactured from extruded plastic and aluminium, ACO Threshold Drain eliminates water ponding at external doorway entrances.



Please refer to product brochures for more information.

## ACO Pipe

ACO PIPE® is a reliable, lightweight and durable stainless steel push-fit pipework system, designed, produced and tested for soil, waste, rainwater and industrial wastewater drainage applications.



# Design Considerations

## ACO Design Services

ACO's in-house technical design team can assist with attenuation sizing and the design of blue roof drainage systems. They can also consider any other surface water drainage requirements by modelling the behaviour of the roof during various storm events.

The information required by ACO to size the blue roof is as follows :

1. Project location
2. Roof area (plus any other areas discharging directly onto the roof)
3. The design storm return period plus any climate change adaptation factor
4. Rainfall data set FSR or FEH

Please note: A blue roof system is generally specified in conjunction with other SuDS components. Changes in the blue roof design and other SuDS systems are likely to have an impact on the performance of the whole system. Such changes should be assessed by an appropriately qualified engineer.

ACO offers a wide range of surface water management solutions. For more information, contact ACO design team or visit our website: [www.aco.co.uk/aco-water-management](http://www.aco.co.uk/aco-water-management)



## Hydraulic Design

It is not uncommon for a blue roof system to be specified where there is limited opportunity and available space for more traditional methods of SuDS and attenuation control. In such circumstances the engineer must consider the design of the blue roof in conjunction with other site SuDS to ensure the hydraulic performance meets the overall surface water drainage requirements needed for planning conditions to be met.

- The roof drainage design should comply with BS EN 12056-3:2000, and should include the provision of emergency overflows. ACO Design Services can provide guidance regarding the sizing and location of roof outlets to BS EN 12056-3:2000
- Blue roofs are generally installed on a 'zero fall' roof. BS 6229:2018 defines a zero roof fall as one having between 0 and 1:80 fall, but it must not have any back falls.
- Void ratio – The total roof area must factor in the void ratio of any gravel surround and fire break strips as well as the void ratio of the storage void. ACO RoofBloxx geocellular unit has a void ratio of 90% and gravel typically has a 30% void.
- Reservoir capacity – The ACO blue roof system can be designed to accommodate an additional reservoir capacity, either within the ACO RoofBloxx system for a warm roof construction using capillary wicks or above using the ACO RoofBloxx Reservoir Tray (see page 13).

## Structural Design

Blue roofs will generally require a concrete slab due to the dead and live load. As such the incorporation of a blue roof system should be considered as early in the planning process as possible to ensure the additional weight of the stored water is accommodated in the structural design calculations for the roof structure.

A detailed structural analysis should be carried out by a suitably qualified engineer to consider construction tolerances, deflection and settlement under load. As the usual depth of the stored water is unlikely to be much more than 100-150mm in depth, (1.0-1.5kN/m<sup>2</sup> load) the actual increase in load is minimal.

## Building Fabric Design Requirements

The permanent and/or temporary storage of rainwater on a roof also requires additional consideration. For waterproofing and exceedance drainage, both BS 6229:2018 and the Green Roof Organisation's (GRO) "Green Roof Code of Practice" provide excellent design guidance. Key considerations include, but are not limited to, the following:

- Surface water drainage – consideration needs to be given for surface drainage on landscaped roof and podium decks. Design should be carried out to BS EN 752:2008 - Drain and sewer systems outside buildings.
- Waterproofing details should finish 150mm above the finished level of any landscaping
- Penetrations: upstand depth restrictions.



- Detailing: Existence of expansion joints.
- Roof geometry – the incorporation of walls and plant equipment may obstruct flow paths to outlets.
- Fire and vegetation breaks.
- Roof outlets and outlet restrictors should be detailed to prevent clogging from fines, they should also include vegetation breaks.
- Thermal insulation – particularly for inverted roof constructions.
- Flootation – notably with inverted roof construction.
- Wind uplift

## Surface Finishing

An ACO blue roof attenuation system can be designed to work in conjunction with a variety of roof constructions and types including warm and inverted roofs, and podium decks.

The high-strength ACO RoofBloxx geocellular unit makes a blue roof suitable for use beneath:

- Extensive and semi-intensive green roofs
- Intensive green roofs
- Paving and decking on suitable pedestals or fixings
- Raised planters
- Pedestrian areas

- Trafficked areas such as podium decks
- Areas with photovoltaic cells (PV) – fixing may be possible through the ACO RoofBloxx unit to avoid the requirement for additional ballast – please consult ACO Design Services.

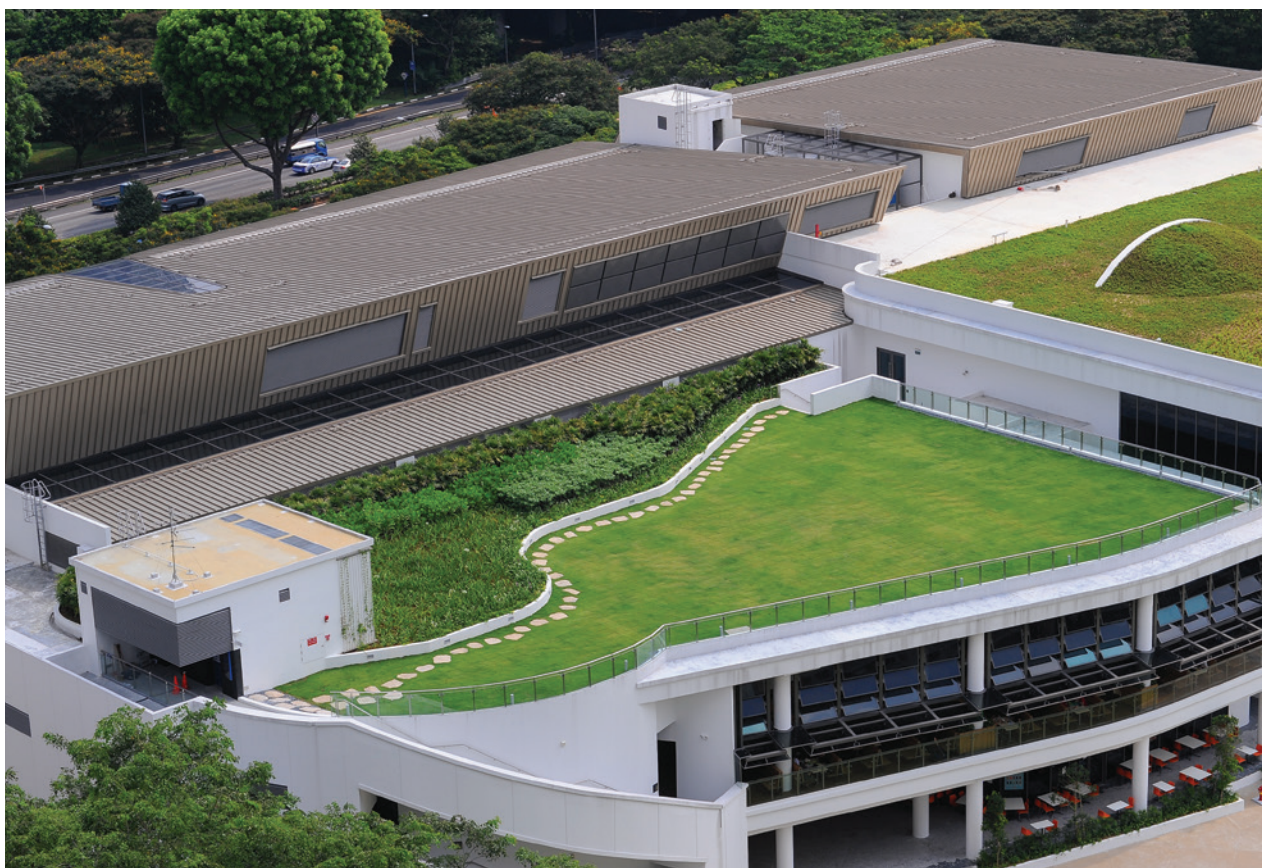
The design of the ACO RoofBloxx system also allows for services to be laid in the drainage void if required.

## Prevention of Fire

Blue green roofs should be designed to provide the necessary resistance to the external spread of fire by the following measures:

- increasing the non-combustible content of the growing medium
- decreasing the organic content of the growing medium
- preventing the system from drying out.

Blue green roofs have to be studied and integrated within the building fire strategy design. Based on each case, a fire risk assessment will be made by the appointed fire consultant and they will propose the most suitable solutions in order to mitigate the fire risks associated with the blue green roof. A number of measures can be proposed by the fire consultant, however this will be done on a bespoke basis. Each project will have its own individual technical solution



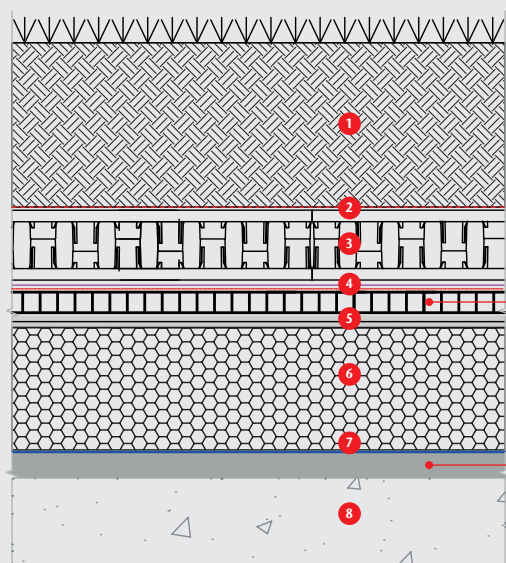
# Typical Installation Details

With some minor design modifications, blue roof storage systems can be easily incorporated into most flat roof systems at relatively little additional cost.

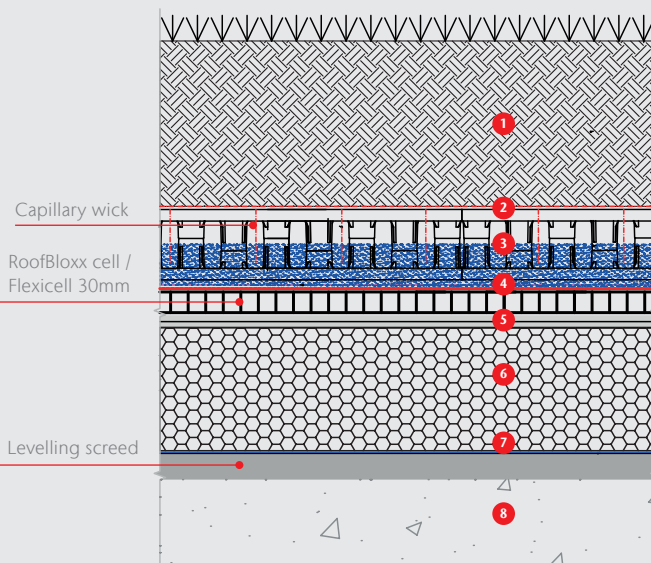
## Warm Roof Construction

A type of roof construction that has an insulation layer above the structural deck, and immediately below its weatherproofing membrane. This type of construction allows heat to be conserved within a building without the need for a ventilation system.

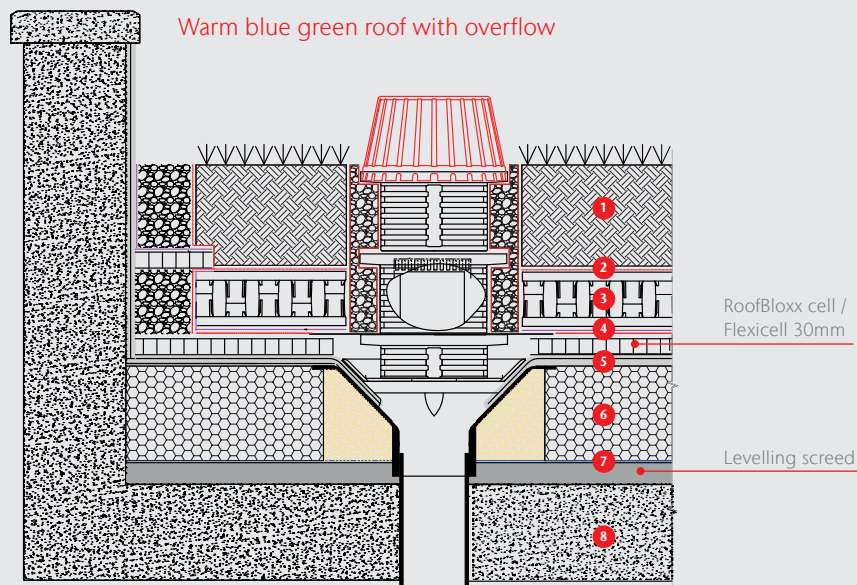
### Warm blue green roof



### Warm blue green roof with reservoir



### Warm blue green roof with overflow



#### Number Key

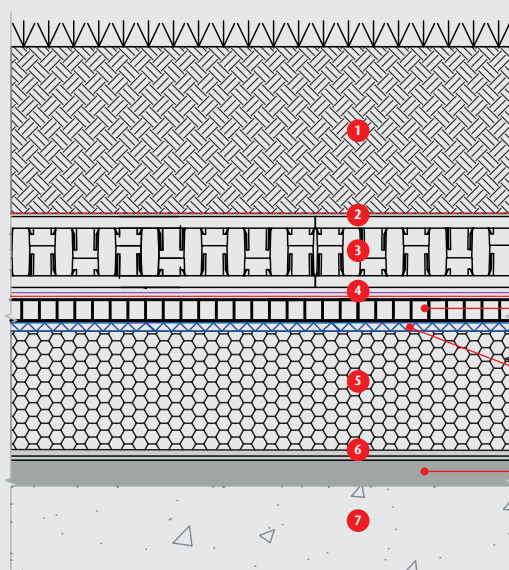
- |                            |   |                  |
|----------------------------|---|------------------|
| 1 Planting (200-1000mm)    | 4 Protection fleece and attenuation lining membrane | 6 Insulation     |
| 2 Filter geotextile        | 5 Waterproofing                                     | 7 Vapour barrier |
| 3 ACO RoofBloxx (85-165mm) | 8 Roof slab   |                  |



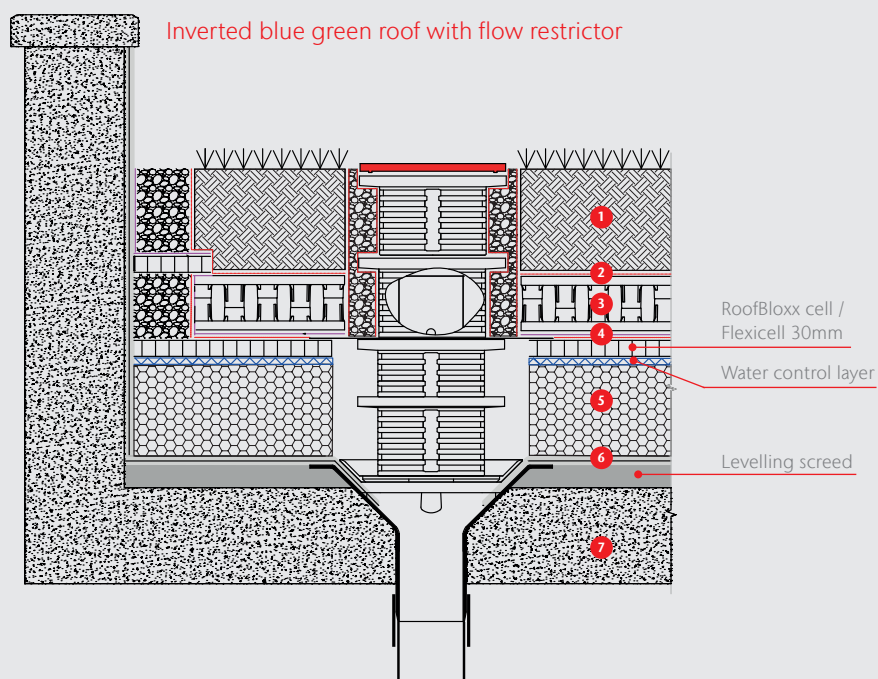
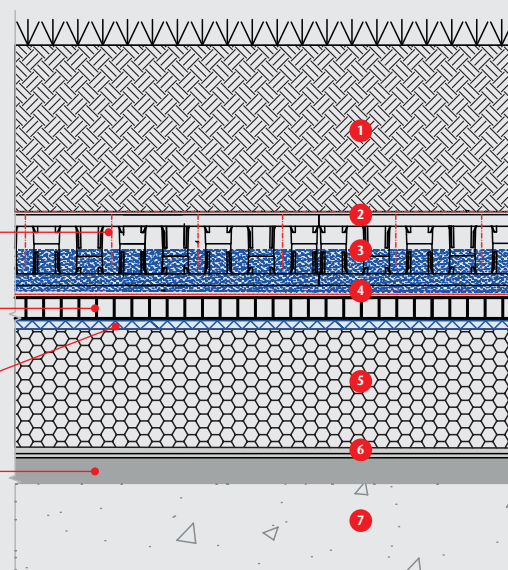
## Inverted Roof Construction

An inverted roof, also referred to as an 'upside down' roof, is a form of flat roofing that has the waterproofing layer underneath the thermal insulation rather than above it. The insulation layer helps to protect the waterproof membrane and prolong its life.

Inverted blue green roof



Inverted blue green roof with reservoir

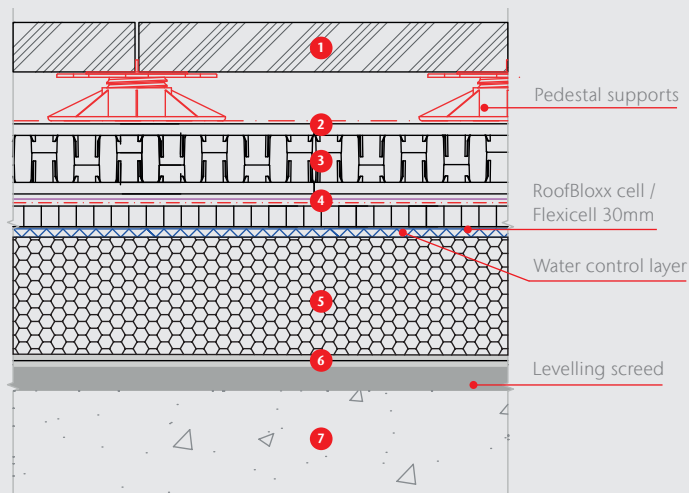


### Number Key

- |                            |   |                 |
|----------------------------|---|-----------------|
| 1 Planting (200-1000mm)    | 4 Protection fleece and attenuation lining membrane | 6 Waterproofing |
| 2 Filter geotextile        | 5 Insulation  | 7 Roof slab     |
| 3 ACO RoofBloxx (85-165mm) |   |                 |

## Inverted Ballasted Roof

Ballasted roof is a flat roof where the insulation is not anchored or adhered in any way to the decking material. The stones/slabs used in a ballasted roof are more substantial and resist wind uplift.

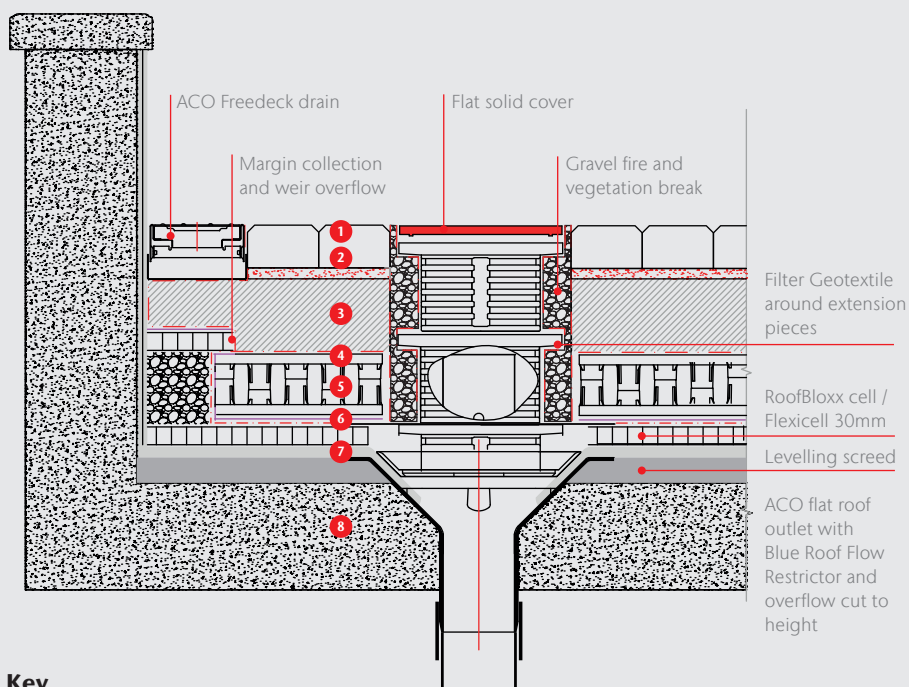


### Number Key

- |                            |   |                 |
|----------------------------|---|-----------------|
| 1 Paving                   | 4 Protection fleece and attenuation lining membrane | 6 Waterproofing |
| 2 Filter geotextile        | 5 Insulation  | 7 Roof slab     |
| 3 ACO RoofBloxx (85-165mm) |   |                 |

## Podium Deck Construction

A podium deck is a raised structural platform or one that has a void underneath it, for example, when it is situated above a basement. They are often uninsulated and may be at ground level.



### Number Key

- |                                       |   |                 |
|---------------------------------------|---|-----------------|
| 1 Block paviors                       | 4 Filter Geotextile                                 | 7 Waterproofing |
| 2 Bedding layer                       | 5 ACO RoofBloxx (85-165mm)                          | 8 Roof slab     |
| 3 Sub base to engineers specification | 6 Protection fleece and attenuation lining membrane |                 |



# Installation Guide

## Installation of ACO RoofBloxx

ACO recommends that the ACO RoofBloxx geocellular unit together with a protection fleece is installed across the complete design area. The fleece protects the waterproofing layer during construction whilst giving the landscape contractor full access during construction.



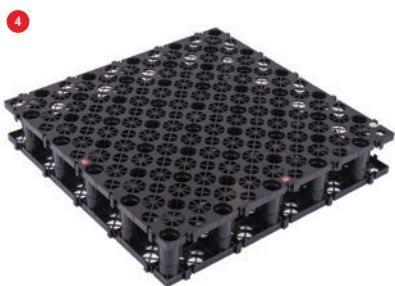
The ACO RoofBloxx units are delivered in bundles of 4 unassembled units. An unassembled unit comprises of two panels that need the top panel to be rotated to form a 85mm high unit



Each panel has one corner that has a star. To assemble one complete unit, the top panel will need to be rotated so that the stars align.

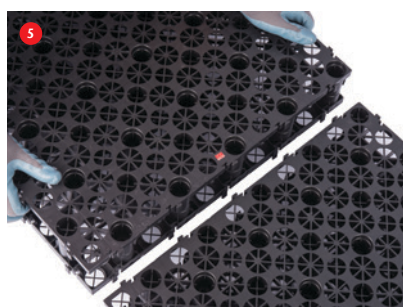


Once the stars align on top of one another, the supporting columns will join together. Simply push down and the 85mm unit is assembled.

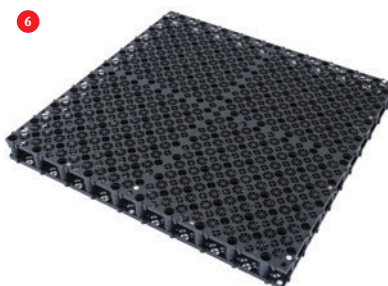


An assembled 85mm unit

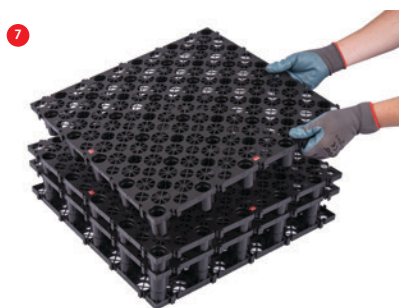
When creating units over 85mm in height, we recommend that an 85mm unit is created first and additional layers are subsequently added.



To join units together, simply align both top and bottom adjoining integral connectors and push down firmly.

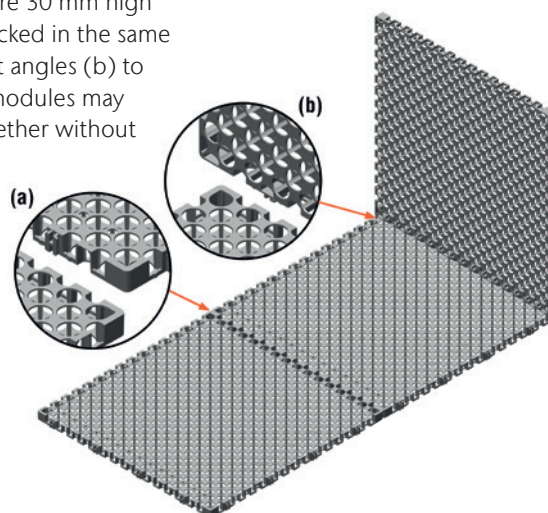


This procedure is then repeated with all units so that a solid sheet is created. The panels can be cut around roof protrusions and details without compromising strength provided columns are cut round and not through.



To create units which are more than 85mm in height, simply stack a single sheet of ACO RoofBloxx directly on top of an 85mm high unit to create a 125mm high unit. An additional layer can then be added to create a 165mm high unit. Please note the stars must align.

RoofBloxx Cell 30 are 30 mm high and may be interlocked in the same plane (a) or at right angles (b) to one another. The modules may also be butted together without interlocking.



## ACO Blue Roof Flow Restrictor and Overflow

1



Install the ACO roof outlet in accordance with installation instructions on page 33 in the [ACO Rainwater Outlets brochure](#). Screw the threaded studs supplied with the outlet restrictor into the clamping ring on the installed roof outlet.

2



Place the flow restrictor plate on top of any raising pieces required to bring the flow restrictor up to the correct level on the roof build up. Place over the threaded studs and tighten ensuring that the neoprene gasket and washer are under the nuts to create a water-tight seal.

3



Place a raising ring over the flow restrictor and using the two spare nuts secure in place

4



Secure additional extension pieces so that the required finished height is achieved and cut the extension pieces to required height. Wrap non-woven geotextile infiltration fabric around the raising rings prior to the placement of gravel and green roof substrate to ensure there is no possibility of debris ingress that might block the outlet restrictor.

5



Finally place the outlet flow restrictor cover plate over the raising ring and secure in place using the bolts supplied.

6



**Additional notes:** The protection fleece should be placed under the outlet flow restrictor / overflow plate between steps 1 and 2 and tighten and /or fix to the adaptor plate.

Seal the secondary geomembrane to the top flange of the flow restrictor / overflow using a proprietary weld or tape method.

If fitting standard overflow outlets, please refer to page 25 of the [ACO Building Drainage High Performance Rainwater Outlets for Flat Roofs, Car Park Gullies and other areas brochure](#).

## Maintenance Considerations

The ACO blue roof system should be regularly maintained to ensure optimum performance and the inspection of roof outlets to check for potential blockages should be carried out in conjunction with fire and irrigation (where fitted) inspections. ACO has colour coded and clearly marked the roof flow restrictor outlets to assist inspection.

All inspections should be carried out twice per annum to remove vegetation from the gravel surrounding all outlets and inspection chambers. The maintenance should be carried out with due regard to safety and access in accordance with the CDM regulations, The Health and Safety at Work Act, and The Construction (Health, Safety and Welfare) Regulations.

# Specification Clauses

## ACO RoofBloxx

The blue roof storage unit is ACO RoofBloxx by ACO Building Drainage measuring 500 x 500 x 85/125/165 mm (as appropriate) with an ultimate vertical compressive strength of not less than 800 kN/m<sup>2</sup> with a 90% void ratio. The ACO RoofBloxx system shall be laid on a 1mm LLDPE welded geomembrane, ACOTex 300gsm Protection Fleece, ACO RoofBloxx Cell 30mm, and overlaid with ACOTex 125gsm geotextile. All laps should be a minimum of 300 mm.

If an irrigation reservoir is required, then add either:

### **Within the RoofBloxx storage unit**

The system will include an additional internal irrigation reservoir of (insert depth) xmm deep using the ACO Blue Roof Restrictor and ACO Capillary Wicks at a maximum of 500mm centres.

### **On top of the RoofBloxx storage unit**

The system will comprise an additional external irrigation ACO RoofBloxx Reservoir Tray – 500 x 500 x 30/60 mm (as appropriate) with an ultimate vertical compressive strength of not less than 470 / 600 kN/m<sup>2</sup> (delete as appropriate) above the ACO RoofBloxx storage unit.

## ACO Blue Roof Flow

The blue roof outflow shall be controlled by an ACO Blue Roof Flow Restrictor(s) and internal overflows as designed by ACO Building Drainage. The flow restrictor and overflows shall be manufactured from 304 stainless steel and used in conjunction with ACO roof outlets. The outlet flow restrictor(s) shall be designed to control the roof run-off to (insert depth) xx l/s at a design hydraulic head of (insert depth) xmm (depth of storage void).

### **NBS Specification Clause:**

ACO RoofBloxx should be specified in section R10/365/465. Assistance in completing this clause can be found in the ACO Building Drainage entry in NBS Plus, or please contact the ACO Design Services team. Note: A specification in NBS format is available to download from [www.thenbs.com](http://www.thenbs.com) or [www.aco.co.uk](http://www.aco.co.uk)



# Further Learning

## Design Support Services

Surface water management system design can often be a complex task. Success in combining products and processes requires a thorough understanding of how these different elements work together.

The ACO Design Services team is able to work closely with you through the entire design process to ensure accurate and cost-effective product selection is made.

Services we offer include (free and without obligation):

- Whole system design, from collection to the attenuation of surface water
- Hydraulic calculations and AutoCAD detailing
- Parts schedules



## ACO Professional Development

ACO has recognised that knowledge transfer is fundamental in keeping up-to-date with the latest advancements in surface water management and has a unique training offer that can be accessed online, in-house or at the state-of-art training facility at the ACO Academy.

### In Company

ACO offers face-to-face professional development sessions. These are carefully designed to last up to 1 hour, so they can be undertaken across a lunch break.

A member of our team will contact you directly to discuss your requirements and will tailor the session to meet your needs.



### ACO Academy Days

ACO's training facility at its UK head office in Bedfordshire has a theatre-style facility that can hold up to 50 people as well as a number of breakout rooms for small groups.

Professional development training can be combined with more in-depth product training at the on-site learning zone.



### Webinars

ACO has developed a series of webinars that will keep you up to date, bringing you technical expertise as well as more specific product information. Whatever your involvement from specification to installation, there will be a webinar to meet your needs and further your learning.



### Seminars

ACO is bringing the experts to you via our programme of regional events, and by sharing information from key influencers within the industry as well as more specific product information. ACO's seminar events will include opportunities to enhance existing knowledge as well as network and discuss thoughts and ideas with other delegates.



# Sustainability

## Playing our part

ACO recognise that sustainability is the single most important issue that the construction industry will face over the coming years. Our research and development programme aims to maximise the use of sustainable material but, importantly, also strives to improve manufacturing and administrative processes that impact our environment.

## Responsible sourcing

ACO have developed a programme of continual improvement which seeks to ensure, where practical, all products manufactured are made from sustainable materials – recycled and recyclable.

The company has a programme of residues, ensuring that all packaging, palletising and office residues are segregated and managed in an ecologically sustainable manner.

## Sustainable drainage systems (SuDS)

Sustainable Drainage Systems (SuDS) aim to control surface rainfall run-off by controlling the rate and volume of runoff from your site, relieving pressure on sewerage systems and mimicking natural drainage as closely as possible. Used effectively, SuDS can help developers deliver greener housing infrastructure.

We have unrivalled experience in designing, creating and advising on fully-integrated and sustainable surface water management systems. Whatever your requirements, we can help you deliver an effective solution and support you with best practice, relevant information and dedicated resources on an ongoing basis.

ACO believes that the best SuDS will be cost effective to operate and provide efficient drainage throughout their life. Rather than being inherently ‘soft’ or ‘hard’, they will instead include an optimized and integral mix of ‘soft’ and ‘hard’ components that will combine to bring out the best in each other.

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## askACO

For further guidance and technical advice, contact our in-house technical design team who will be pleased to help you with the specification and design of your blue roof.

Telephone **01462 810431** or visit **[www.aco.co.uk](http://www.aco.co.uk)**



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- ACO Water Management  
Civils + Infrastructure  
Building + Landscape
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  - ACO Access
  - ACO Sport
  - ACO Wildlife
- 

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the future of drainage**

