BAUDER
making roofs secure.

Blue Roof Systems

Flat roof and podium level SuDS solutions

Blue roof finishes can comprise a variety of vegetation for green roofs, hard landscaping, and even incorporate a biosolar PV array.

Bauder is a leading European manufacturer of flat roof waterproofing membranes and insulation to make buildings watertight and thermally efficient; photovoltaic systems for renewable energy generation; green roofs to support the environment and create better living and working spaces for people; and blue roofs for stormwater attenuation and prevention of localised flooding.

Customers choose us because of the way in which we do business, for our robust advice on the right system, and our approach to delivering projects. We work alongside clients to deliver the best solution for a building from our broad portfolio of systems.

Blue Roofs

Rooftop sustainable urban drainage solutions (SuDS)

Designed to attenuate and slow the discharge of stormwater on a flat roof for up to a 48 hour period via a restrictive flow outlet to help prevent localised flooding.

A BauderBLUE roof controls rainwater where it lands, one of the core pillars of SuDS design.

The blue roof outlet restricts the discharge of stormwater to a calculated and defined flow rate to significantly slow down the volume of water leaving the site. As the storm passes, water continues to discharge from the roof at a controlled rate over a set period (typically up to 48 hrs).

This rooftop SuDS design has weight load implications and the project's structural engineer will need to be engaged at an early stage.

Specifying a blue roof

A BauderBLUE roof system can be constructed at either rooftop or podium level with a variety of landscape finishes including green roofs, biosolar PV array, or hard landscaping.

Usually required to meet planning when restrictions have been placed on the construction to limit the flow rate of rainwater leaving a site via the drainage system.

Outline of our BauderBLUE solutions

- Three different systems with stormwater flow restrictor outlet.
- Our specification service will confirm suitability of waterproofing system for each roof area.
- Warm, cold, and inverted roof design options.
- Single point guarantee to comply with client's insurance company requirement.

Achieving technical objectives

- Bespoke, project specific discharge rates to match drainage requirements for the site.
- Precise volume and weight of water storage with overflow to ensure the maximum water level (H-Max) is never exceeded.
- Design support to meet relevant British Standards and blue roof guidance criteria.

BauderBLUE ST adjustable blue roof outlet flow restrictor

BauderBLUE Roof Systems

Three methods for creating a blue roof with our solutions

There are different systems available to the construction designer to achieve a blue roof depending on the finish desired and the volume of water to be attenuated.

BauderBLUE STORMsub System

This hybrid system utilises the water storage capacity of a green roof build up. The additional SUB-RE UK substrate layer and RE 40 drainage and attenuation board act with the flow restrictor to carefully control the water discharge off the roof. The STORMsub system reduces the plastic content of the blue roof compared to a 100mm STORMcell system to enhance the environmental focus of the solution.

Finish options:

- Extensive and biodiverse vegetation

BauderBLUE STORMcell System

This high-volume system creates a void space between the waterproofing and the surface finish. The void is created by the BauderGREEN RWR 100 and enables water movement to the flow restrictor outlet. The STORMcell system gives the greatest capacity for water storage, three layers of RWR 100 will hold up to 285 litres/m^2.

Finish options:

- Extensive, biodiverse, and semi-intensive green roofs
- BauderSOLAR G LIGHT • Paving • Stone ballast

BauderBLUE STORMvoid System

This simple system creates a void space with Bauder pedestals and hard landscaping finish to an exact finish height to allow water movement to the flow restrictor outlet. Utilising Bauder pedestals ensures the entire system is covered by our guarantee.

Finish options:

- Paving • Metal decking

Plus points

- Our specification service will confirm suitability of the Bauder waterproofing system and type of blue roof for each roof area.
- We provide technical calculations for the required discharge rate of the blue roof and its geographical location.

Blue Roof Construction

Warm, inverted, or cold roof design to zero falls according to BS 6229:2018

Overview of the fundamental elements required for a blue roof that will generally be constructed with a concrete deck. Your area technical manager will assist in the highly developed points of design and construction.

Deck construction

The roof deck has to be built with zero falls (no back falls) to ensure the required water holding capacity is met and the blue roof is effective. When the construction is complete, a deck deflection survey will confirm the accuracy of construction, any back falls can then be corrected to ensure compliance to BS 6229:2018.

Waterproofing the building

An early and critical consideration for a blue roof is the waterproofing. There are two systems in our portfolio, reinforced bitumen membrane waterproofing and hot melt structural waterproofing that deliver the robust performance required. See page 12 for more information.

Warm roof construction

Insulation is between the layers of the waterproofing and the compressive strength of the insulation must exceed the maximum expected imposed loads for the blue roof, including the water within the blue roof components. Warm roofs normally allow for a shallower roof build-up.

Insulate with:

• BauderPIR • BauderROCK • BauderGLAS

Inverted roof construction

Insulation is above the waterproofing and will be subject to the force of buoyancy which causes floatation. The weight of the surface finish must exceed the force of buoyancy. Accurate calculation for thermal performance is not possible due to rainwater cooling around the insulation.

Inverted blue roofs are often preferred when a podium will be used as a site work space during construction.

Insulate with:

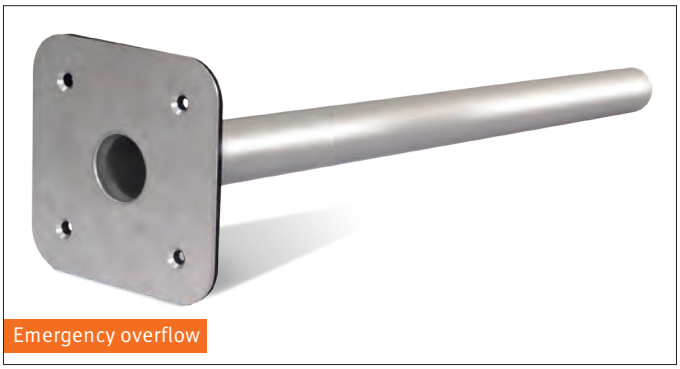
• BauderJFRI • BauderXPS

Cold roof construction

The thermal effectiveness of the construction will have been included, where necessary, within the building rather than included in the blue roof solution.

Emergency overflow

An emergency overflow that is unconnected to the blue roof outlet will discharge the water should the maximum height of the blue roof design be exceeded.



Emergency overflow

Roof penetrations

The blue roof design must minimise or eliminate penetrations in the area where water is to be attenuated, other than the rainwater outlets or emergency overflows that are required for drainage functionality.

BauderBLUE STORMsub System

Creating a blue roof within a green roof where the substrate and water retention board attenuate stormwater

Extensive or biodiverse vegetation finishes can be coupled with a biosolar PV array for maximum environmental advantage.

Green roofs naturally, as part of their multi-layer design function, soak up water for the plants to use, retain it, and delay its run-off. Typically, a green roof will reduce annual run-off by 40-60% per annum*. However, simply using a green roof to attenuate water run-off has a major disadvantage, once saturated there is no control on the rate of water discharge so on its own it cannot be used to achieve a particular discharge rate.

The BauderBLUE STORMsub system utilises our BauderGREEN RE 40 drainage and attenuation board and BauderGREEN SUB-RE UK adapted lightweight substrate as the specific water attenuation components; all other components in the green roof are specified as normal to support the vegetation and safeguard the waterproofing.

Plus points

- Greater depth of substrate improves the vegetation cover and drought tolerance of the plants.
- Reduces the volume of plastics in the blue roof (84% reduction) compared to our STORMcell system with 100mm depth of BauderGREEN RWR 100.
- Suitable to use with our biosolar PV system.
- Can be used with Bauder's full range of vegetation options to suit visual preference or Biodiversity Action Plan.
- Comprehensive range of guarantee packages to fulfil cover requirements for the project (dependant on system/product selection). For more information contact our technical dept for a sample guarantee outlining cover level, terms and conditions.

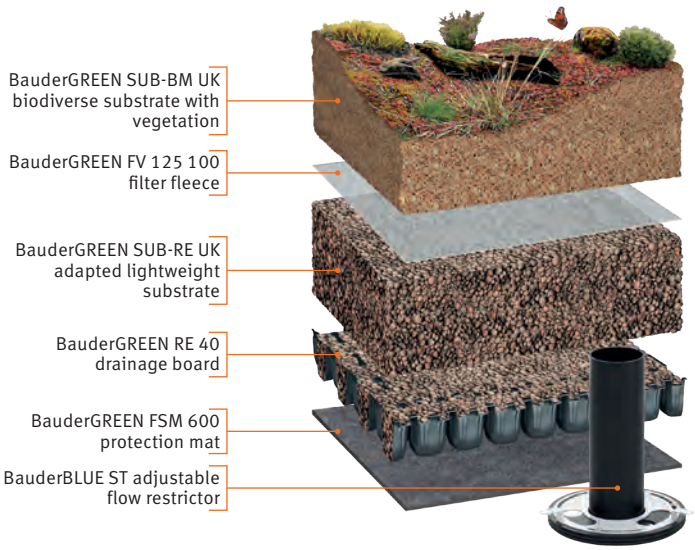
Roof finish options

- Extensive green roofs.
- BauderGREEN XF 301.
- BauderGREEN Flora 3 biosolar and shade tolerant seed mix.
- Intensive green roof.
- Pebble ballast.

*(Source: Green roofs as a tool for solving the rainwater run-off problem in the urbanised 21st century? Mentens, J.; Raes, D.; Hermy, M. Revised 2005)

Biodiverse wildflower finish

BauderGREEN RE40

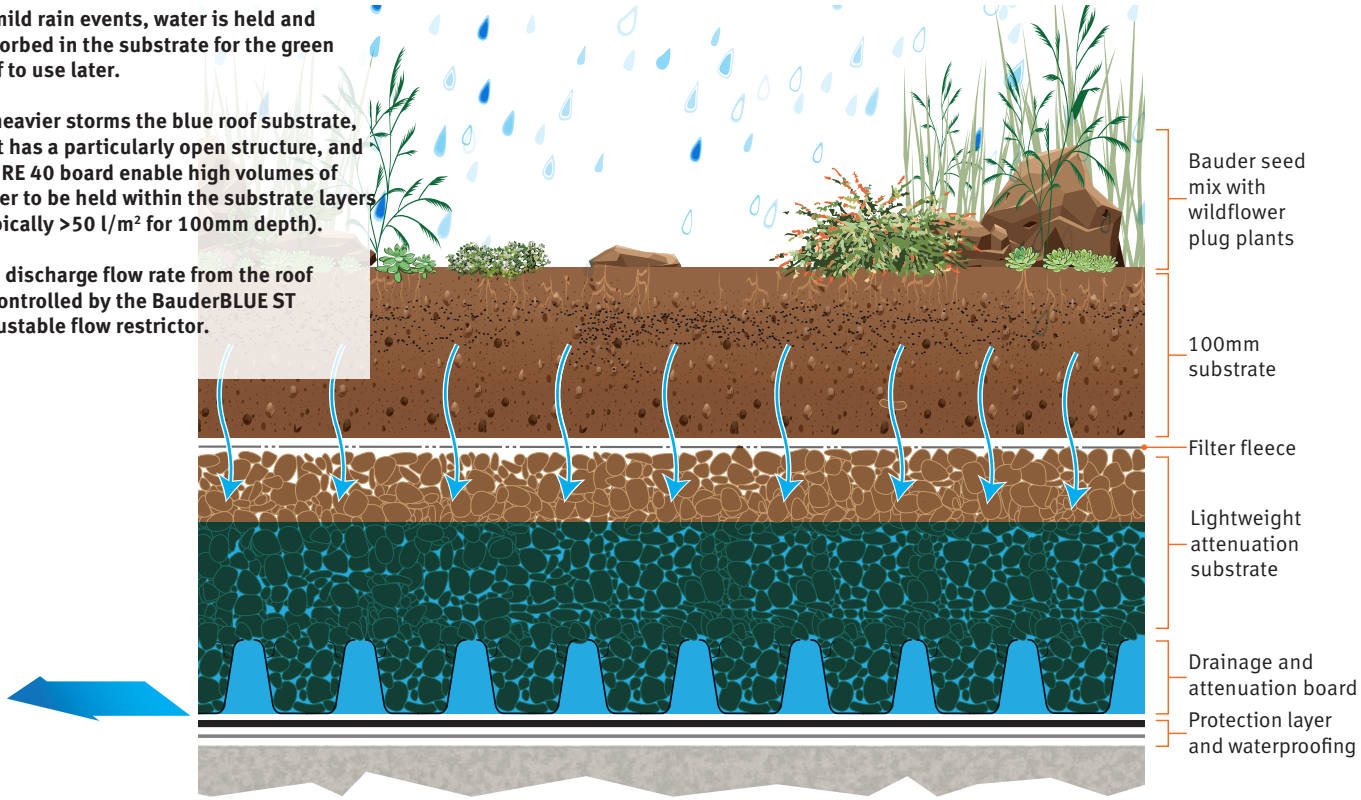


BauderBLUE STORMsub System

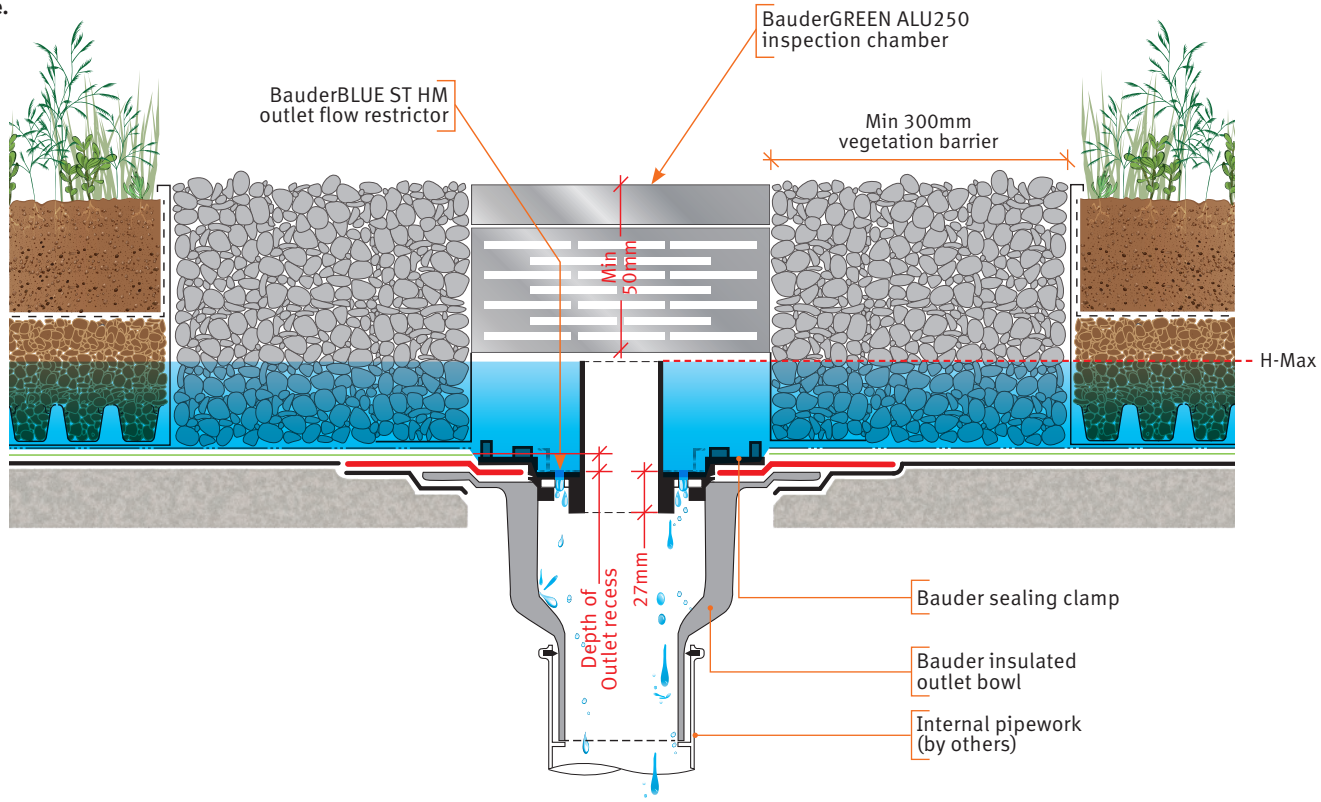
In mild rain events, water is held and absorbed in the substrate for the green roof to use later.

In heavier storms the blue roof substrate, that has a particularly open structure, and the RE 40 board enable high volumes of water to be held within the substrate layers (typically >50 l/m² for 100mm depth).

The discharge flow rate from the roof is controlled by the BauderBLUE ST adjustable flow restrictor.



Both illustrations show Bauder biodiverse green roof. All types of green roof finish are suitable.



BauderBLUE STORMcell System

Creating a blue roof beneath a green roof finish for high volumes of stormwater attenuation

The surface finish freely drains into the attenuating cavity forming layers that allow free-flowing movement of water to the flow restrictor outlets.

This solution is designed to hold high volumes of stormwater during severe rain events and reduce the flow rate from the roof to acceptable levels for the drainage system.

The BauderGREEN RWR 100 creates the void space beneath the roof finish and can be used in a multi-layer solution for increased levels of water attenuation. The product is >95% void and achieves compressive strength ≥400kN/m² for use under green roofs, roof mounted equipment, and hard landscaping surfaces.

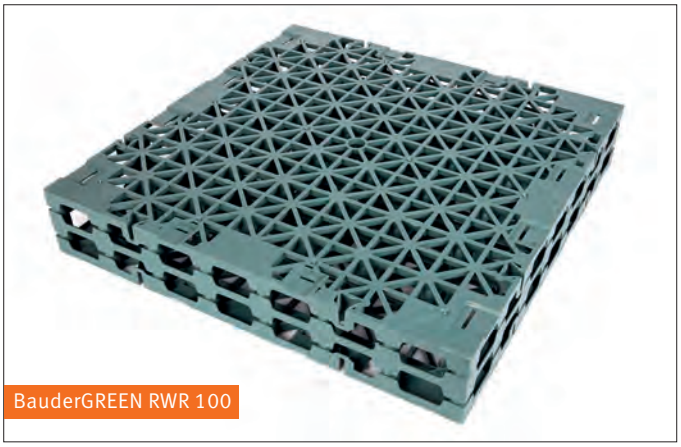
Plus points

- Accommodates high volumes of water.
- Suitable as a base to build soft and hard landscaping including planters and paving details.
- BauderGREEN RWR 100 made from recycled plastic.
- High levels of compressive strength, suitable to mount plant equipment.
- Ideal as part of a comprehensive BREEAM solution.
- Specify with our BauderSOLAR G LIGHT biosolar PV array.
- Comprehensive range of guarantee packages to fulfil cover requirements for the project (dependant on system/product selection). For more information contact our technical dept for a sample guarantee outlining cover level, terms and conditions.

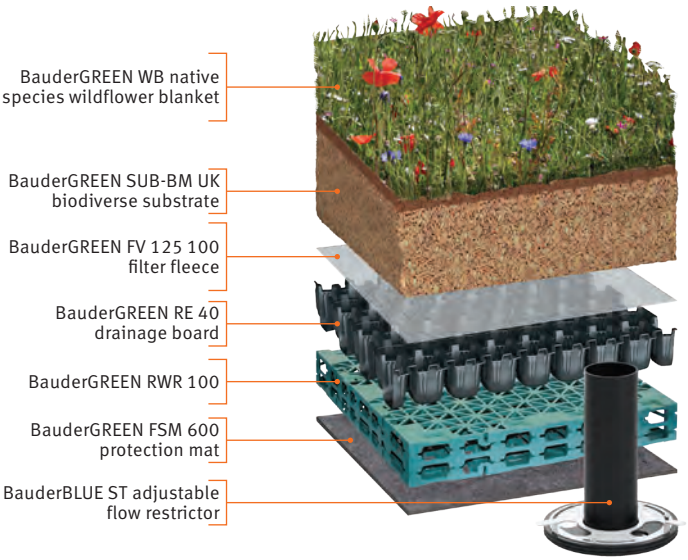
Roof finish options

- Extensive green roofs.
- BauderGREEN WB native species wildflower blanket.
- BauderGREEN Plugs.
- BauderGREEN Flora 3 biosolar and shade tolerant seed mix.
- Intensive green roof.
- Pebble ballast.

Biosolar PV with wildflower finish



BauderGREEN RWR 100



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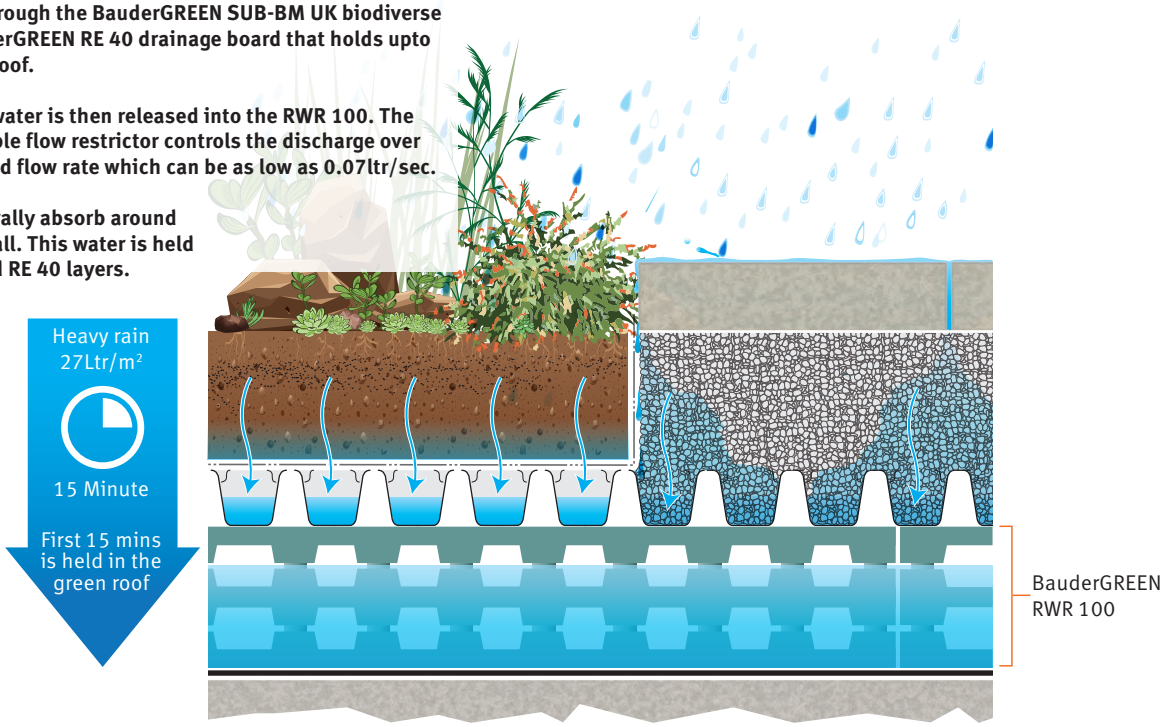
BauderBLUE STORMcell System

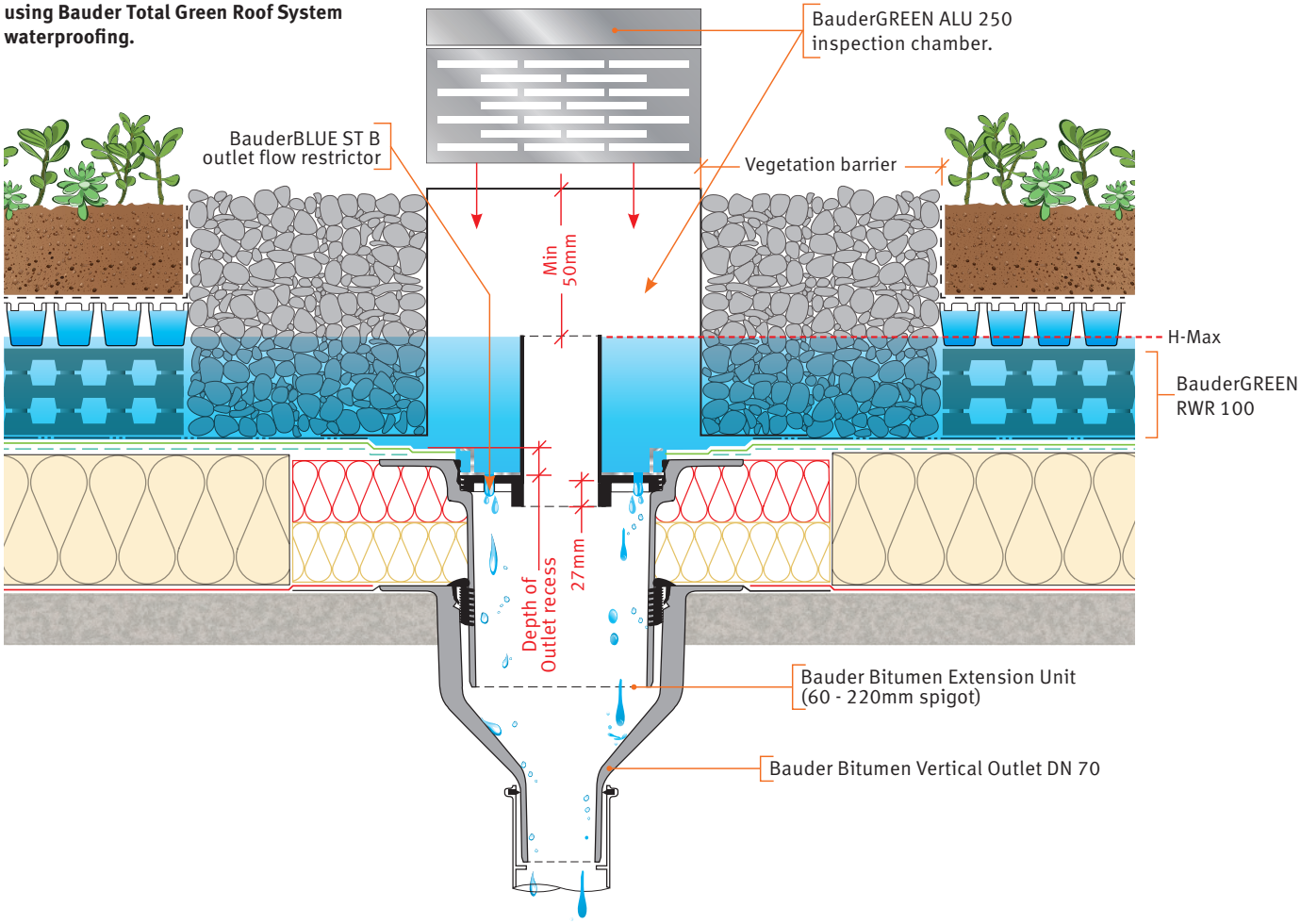
Rainwater perculates through the BauderGREEN SUB-BM UK biodiverse substrate into the BauderGREEN RE 40 drainage board that holds upto 13.5 l/m² for the green roof.

During a storm, excess water is then released into the RWR 100. The BauderBLUE ST adjustable flow restrictor controls the discharge over <48 hours at the required flow rate which can be as low as 0.07ltr/sec.

The green roof will naturally absorb around 50% of the annual rainfall. This water is held within the substrate and RE 40 layers.



Illustrated here as a warm roof construction using Bauder Total Green Roof System waterproofing.



BauderBLUE STORMvoid System

Simplest blue roof solution beneath hard landscaping on a pedestal support system

Courtyard podiums or terraces are ideal locations for this blue roof solution with a completely paved finish above the void space created by the pedestal system.

This blue roof solution incorporates open-jointed paving on a Bauder pedestal support system that covers the height of the H-Max. The weight loading of the paving must exceed any buoyancy forces that will be exerted on the pedestals. The STORMvoid system is likely to require additional ballast to prevent floatation if used on inverted blue roofs.

The Bauder pedestal range is used in the STORMvoid system with hard landscaping. Selection will depend on the performance required.
Options include:

Bauder Adjustable Pedestal System
Simple, high strength, low-cost pedestal units that achieve depths from 18mm to 955mm. The pedestals feature a 197mm diameter base to negate the need for additional load spreader.

Bauder Non-Combustible Pedestal System
An all metal, non-combustible pedestal with a 170mm diameter base plate to spread load across the roof surface. The pedestal system can achieve a variety of heights from 42mm to 282mm.

Plus points

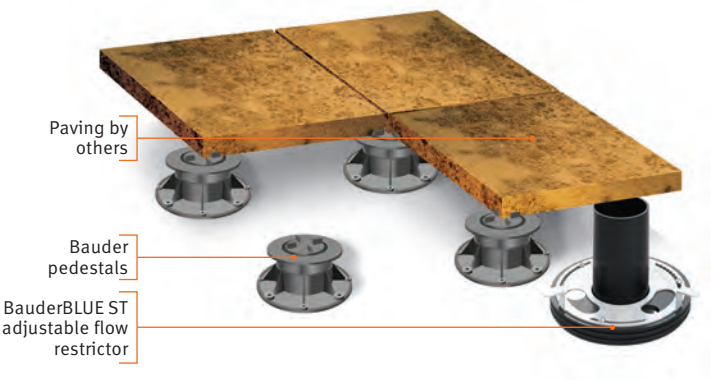
- Accommodates high volumes of water.
- Hard landscape finish.
- Often an ideal finish for simple roof areas.
- Ideal as part of a comprehensive BREEAM solution.
- Comprehensive range of guarantee packages to fulfil cover requirements for the project (dependant on system/product selection). For more information contact our technical dept for a sample guarantee outlining cover level, terms and conditions.

Roof finish options

- Paving.
- Metal decking.

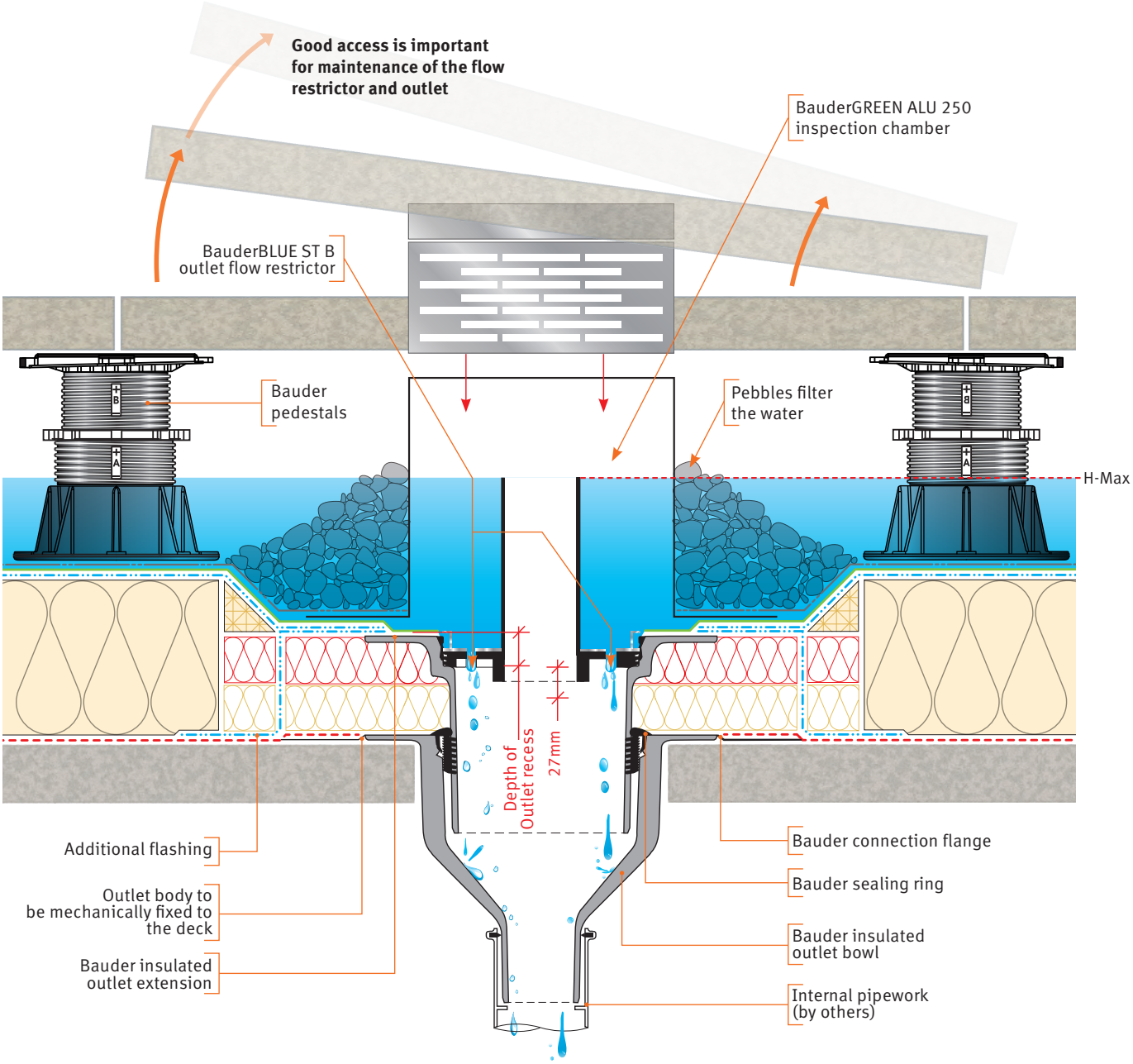

Permeable paving on pedestals finish


Bauder pedestals



BauderBLUE STORMvoid System

The STORMvoid system uses the Bauder range of pedestals to form the blue roof void. Rainwater landing on the decking or paving drains through the open joints between them into the void below. Here the water is held via the BauderBLUE ST adjustable blue roof flow restrictor and discharged at the required rate for the roof. The system is ideal for simple hard landscaped blue roofs.



The discharge flow rate is controlled by the adjustable flow Restrictor. The pebble margin filters the rainwater to prevent debris being washed into the restrictor.

Sumping of the outlet increases efficiency of the flow restrictor.

Waterproofing a Blue Roof

Ensuring the construction remains watertight throughout the service life of the structure

It is critical to ensure the waterproofing system is able to meet the demands placed on it by the blue roof. Additionally, the design should minimise the risk of water ingress by eliminating penetrations within the blue roof areas.

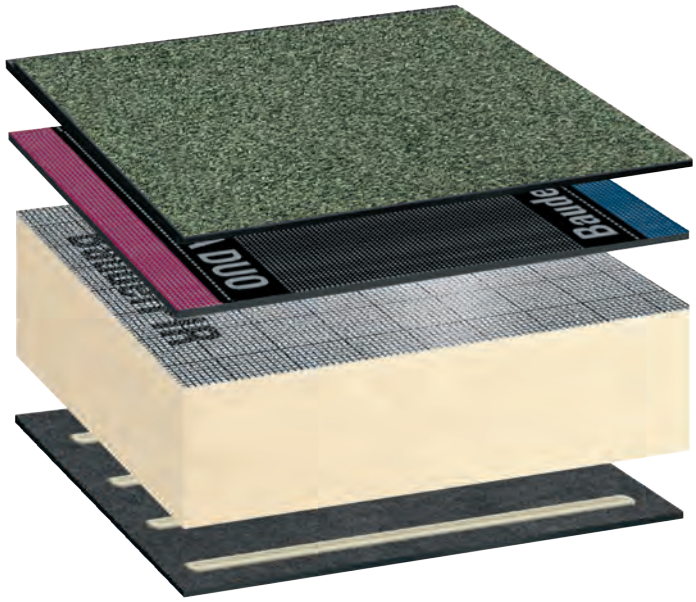
Reinforced bitumen membrane systems for warm roof construction

Our reinforced bitumen membrane systems are used when a warm roof needs to be constructed on the building.

BTRS PLUS and BTRS are suitable for STORMcell and STORMvoid hard landscaping. For green roof systems over STORMcell or STORMsub system BTGRS PLUS and BTGRS are used with their root resistant cap sheets.

In a warm roof all penetrations are isolated. This is achieved by forming a secondary seal between the vapour control layer and the underlay or the underside of the waterproofing, set 250mm back from the penetration.

See our Reinforced Bitumen Membrane brochure for more details on these systems.



Reinforced bitumen membrane systems for warm roof construction

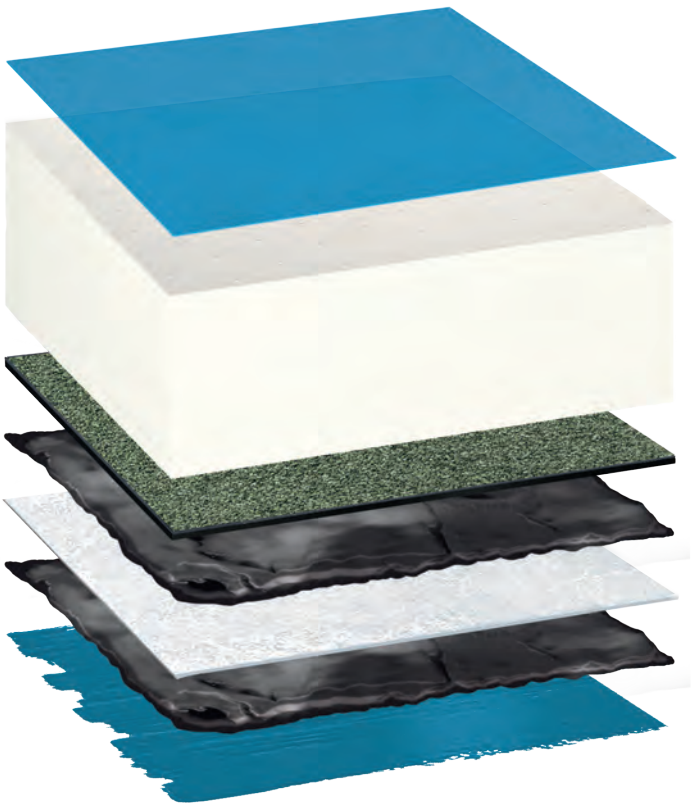
Hot melt structural waterproofing system for inverted roof construction

A seamless monolithic liquid waterproofing that is hot applied to the deck. The durability of this system matches the expected service life of the structure, as stated in BBA certificate 06/4350. Also specified as a cold roof construction.

See our Hot Melt Structural Waterproofing brochure for further information.

Incorporating a green roof

A root resistant membrane is specified to prevent plant roots and rhizomes damaging the waterproofing.



Hot melt waterproofing for inverted roof construction

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Technical Support Service for Blue Roof Projects

Supporting you in the design of a blue roof to meet the needs of the building and its construction

Our technical managers are based nationwide and play a vital role in the success of every blue roof project from initial concept through to installation and sign-off of the Bauder solution.

We assist you with the design of the detailing, writing the specification for the blue roof solution, and recommend suitable approved contractors to tender for the project. Our service is without charge, and we work with you to ensure your roof specification meets all your needs.

Working with you to understand

- Building type and usage.
- Drivers for the blue roof.
- The SuDS requirements for blue roof, i.e. target flow rates.
- Zero falls necessity.
- Requirements for waterproofing system design life.
- Opportunity for adding a green roof or biosolar PV array to meet sustainability targets.
- Budget.
- Insulation responsibility to meet building regulations and negate risk of floatation for inverted roofs.
- Guarantee requirements.

Our service to you delivers

- Flow rate calculations for roof, site, and geographical location to meet planning obligations.
- Drainage calculations for the overflow requirements.
- Calculation for the total imposed load of the waterproofing and blue roof system and volume of water held in a 1:100 yr storm.
- Recommended waterproofing system for the structure.
- Wind load and restraint calculations for buoyancy forces on inverted insulation and roof finish.
- Full design service for green roof and biosolar PV with yield analysis.
- NBS Chorus, comprehensive Bauder detailed specification.
- Roof detail drawings.
- Comprehensive range of guarantee packages to suit project and cover requirements.
- Recommended approved contractors.

Project Study

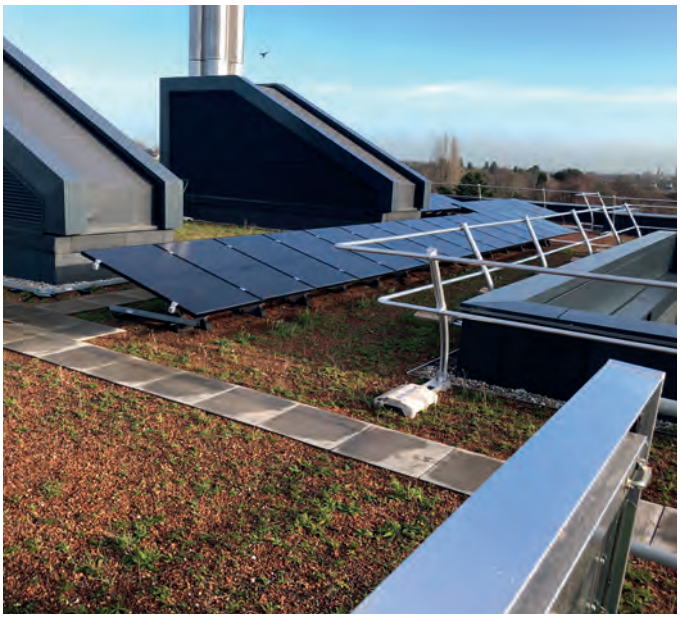
Department of Engineering, Cambridge University

BauderBLUE STORMcell System with BauderSOLAR G LIGHT.

Synposis

A new build construction with sustainability as a key driver in the design with the solution to be delivered by a single source supplier that could provide a guarantee for products and workmanship for the waterproofing, blue roof, extensive green roof, and biosolar PV array.

The roof deck was constructed using large span pretensioned concrete plank with consequential restricted dead load weight to the roof. Considerate specification of the blue roof with green landscaping and biosolar PV array was essential to ensure weight loads were heeded and followed the defined calculations. Additionally, the pretensioned deck did not provide a completely flat finish. When installing a blue roof, a flat deck with no falls is essential, as detailed in BS 6229:2018. To overcome this onsite challenge, the final deflection of the fully loaded roof was calculated and the concrete deck was screeded to give zero falls.



Highlights

- Warm roof solution with sustainability central to the design incorporating blue roof, green roof, and biosolar PV array.
- Concrete deck screeded to ensure zero falls to meet BS 6229:2018.
- Designed flow rate less than 0.7 litres/second.

System summary

Blue Roof	BauderBLUE STORMcell
Waterproofing	Bauder Total Green Roof System
Green Roof	Bauder extensive wildflower with Bauder Flora 3 seed mix
PV Array	BauderSOLAR G LIGHT

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Department of Engineering, Cambridge University

BUILDING BOARD	
Roof Size:	1,610m²
PV Scheme:	40 modules; 9.91MWh
Specifier:	RH Partnership Architects
Approved Contractor:	Voland Roofing
Main Contractor:	SDC Limited
PV Installer:	Voland Limited

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making roofs secure.

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Respecting the planet

Reducing use of materials

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