BAUDER

TECHNICAL DESIGN GUIDE

FLAT ROOF SOLUTIONS

This flat roof technical design guide was first published in 2009 and since then over 20,000 copies have been distributed and used by professionals working on the design and construction of modern buildings as well as those involved with the refurbishment of current buildings.

This 15th edition features the new inclusion of blue roofs as well as additional technical information on waterproofing flat roofs all backed up by supportive photography, illustrations and advice.

"We realise that a flat roof is a long-term investment for our clients and with this design guide and the expert advice from my colleagues at Bauder we believe we can offer you that additional security you need. Selecting the right waterproofing and insulation with the appropriate accessories, and even incorporating a blue roof, green roof or solar PV – or all three – is that bit easier with this design guide which has been created to help the specifier with the selection, design and specification process."

Jan Bauder,
Joint Managing Director
Bauder Group

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This technical design guide has been carbon captured through the Woodland Trust's Woodland Carbon scheme, creating 40.12m² of new native woodland in the UK. Capturing carbon dioxide for continual benefit to the environment and creating new habitats for wildlife and biodiversity.

A family business in the fourth generation

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Introducing Bauder

It's been more than 160 years since the first roof related products were created in our company.

Today, Bauder stands for high-quality, top performance roofs that are durable, cost-effective, and sustainable.

OUR COMPANY

A family business in the fourth generation

Bauder is one of Europe's leading manufactorers and suppliers of modern waterproofing thermal insulation green and blue roofs and photovoltaic systems for the roof.

Customers choose us because of the way in which we do business, the way we treat every project individually and how we work alongside clients to deliver the best solution for a building.

Our People

A successful project requires teamwork, and our people give a unified approach to delivering a flat roof project.

We maintain high standards throughout the business by offering a high level of commitment to our employees ensuring they are valued, supported, rewarded, empowered to be accountable and take full ownership for their areas of responsibility. This in turn results in a motivated, team-driven culture, encouraging initiative and job satisfaction. It is the strong people focus which enables us to maintain a reputation that is second to none, and one which continues to drive us forward as a strong, high calibre market leader.

Our History and Future

Combining tradition and innovation has made our company what it is today. As an owner managed company for over 160 years, we are not under pressure to deliver maximised short-term profit, but continue to develop our business steadily and on a long-term basis.

Markets are continually changing, and so are the demands that our customers place on us. We see this as an opportunity for healthy growth. Recognising the individual requirements of the markets and developing tailor-made, innovative solutions is our strength.

Plant safety and environmental responsibility

For Bauder, plant safety and environmental responsibility mean that the production facilities and processes are designed to be safe so that protection for people and the environment is ensured at all times. Constantly optimizing the safety of our processes and facilities, as well as the careful use of natural resources and raw materials and the improvement of energy efficiency are part of our environmental and energy management system. Caring for our environment, our employees and our neighbourhood is part of our corporate culture and is part of our long-term company success.

Sustainability is one of our most important corporate goals.

IT'S ALL ABOUT THE ROOF

The right solution for every flat roof project

Our focus is centred on providing a waterproofing system for a flat roof which can combine, where needed by the client or project, with our additional systems for a green roof, blue roof or photovoltaic array.

Our Portfolio

We offer a single-source for comprehensive services as well as a wide range of waterproofing solutions, materials and accessories; insulation for thermal performance; components for a green roof and its vegetated finish; a blue roof for SuDS and solar PV for rooftop energy generation.

The roofs we deliver are designed to meet the needs and budgets of new build construction or refurbishment works on a current building; and our rounded approach gives, specifiers, designers, planners, main contractors and clients the peace of mind that they are making the right decisions for the roof.

Our Approach

Our professional gives you the best possible technical support for each and every project.

Our expert technical managers advise on the right solution and specification for the project and can also deliver bespoke CPD seminars helping clients enhance their knowledge of designing flat roofs and when to specify the different systems. Our technical department draws together all the documents and drawings required for tender before the project goes to site.

Project Delivery

You can be assured that whatever work is performed on your building's roof it will be of the highest quality, as we only allow fully trained Bauder approved contractors to install our roofing systems. Our dedicated team of site technicians monitor the installation as it progresses and confirm when the roof is satisfactorily complete before the guarantee is released.

Guaranteed to Perform

Our comprehensive range of guarantees give total reassurance for the performance of your Bauder roof.

Unlike others in the market, our choice of guarantees map to the building's and client's requirements to give complete satisfaction and can cover design, products and workmanship and are not reliant on the size of the roof.

TECHNICAL SUPPORT

Expert advice for all your projects

At Bauder we pride ourselves on being much more than just a manufacturer and supplier. Our single point service ensures your roof design is cohesive to reduce risk for specifiers and building owners.

Our technical managers play a vital role in the success of every project. Your dedicated technical manager will work closely with you to develop the most appropriate, budget aware and practical solution for your project. They will work alongside our highly experienced technical department to provide a bespoke specification package tailor made to your individual project. The technical manager will remain involved with your project from initial design through to completion of roofing works on site, providing you with a dedicated single point of contact.

Technical Roof Design from a Single Source

Flat roofs can be perceived as simplistic in both their visual appearance and design, however there is a precision to the detailing that must be adhered to so that the solution remains watertight, endures and resists the elements, and stands the test of time.

Our technical department has been designing details for all our waterproofing systems with their own individual characteristics and technical requirements and are highly proficient at interpreting multifaceted designs or overcoming the complexity of a challenging roof.

U Value and Thermal Bridging

Our technical design team will determine the thickness of insulation required to meet current building regulations as well as ensure that the build-up thickness can be accommodated at rooftop level, that the imposed weight loading on the deck structure is acceptable, the compressive strength will meet requirements of the design, deliver the required fire resistance, satisfy the acoustic performance needed and be compatible with the other roofing components.

Thermal bridging, where heat transfers and is lost through the building fabric at vulnerable points, is minimised in our roofs at the design stage and we specify insulated accessories such as outlets and soil vent pipes within our roofs to further eradicate cold bridging.

Air Leakage

To counteract air leakage, our roofs are designed to minimise air permeability, and therefore heat loss, by ensuring the correct detailing and sealing of membranes.

Acoustic Performance

Our acoustically absorbent insulation will reduce noise pollution within the building by attenuating impact noises from rainfall radiating and reverberating through the building. Our technical team will work with you to achieve the performance levels required using our BauderROCK insulation, or a hybrid arrangement with the inclusion of PIR insulation to help reduce the height and weight of the completed roof construction.

Condensation Risk Analysis

The rising levels of insulation included in the roof design can often increase the risk of condensation within the building which can give rise to a range of problems from surface staining of internal finishes to long-term degradation of the structure.

Our roof designs include an assessment on condensation risk for the roof in accordance with BS5250, identification of the risk and design of the vapour control layer and waterproofing layers to eliminate any potential condensation problems from occurring in the construction of either a cold or warm roof design.

Wind Load Design

These calculations are of paramount importance within the design of a flat roof to ensure that the roof is appropriately secured to the building and able to withstand the anticipated levels of uplift to remain in place.

Our calculations are based on the Eurocode and UK National Annex methodology for both mechanically fixed and adhered bituminous and single ply systems and we use specialist software to provide the reports.

Drainage Calculations

Roof designs using our outlets come complete with drainage detailing for the building so that water will drain quickly and effectively to clear the roof's surface as rapidly as possible either via internal rainwater outlets and downpipes or via external guttering systems or hoppers.

On receipt of the designer's catchment area figures we can calculate the appropriate Bauder outlet type and number based on BSEN 12056.

Safe Access

All flat roofs will have a requirement for a certain amount of pedestrian access, whether this is for maintenance of the roof and any rooftop plant or as a fire escape route. It is therefore necessary to design any flat roof to allow for safe access and our technical team will create the waterproofing details to accommodate the desired edge protection, mansafe system, and non-fragile rooflights.

WATERPROOFING SYSTEMS FOR ALL FLAT ROOFS

Making roofs secure

We approach each flat roof project as unique; taking time to fully understand the needs of everyone involved, the building and intricacies of the project to be delivered.

Recommending the Right Waterproofing System

Once we comprehend the scope of the brief, we match without bias, the criteria against our wide-ranging portfolio of flat roof waterproofing systems. These include reinforced bitumen membrane, single ply, hot melt, cold liquid applied, and the correct insulation for a warm or inverted roof construction. Additionally, we can also work with you on the design of a green roof, blue roof and solar PV or a combination of these. This means we can recommend the right solution for every project, whether new build or refurbishment.

Waterproofing Roof Designs

Our design service for waterproofing systems really does take in to account which of the systems will best suit the needs of the building and the client. Our technical managers understand all the waterproofing types in our portfolio of systems which ensures they don't have to impose a particular solution on a building.

Detailing

Our waterproofing designs include CAD drawings of all the rooftop details, and follow the latest recommendations by the Single Ply Roofing Association (SPRA), the Liquid Roofing and Waterproofing Association (LRWA) and the National Federation of Roofing Contractors (NFRC).

Torch-Free Detailing

For all Bauder bituminous membrane waterproofing and hot melt systems, we follow the NFRC 'Safe2Torch' Guidance 2017 where combustible construction materials are identified and the specification accounts for them with self adhered membranes, explicit hot-air welding installation techniques, and exclusion zones for the use of a gas torch.

LET'S GET IT RIGHT

KEY UNDERSTANDINGS FOR THE CORRECT WATERPROOFING TYPE ARE:

- Building use.
- Length of service life expected of the waterproofing.
- Guarantee requirements.
- Levels of rooftop sited plant and equipment.
- Designed penetrations on the roof.
- Access requirements for maintenance etc.
- Structure of the deck and ability to create roof falls.
- Insulation needs and roof construction type.
- Installation stipulations.
- Acceptable weight loading.
- Geographical location and wind load.
- Fire requirements.

YOUR ROOF SOLUTION

OUR SERVICE TO YOU DELIVERS

- Recommended waterproofing specification.
- Illustrated layered build up of the system.
- BIM objects NBS specification or Bauder specification.
- FM approval for many Single Ply Systems BBA Certification.
- Environmental Product Declarations.
- CAD drawings of the roof details, including torch-free for bituminous systems with exclusion zones.
- Type of insulation to satisfy warm or inverted roof construction, Bauder PIR, BauderROCK or BauderJFRI.
- U-Value the insulation scheme will achieve.
- Thermal bridging resolution.
- Weight loading of the scheme.
- Roof survey for refurbishment projects with detailed roof plan and marked with Torch-free zones where identified.
- List of approved contractors for tendering process.

NEW BUILD PROJECT SERVICE

Supporting you in the design of a new roof

For new build projects, any of our range of waterproofing systems can be used, with some systems lending themselves to a particular project depending on the design durability, cost and life expectancy to create a successful roof system for your building.

We work on a one-to-one basis to ensure that the roof specification we generate for you meets the needs of the building and all project stakeholders.

LET'S WORK TOGETHER

WE WORK WITH YOU TO UNDERSTAND AND IDENTIFY

- Building type and usage.
- Drivers for construction and any planning constraints.
- Requirements for adding a green roof, blue roof or solar PV array.
- Building's design life.
- Useable roof space.
- Budget.
- Waterproofing system requirements.
- Funding opportunities available.
- Sustainability targets.
- Guarantee requirements.

YOUR ROOF SOLUTION

OUR SERVICE TO YOU DELIVERS

- Recommended waterproofing system for the building.
- Full design service for green roof, blue roof or solar PV with yield analysis.
- BIM objects.
- Comprehensive detailed specification.
- Thermal analysis and condensation risk calculations.
- Falls and drainage design.
- Wind load and restraint calculations.
- Detail drawings on all roof penetrations, abutments and edge finishes.
- Roof plans.
- Tapered insulation scheme and layout, where required.
- Inclusion of insulated outlets and soil vent pipes to remove thermal bridging.
- Proposed rooflight structures and other rooftop accessories.
- Guarantee options.
- Recommended approved contractors.

Our Technical Managers

Our technical managers are based nationwide and play a vital role in the success of every new build project from conceptual stage through to hand-over and sign-off of the Bauder installation.

Our turnkey service supports you, is without charge and follows these six simple steps

Brief and Consultation
You give us your remit either at your office or on site. We will discuss the roofing project, your preferred system application, your budget and how the programme of works can be formulated.

Roof Element Proposal
Together we can determine which roofing system and specific build up will be optimal for each individual roof area on your new build project given the construction type, level of access and required performance.

Specification and Detail Design
You will receive the detailed specification package for your project, which answers your brief and meets the needs of the building. This will include detail drawings and all other relevant technical calculations.

Contractor Selection
The Bauder approved contractors best placed to deliver your new roof will competitively price and tender for your project. Our national network of contractors undergo a rigorous selection process and their installers are trained specifically in the application of our systems, so you are ensured an expert installation.

Installation of the Roofing Solution
Once the Bauder approved contractor has been appointed, a pre-contract meeting will make sure that the project delivery is well coordinated. The works are closely monitored by Bauder site technicians with regular inspections and reports to ensure quality and waterproof integrity of the roof.

Sign off and Guarantee
A full final inspection is completed on the works by our site technician team following stringent approval criteria before the guarantee is issued. Our guarantee packages can cover all elements of product, design and installation of the Bauder system.

REFURBISHMENT PROJECT SERVICE

Reinstating the integrity of a flat roof

We understand that surveying a flat roof to determine its condition can often be challenging, especially when you cannot detect the extent of the issues present through a visual assessment. We can help you by performing technical roof diagnostics that pinpoint the location and levels of moisture within a failing roof, and provide you with all the information and support you need to deliver your flat roof assessment and refurbishment solution.

Our Roof Evaluation Service

There are different options available for refurbishment; stripping up the failing system and replacing it, removing the damaged areas to partially strip the roof, or overlaying the existing system. All options have their benefits, and we can advise you as to which one is most suitable and cost-effective based on the results of your roof survey, which we carry out free of charge.

Our Refurbishment Technical Managers

The service you receive from us is a reflection of our years in the waterproofing manufacturing industry and the decades of working daily on roofs, understanding the issues, the challenges of water ingress and how they impact the building.

LET'S WORK TOGETHER

WE WORK WITH YOU TO UNDERSTAND AND IDENTIFY

- Building type and usage.
- Drivers for refurbishment, scope of roof failure and any planning constraints.
- Need for additional scientific roof diagnostics.
- Requirement for waterproofing system's design life.
- Opportunities for adding a green roof or solar PV array on the useable roof space.
- Budget.
- Waterproofing system requirements.
- Upgrading insulation to meet building regulations and Designer's requirements.
- Funding opportunities available for solar PV.
- Sustainability targets.
- Guarantee requirements.

YOUR ROOF SOLUTION

OUR SERVICE TO YOU DELIVERS

- Roof survey and plans.
- Condition of the existing roof covering and identification of water ingress.
- Recommended waterproofing system for the building.
- Full design service for green roof, blue roof or solar PV with yield analysis.
- Comprehensive detailed specification.
- Upgrade insulation solution.
- Tapered insulation scheme and layout, where required, for falls and drainage.
- Thermal analysis and condensation risk calculations.
- Wind load and restraint calculations.
- Detail drawings on all roof penetrations, abutments and edge finishes.
- Inclusion of insulated outlets and soil vent pipes to remove thermal bridging.
- Proposed rooflight structures and other rooftop accessories.
- Guarantee options.
- Recommended approved contractors.

Our turnkey service supports you, is without charge and follows these six simple steps

Brief and Consultation
You give us your remit either at your office or on site. We will discuss the roofing project and any historical problems with water ingress, the preferred system application, your budget and how the programme of works can be formulated.

Roof Survey
We will perform an honest and detailed appraisal of all roof areas to assess the current roof covering, insulation type, deck construction and design considerations. Additional technical roof diagnostics can further locate specific areas of water ingress.

Report, Design and Specification Service
You will receive the detailed survey condition report and the specification package for your project, which answers your brief and meets the needs of the building. Together we can then determine which solution best matches your requirements.

Contractor Selection
The Bauder approved contractors best placed to deliver your new roof will competitively price and tender for your project. Our national network of contractors undergo a rigorous selection process and their installers are trained specifically in the application of our systems, so you are ensured an expert installation.

Installation of the Roofing Solution
Once the Bauder approved contractor has been appointed, a pre-contract meeting will make sure that the project delivery is well coordinated. The works are closely monitored by Bauder site technicians with regular inspections and reports to ensure quality and waterproof integrity of the roof.

Sign off and Guarantee
A full final inspection is completed on the works by our site technician team following stringent approval criteria before the guarantee is issued. Our guarantee can cover all elements of product, design and installation of the Bauder system.

FLAT ROOF SURVEY

Identifying areas of concern

To provide a technical specification proposal for any refurbishment project, you first need to establish the existing roof build up and its condition. Our technical managers will carry out an in-depth roof condition survey where they will assess the current status of the existing roof coverings, structural design and thermal performance.

Establishing the Build Up and Condition

Carrying out core sampling provides information on the material construction of the roof waterproofing, insulation incorporated and deck type whilst also providing evidence where water ingress may have occurred. Core samples are taken at strategic locations on the roof to increase the chance of establishing the exact build up, whether there is tapered insulation present, to find entrapped water in the system and to establish consistency of the build-up on the entire roof area. This usually includes multiple core samples.

Core Sample Analysis

Although water ingress usually accumulates at the low points on a flat roof, it can also be found on the other areas, for example, when an existing roof area is found to contain tapered insulation, then the falls that are visible on the surface of the waterproofing are different to the falls under the tapered boards. This can lead to water accumulation in unexpected locations. Our trained technical mangers will give guidance on this during the survey.

Photographic records of each core sample are taken and used within the finished report for visual evidence and clarification of the located.

The process for the sample taking is:

1. The locations to be sampled are identified. Samples will be taken at high and low points of the roof area.
2. Each core sample is taken by removing an area of the waterproofing, typically 10x10cm to reveal the layers of the build-up down to the deck.
3. Roof layers are recorded for the report and the deck type noted, along other noticeable conditions.
4. The presence of any water within the roof layers is detailed and photographed, and the moisture levels within the insulation measured with a moisture meter.
5. Once the build-up has been photographed and recorded the materials are repositioned and covered with a self-adhesive, liquid applied or heat applied patch to fully seal the trial space.

ROOF SURVEY REPORT

Once all of the information from our roof survey has been collated, our technical managers produce a bespoke survey report. The depth of information in the report can vary based on the client's requirements and nature of what the report is to be used for.

All reports will confirm the findings from the core samples taken and the condition of the roof build-up at the point that the sample was taken. The content of the survey report would then normally encompass:

- The deck
- Existing waterproofing
- Falls
- Drainage
- Upstands and details
- Rooflights
- Plant
- Associated works

The survey report would then conclude with a roofing system proposal based on the client's requirements and to conform to current regulations. A budget price for the proposed roofing works can also be included, together with health and safety information.

Should the report be required in a specific format or for an explicit reason i.e. funding, then we will strive to accommodate the content and the format. A typical example of this is for academy school funding bids where the format and the volume of content is regulated.

Our survey reports and specification proposals are also supported by technical calculations, which include U value and condensation risk analysis, wind loading calculations, drainage calculations etc.

In addition to the invasive testing of the roof through core samples, we are also able to provide non-invasive testing of roofs utilising our Troxler moisture gauge and thermography - more in-depth information provided on the following page.

Energy Loss Assessment

Complementing the advanced surveying techniques Bauder can also provide information relating to energy loss though the existing roofing system and give calculated estimates of the energy gains when the insulation is upgraded or replaced with new Bauder insulation.

Using bespoke software, we can provide an estimate of the actual cost saving along with carbon reduction figures and a total energy percentage saving per year.

The software can also be used to estimate energy loss through saturated insulation due to long-term water ingress. When used in conjunction with our moisture mapping service this can be very useful to determine the pay back on the clients investment when upgrading or replacing insulation.

Additionally this software is also used to give cost benefits when the Bauder Solar Photovoltaic System is incorporated within the new proposal. This provides up front guidance on the payback period and expected gains from the new PV system and upgraded insulation.

Project Carbon Dashboard
The original 2000m² roof was uninsulated and only achieving a UValue of 2.8, using the energy loss software we can indicate that by upgrading the roof with an insulated solution to achieve a new UValue of 0.19 estimated annual savings can be gained, as shown on the dials.

ADVANCED SURVEY TECHNIQUES

Scientific roof diagnostics to pinpoint areas of entrapped water

Technical roof diagnostics reports enhance our flat roof survey by verifying the levels and locations of moisture within existing waterproofing systems.

The readings from the testing methods give objective information about the true condition of a roof, eliminating conflicting opinions and advice so that sound decisions can be made on the roofing options without conjecture.

The report identifies areas of dry and moisture impeded insulation so that the suitable recommendation can be made, ensuring that remedial work is only carried out on essential areas through partial or isolated removal of damaged roof areas rather than a full removal of the waterproofing system. The report also identifies if the waterproofing is sound enough to be overlaid entirely without damaging levels of water becoming trapped. This comprehensive analysis enables accurate costings to be put forward for budget certainty.

Advantages of a Supportive Technical Diagnostic Report.

- Decisions for roof repair are based on accurate, scientific information rather than assumptions and opinions.
- Precise roof areas are pinpointed for specific remedial action.
- Detailed scope of works ensures that remedial work is only carried out on essential areas.
- Saves money by eliminating unnecessary removal of existing waterproofing which, in turn, reduces waste and disposal of the existing roofing system that have the potential to be overlaid.
- Provides enhanced cost data at an early stage.

MOISTURE MAPPING

Measurements are generally performed in a two metre grid pattern that is plotted on a scaled drawing of the roof. Once readings at all grid points have been recorded software is used to plot and create a moisture map of the build up on the roof area.

Moisture mapping is suited for all roof structures, including those with multiple layers of insulation and previously overlaid waterproofing systems

Our diagnostic report plots precisely the roof's condition confirming the suitability of the existing build up to receive a waterproofing membrane overlay and identifying areas that need the insulation to be replaced beforehand.

Moisture Mapping Key Features

- Identifies moisture in multiple layers of insulation and waterproofing.
- Non-destructive testing of the whole roof.
- Suitable on all types of flat roofing.
- Very reliable and accurate results.
- Unaffected by temperature differential due to solar gain.
- Can be undertaken during hours of day light.

Outline Moisture Mapping Report

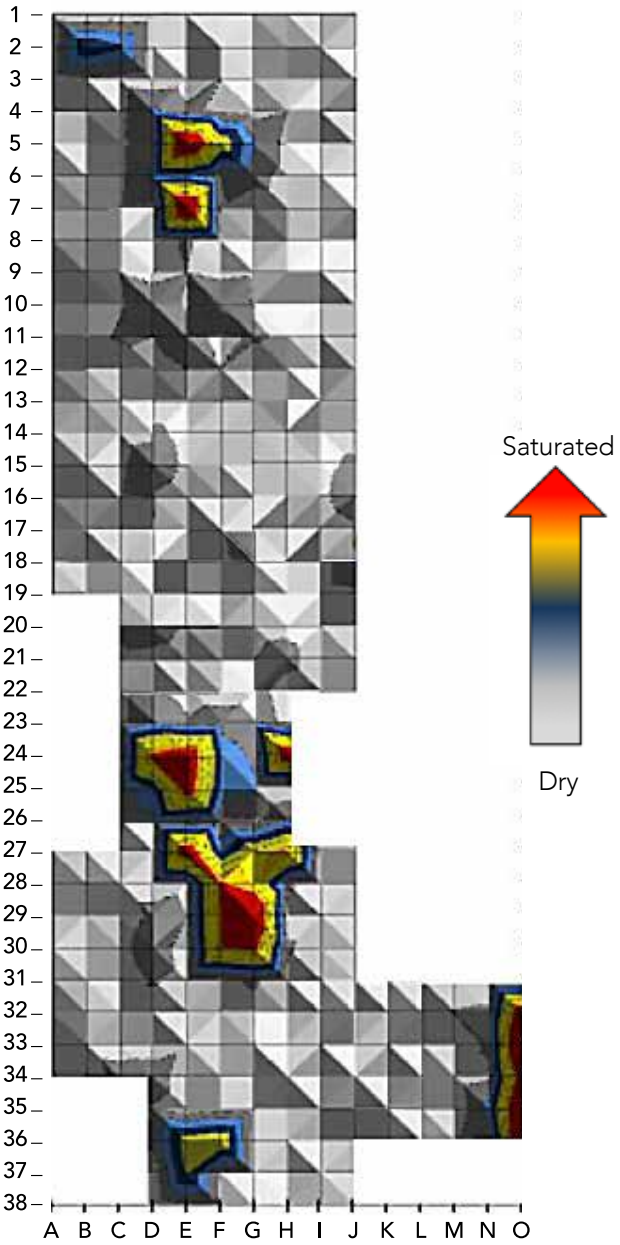
The moisture mapping survey on this project (histogram on facing page) comprised 561 gauge readings, with readings ranging from 20-72 recorded.

Four core samples were cut; the first at a low point on the roof at grid reference **e7** where a gauge reading of 125 was recorded and the waterproofing system was found to contain saturated 20mm thickness cork insulation with the underlying first layer of 12mm fibreboard insulation being wet and the lower layer of fibreboard insulation being dry.

The second core sample was cut at low point grid reference **g15** where a gauge reading 34 was recorded and the varying waterproofing system components were all found to be dry.

The third core sample was cut at high point grid reference **f27** where a gauge reading 48 was recorded and the waterproofing system was found to contain damp 140mm thickness cork insulation with a layer of standing water under the cork. Due to the volume of water we could not cut through the underlying waterproofing membranes and insulation layers.

The fourth core sample was cut at low-midpoint grid reference **d4** where a gauge reading 42 was recorded. The waterproofing system was found to contain damp 50mm thickness cork insulation with the underlying first layer of fibreboard being dry but in a powder format due to having previously been wet. The final layer of fibreboard insulation was found to be dry and in a good stable condition.



Analysis of Data Readings

Using the core sample results we have established that all readings 18-40 can be interpreted to show the waterproofing to contain very little or no moisture, readings with the higher readings being associated to changes in the waterproofing materials/thicknesses and not to moisture ingress.

Readings of 41 and above contain varying levels of moisture which rise in line with the increasing gauge readings.

Conclusion and Recommendations

The readings show that the existing built-up bituminous waterproofing system contains several localised areas of moisture where the cork and top 12mm fibreboard contain varying levels of moisture that should be removed and replaced with new dry products prior to installation of the proposed overlay system.

There is no requirement to remove the entire existing waterproofing.

THERMOGRAPHIC IMAGING

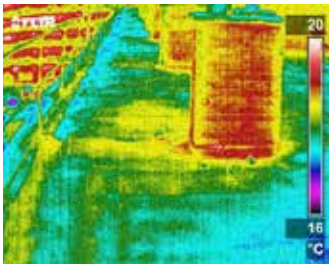
Thermographic roof surveys are conducted using an infrared camera to identify the locations of thermal irregularities and energy inefficiencies due to destructive water damage within the roof build up.

Thermographic testing must be performed at night-time when the roof surface has sufficiently cooled. The thermal image instantly shows temperature differences that verify wet and dry areas as moisture conducts heat faster than any parts that are dry, making roof leaks much easier to identify.

This diagnostic method is best suited to situations where only a single layer of insulation is between the vapour control layer and the waterproofing membrane.

Our analytical report includes visual evidence of the roof's condition and also quantifies the building's energy loss, so that we can help the client improve their roof's thermal efficiency.

Daytime observation of a roof area at Shaftesbury Court with no apparent signs of water ingress.



Night-time thermographic image of the same roof area at Shaftesbury Court, where the yellow parts on the roof show heat loss and damaged insulation because of water ingress.

TAPERED INSULATION SCHEMES FOR FALLS ON A ROOF

Creating effective roof drainage

It is a requirement of Building Regulations that adequate provision is made for rainwater to be carried from the roof of the building.

It is generally considered good practice for flat roofs to be designed to clear surface water as rapidly as possible. According to BS6229 & BS8217, flat roofs should be designed with minimum falls of 1:40 to ensure a finished fall of 1:80 can be achieved, allowing for any inaccuracies in the construction.

Falls in the roof structure can be achieved by adjusting the height of the supporting beams or purlins, by using tapered supports, or by the addition of firring pieces before the deck is laid. In the case of a cast in-situ concrete slab, falls are normally provided by use of a screed. However, many roofs are being designed whereby the falls are created using tapered insulation which reduces construction costs considerably. Having no falls is not recommended with the exception of some ballasted roofs where back falls must be avoided.

Tapered insulation is a lightweight, convenient and cost effective alternative method of providing falls to the roof and can be used with our waterproofing systems. The tapered schemes are quick to install and as the insulation and falls are applied in a single operation, site times and traffic are greatly reduced.

Advantages of tapered insulation

- Reduced costs and installation time particularly compared to screed to falls where drying time is a significant factor.
- Greater flexibility where complex fall configurations are required.
- Reduced weight, particularly when compared to cement screeds.
- Refurbishment benefits as the tapered scheme can be retrofitted on an existing building where drainage falls are insufficient.

Tapered Insulation Roof Designs

We provide a full design service and all our tapered insulation layouts are bespoke to match the roof and building's requirements and are created using the latest design software to minimise waste and confirm the thermal performance of the scheme to meet the designer's requirements.

LET'S WORK TOGETHER

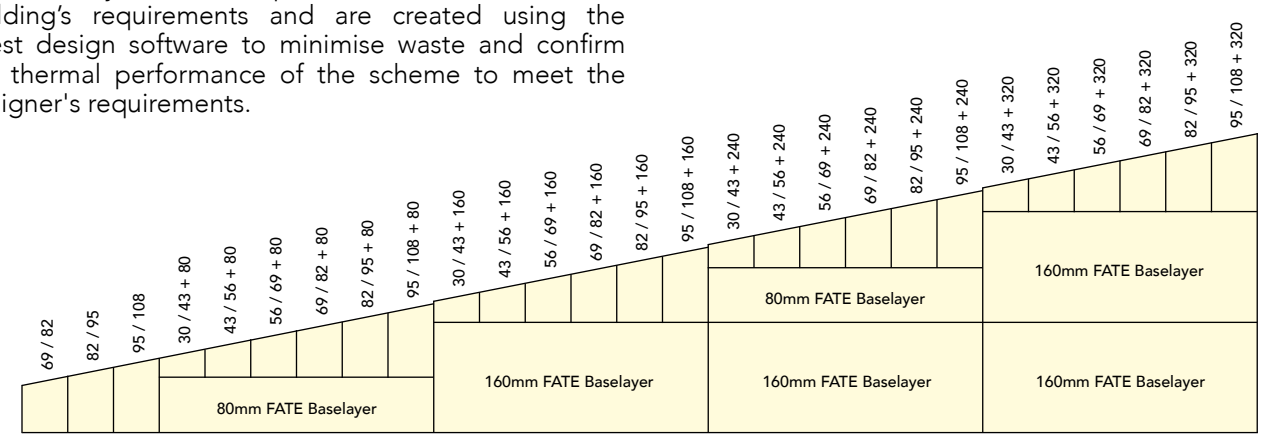
WE WORK WITH YOU TO UNDERSTAND AND IDENTIFY

- Roof area, shape and size, dimensions of roof features such as rooflights, and any overhanging roof areas.
- Where falls are to be designed and the drainage aspects.
- Height restrictions at roof details.
- Location of rooftop plant and equipment.
- Any backfalls on a current roof or new slab.
- Condensation risk from any existing insulation identified above or below the deck.
- Required U Value to meet building regulations and the designer's requirements.

YOUR ROOF SOLUTION

OUR SERVICE TO YOU DELIVERS

- Roof survey for refurbishment projects with detailed roof plan.
- Preliminary design, if required, for maximum heights and budget costs.
- Full layout of final scheme and bonding areas for multi-layered designs.
- Direction and gradient of falls.
- Thermal bridging resolution.
- Type of insulation to satisfy warm or inverted roof construction, Bauder PIR, BauderROCK or BauderJFRI.
- Weight loading of the scheme.
- U-Value the tapered scheme will achieve.



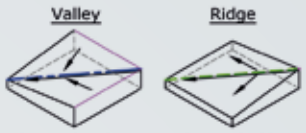
Multiple-layer tapered insulation

Example of multi-layer scheme

Key:

- 30mm Flatboard - NO Baselayer
- 30mm Flatboard + Baselayer
- = High Points of Tapered Insulation (Recommended Start Point for Installation)
- = Tapered Insulation
- = Bauder Pre-Cut Valley Boards

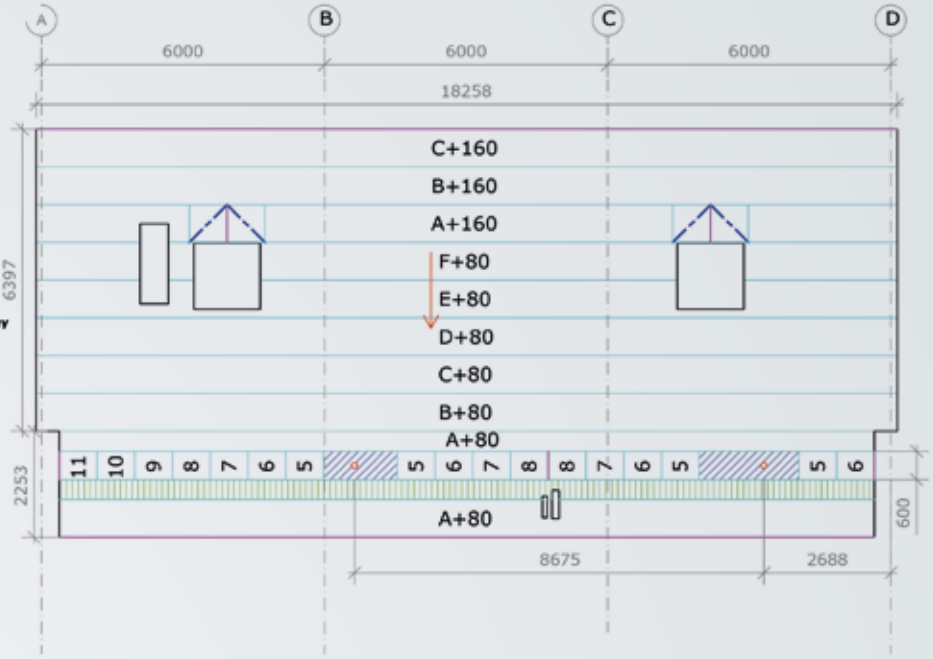
NOTE:
ALL roof dimensions, rooflights and outlet positions to be checked BEFORE the Tapered scheme is ordered



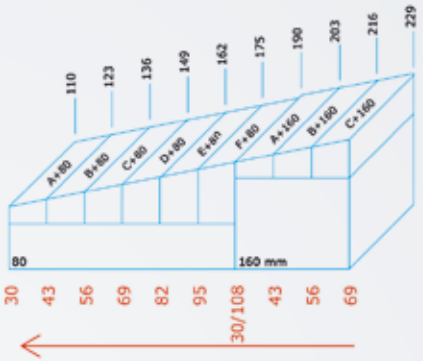
Ridges & Valley = 800mm x 800mm

Important Notice:
This scheme is of a MULTI-LAYER design and as such extra insulation adhesive will be required to adhere the taper boards to the base layer / overlay layer.

Upper Roof Area
80mm & 160mm FA-TE Baselayer. NO Baselayer to Sumps/Gutters (Refer to the table for the overall insulation thickness). Please see the Key for Gutter/Sump Thicknesses

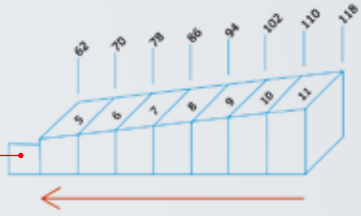


1:60 PIR Tapered Boards (800mm x 1200mm)



1:100 PIR Tapered Boards (800mm x 1200mm)

For Gutter/Sump Insulation Thickness Please see Key



NOTE REGARDING U-VALUES

The individual roof areas achieve the Average 'U' Values stated in the table. These U-Values are calculated according to BS EN ISO 6946:2007(E) Annex 'C'.

Roof Name Area:	Deck Type	Minimum U Value	Average U Value	Approximate Net Roof Area (m²)	Approximate Area of Insulation to be Bonded (m²)	Total Insulation Required Inc Waste (m²)
Upper Roof Area	Concrete	0.71 W/m² K	0.15 W/m² K	153.46	291.88	310.48

GREEN ROOF DESIGN

Achieving the green roof you envisage

There are fundamental principles that apply to the design of a green roof, regardless of the proposed landscaping, location or climate. The specified solution must replicate nature within the build up and be able to support the desired vegetation.

Our design team can support you through all the considerations when configuring a green roof for your project.

Designing to protect the building's construction and flat roof waterproofing is vital when delivering a green roof as many additional forces can affect the structure. Green roofs are installed on roof pitches ranging from 1° to around 30°. Fundamentally it's about finding the balance between requirements for water storage, drainage and irrigation; sufficient depth of growing medium to support the intended vegetation and weight loading levels; as well as meeting the regulatory needs for construction, fire, safe access and the duty for maintenance.

Our Green Roof Design Service

Our complete green roof design service encompasses initial design advice on waterproofing or landscaping related issues through to a detailed and comprehensive specification package supplied in National Building Specification (NBS) or BIM format.

Whatever your requirement may be for a green or biodiverse roof landscape we will be able to assist you from the conceptual stage in developing a practical solution which will be cost-effective whilst also delivering long-term performance.

LET'S WORK TOGETHER

WE WORK WITH YOU TO UNDERSTAND AND IDENTIFY

- Why the green roof is required and what performance is expected.
- Landscape finish to be achieved.
- Levels of access required for the roof.
- Planning constraints.
- How to meet a Biodiversity Action Plan, where required.
- Project location, climate and roof size.
- Loading limitations.
- Levels of rainwater retention or irrigation requirements to support the vegetation.
- Drainage for the roof.
- Budget.
- Ongoing maintenance requirements.

YOUR ROOF SOLUTION

OUR SERVICE TO YOU DELIVERS

- Recommended waterproofing system beneath the green roof.
- Combination of green roof components for water storage and drainage, protection layers.
- Substrate depth and type required.
- Vegetation proposal and planting scheme for extensive and biodiverse roofs.
- Irrigation requirements.
- Weight loading of the system.
- Wind uplift resolutions.
- Ongoing maintenance programme or management plan.
- Specification for the project complete with compatible waterproofing system, and landscaping/ green roof layers.

BLUE ROOF DESIGN

Creating rooftop SuDS for stormwater management

Fundamentally, a blue roof is a sustainable urban drainage solution (SuDS) designed to attenuate storm water at roof level, slowing down the release of rainwater in to the drainage system. The principle of SuDS is to try and replicate the natural drainage pattern prior to construction.

Bauder Blue Roof Design Service

By the nature of how a blue roof needs to perform and the weight loading implications, the design can create many challenges for the architect as it will require careful consideration and specialist calculations for it to be a success.

The calculations for drainage requirements are a specialist discipline and should only be carried out by a specialist. We produce roof specific discharge reports for the blue roof specifications we are engaged with.

We will work with the client, architect and drainage engineer to provide a single point solution for the waterproofing, blue roof and green roof layers, and guarantee. Our specialist report and calculations will determine the most effective scheme for the project.

LET'S WORK TOGETHER

WE WORK WITH YOU TO UNDERSTAND AND IDENTIFY

- Project's roof size.
- Allowable site rainwater discharge rate.
- Planning constraints.
- Maximum attenuation volume on the roof.
- Geographical location.
- Inclusion of emergency overflows.

YOUR ROOF SOLUTION

OUR SERVICE TO YOU DELIVERS

- A detailed report.
- Appropriate form of waterproofing.
- Specialist calculations to determine the most effective scheme for the project.
- Roof discharge report.
- 1:100 year storm profile for the roof (+40% factor for climate change).
- Number of outlets required, complete with an assigned number of control holes, restricting the flow of water in line with the discharge rate for site.
- Maximum attenuation volume of the roof.
- The depth of void required on the roof on to which any landscaping finish can be installed (referred to as the H-Max).
- Detailing for the blue roof including the flow restrictor outlets and emergency overflows.
- Specification for the project complete with compatible waterproofing layers, blue roof system and landscaping/green roof layers.

DESIGNING SOLAR PV ARRAYS FOR FLAT, GREEN AND BLUE ROOFS

Roofs to provide energy generation

A flat roof is often a wasted resource and unlikely to be shaded which makes it the ideal location for a PV array. Large commercial or public buildings can often have flat roofs and a perfectly suited energy profile to maximise benefit from a Solar PV array. Additionally, most flat roofs are not at eye level and so the PV array is generally hidden from view at street level.

Solar PV and BioSOLAR Design Service

Successfully designing and delivering a PV system can be a complicated process and our team of dedicated solar PV specialists, area technical managers and roof technicians can help you every step of the way.

Our service assists designers and specifiers on new build and retrofit refurbishment projects, as our solar PV systems are suitable for both scenarios

LET'S WORK TOGETHER

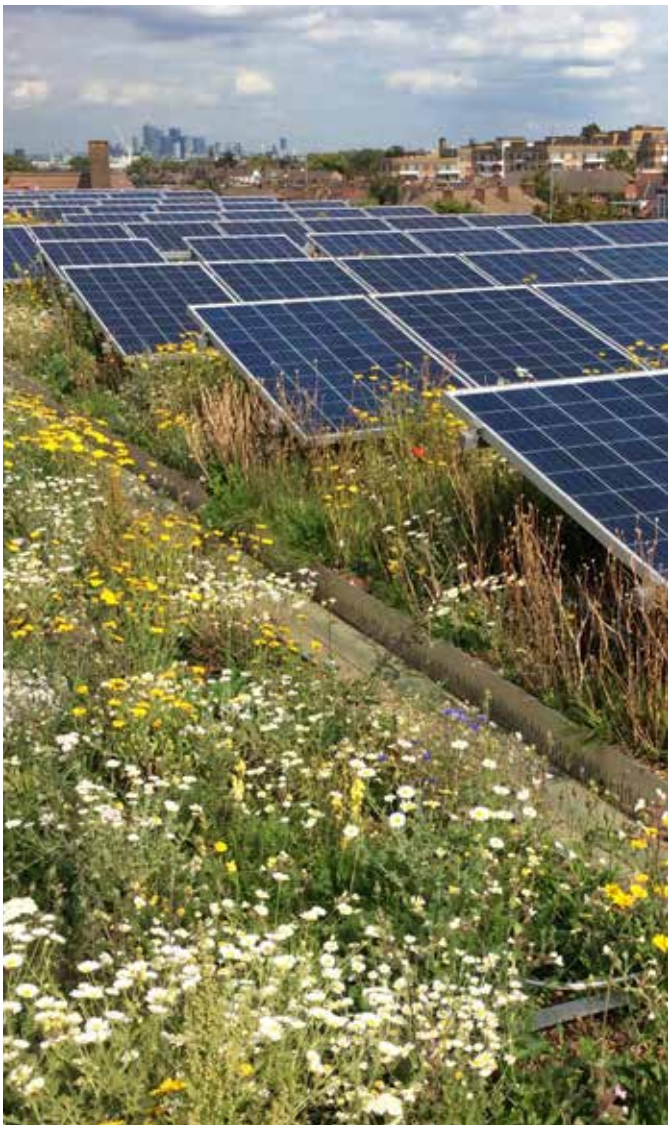
WE WORK WITH YOU TO UNDERSTAND AND IDENTIFY

- Drivers for solar PV installation.
- Building's energy consumption.
- Useable non-shaded roof space.
- Budget.
- Waterproofing system requirements.
- Funding opportunities available.
- Meeting planning constraints.
- Energy generation requirements.

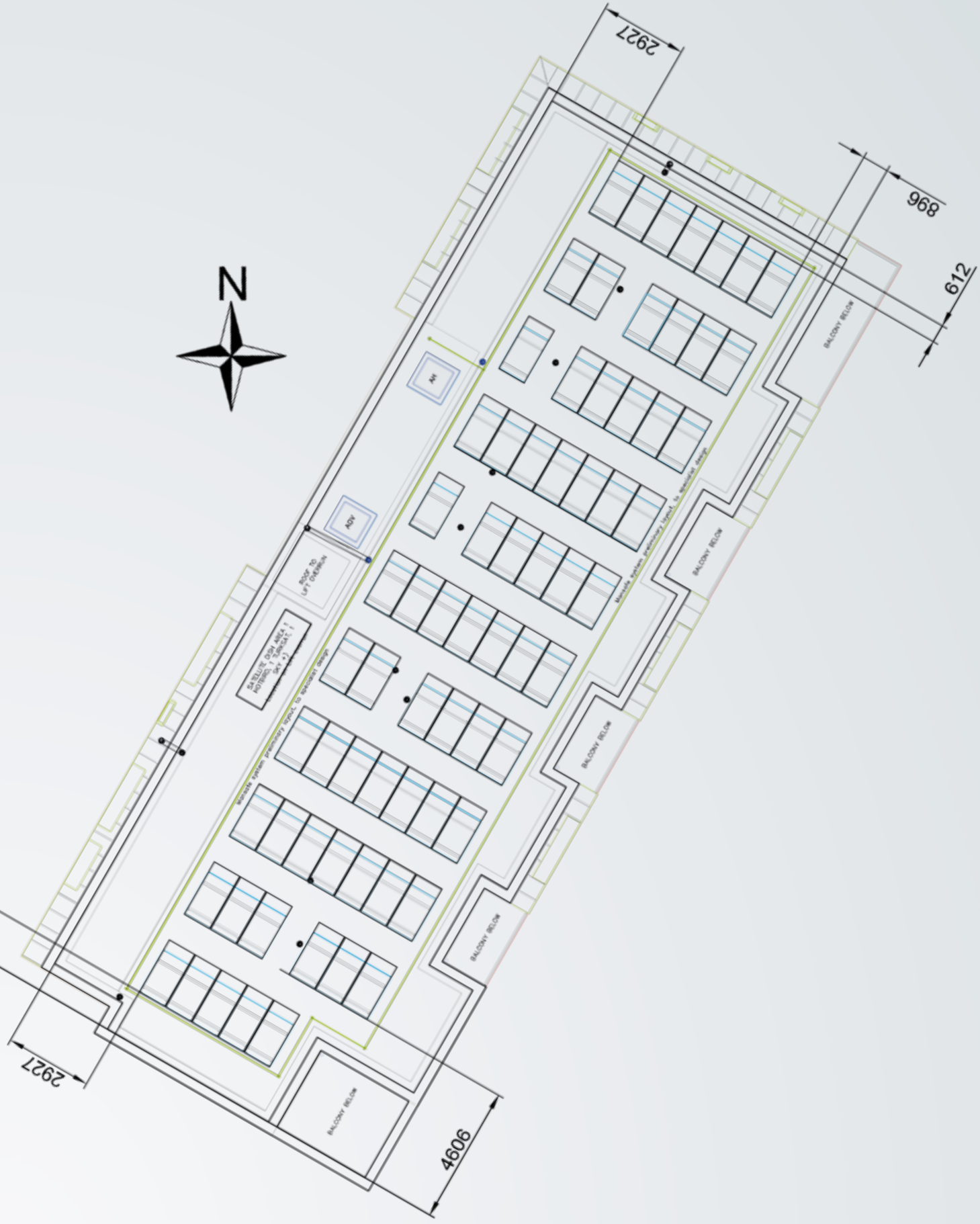
YOUR ROOF SOLUTION

OUR SERVICE TO YOU DELIVERS

- A detailed PV specification package.
- Proposed waterproofing system.
- Array layout roof plan.
- Number of panels and their orientation.
- System output.
- Carbon saving.
- Wind load calculations.
- Inverter sizing and specification.
- Full electrical design.
- Grid application assistance.
- Budget costing.
- Information on funding options.
- Green or blue roof integration and vegetation scheme for BioSOLAR installations.



Example of a BioSOLAR PV scheme



INSTALLATION EXPERTISE

Delivering a first-rate roof

Design and the quality of the roofing materials contribute greatly to the performance and longevity of a flat roof, as well as the quality and experience of the installer. You can be assured that the waterproofing, PV, green roof and blue roof will be of the highest standard as we only allow trained and certified Bauder approved contractors to install our roofing solutions.

Approved Contractors

Our national network of approved contractors are evaluated, to ensure they possess the technical expertise required and organisational facilities to manage and maintain an efficient and well-run site.

We look to build strong relationships with our approved contractors by providing them with training, support and expert advice in order to deliver a high quality roof installation.

Training

Our head office has full training facilities for all our waterproofing systems and we are approved to offer the following Basic Competency Programme (BCP) training which is a gateway for achieving NVQ Level 2.

- RBM systems - National Federation of Roofing Contractors (NFRC).
- Single ply systems - Single Ply Roofing Association (SPRA).
- Cold liquid applied and hot melt systems – Liquid Roofing and Waterproofing Association (LRWA).

Badged Operatives

Excellent workmanship is crucial to the guarantee that accompanies Bauder installations and so we have always operated a policy to train and approve the individual installer, and not simply the contracting roofing company.

Each individual is provided with an ID badge showing photographic identification, name, badged operative number and the systems that they are trained to install.

Our site technicians check the ID and approval status of all operatives installing our systems on site using our Bauder App.

Installation Monitoring

Once your roofing works commence, our experienced team of site technicians will monitor and inspect the workmanship at key stages to ensure that the standards required to meet our guarantee are fulfilled, as well as providing you with concise reports on how the works are progressing, including confirmation of issues or actions required.

Our national team is one of the largest of all the manufacturer-suppliers, ensuring all our sites receive the attention they deserve.

Installation and Completion of a Green or Blue Roof

A full inspection sign-off on the waterproofing by our site technician takes place on the completed waterproofing, prior to the installation of any green roof components, blue roof void forming products, or any landscaping. This confirms that the installation of the waterproofing system is in accordance with our recommendations and specification and meets the criteria for guarantee.

GUARANTEED QUALITY

Comprehensive package your projects

Your new completed roof will be backed up by what we can confidently claim to be the most comprehensive guarantee range in today's roofing industry, giving you total reassurance with regards to the future performance of your roof.

Unlike others in the market, Bauder offers a full range of guarantees that match the building's and your requirements to give complete satisfaction. We issue our guarantees as part of our service because we monitor quality every step of the way from manufacture to installation.

A credible guarantee is vital; but never needing to call upon it is our aim.

Guarantee Cover Options

- Products supplied by Bauder.
- Workmanship of Bauder products installed by our approved contractors.
- Defective design and / or specification where Bauder products are concerned.
- Financial loss from building damage due to faulty manufacture or installation of Bauder products.
- Consequential damage through Bauder waterproofing system failure due to faulty manufacture or installation of Bauder products.

2

Sustainability and Environment

We are committed to reducing the impact our business and manufacturing operations have on society and the environment.

MANAGING OUR IMPACTS

Protecting the future

The Bauder group is totally committed to reducing the impact our business has on the environment. Our goal is to ensure we pass to future generations an intact ecological, social and economic company.

Manufacturing

As a company, we aim to manufacture the highest quality flat roof systems, which offer the longest service life possible to provide lower whole life costs. By continually focusing on improving manufacturing processes for all of our products, we are able to further reduce raw material usage, waste, and emissions. For example, across our manufacturing factories we utilise shredders to recycle any membrane offcuts and waste back into production.

Operation of Our Production Plants

Our manufacturing plants use closed rotation cooling systems which dramatically reduce water consumption and avoid environmental pollution.

Over a five-year period we have successfully reduced the energy consumption for the manufacture of PIR insulation by 20% and is a reflection of our ISO 50001 Energy Management accreditation. This is good for the business, good for clients and good for the environment.

Packaging and Site Waste

On site, we work closely with recycling specialists to reduce rubbish going to landfill. The protective paper covers on our membranes are easily recycled, as are the plastic wrappings on the insulation board packs.

The offcuts of membrane during a roof installation are utilised at the detail flashings so that the amount of membrane required for a project is strictly calculated to reduce waste and costs.

As an example, on a large local authority refurbishment scheme we were instrumental in successfully achieving recycling targets by diverting and reducing the volume of waste to landfill by 90%.

PROVING OUR STANDARDS

Recognised commitment to sustainability

As a company we work hard to ensure our systems and products meet the latest criteria and recognise the importance of assisting our customers, specifiers and contractors to achieve their sustainable targets by providing them with informative, honest data that enables them to make an informed choice when selecting our roofing systems.

DAkkS Deutsche Akkreditierungsstelle D-ZM-16089-01-00

International Organisation for Standardisation (ISO)

The ISO develop and publish international standards that serve as a benchmark by which to evaluate companies, ensure the safety and quality of products and services, improve the environment in which we live in and facilitate business.

We have the following verified ISO certification:

- **ISO 9001:2015 Quality Management Certificate** EN1271 (UK) and 70499/03-15_e (Germany). and FM 86932 for Holt Melt manufacturer.
- **ISO 14001:2015 Environmental Management Certificate** A10552 (UK) and 70499/03-15_d (Germany).
- **ISO 50001: 2011 Energy Management Certificate** 70499/03-15_c (Germany).

Environmental Product Declaration (EPD)

This certification is based on ISO 14025 and EN 15804 and is a global programme for verifying and registering comparable information about the life-cycle environmental impact of a product.

The Eco Platform accreditation is recognised by the BRE as valid and transferrable environmental documentation towards obtaining BREEAM credits within their assessment process for BREEAM UK New Construction 2018.

We have EPD certificates covering bitumen, single ply and LiquiTEC waterproofing as well as PV insulation:

- **Bitumen Membranes** S-P-00414
- **Thermofol PVC Membranes** EPD-BAU-20130188-IBCC-EN
- **Thermoplan FPO Membranes** EPD-BAU-20130189-IBCC-EN
- **LiquiTEC Products** EPD-DBC-20130101-IBE1-EN
- **PU Insulation - Mineral Fleece Facing** EPD-IVP-20140206-IBE1-EN
- **PU Insulation - Aluminium Facing** EPD-IVP-20140207-IBE1-EN

All certificates can be downloaded from our website bauder.co.uk/technical-centre

Green Roof Benchmarks

We are a founder member of the Green Roof Organisation (GRO). The GRO Guidelines, which refer back to the original German association The Landscaping and Landscape Development Research Society e.V. (FLL), recommends levels of performance, longevity of components and technical design criteria.

Our membership of the International Green Roof Association (IGRA) sees us supporting and promoting ecological green roofs in the UK and Ireland through the exchange of ideas and technologies.

Royal Horticultural Society (RHS) – Perfect for Pollinators and Flora Locale

The United Kingdom's wild bees and other pollinators are considered to be in decline. By planting nectar and pollen rich flowers over a long season, this trend can be reduced. The plant varieties within our Flora Seed Mixes for substrate green roofs have been specially selected and blended to give a high diversity of wildflowers included in the RHS Perfect for Pollinators list to provide a rich habitat for priority pollinators, larval food plants for butterflies and seed sources for birds.

Flora Locale

In addition to our seed mixes being perfect for pollinators, the mixes and wildflower blankets have native British provenance for perennial wildflowers, annuals and grasses to meet BREEAM and Biodiversity Action Plan (BAP) requirements.

Buglife

Buglife is the only organisation in Europe devoted to the conservation of all invertebrates. We work with Buglife to advance biodiversity standards on green roofs through the development of design criteria for biodiverse green roofs. Our systems are the only roofs endorsed by Buglife.

REDUCE, REUSE, RECYCLE, RECLAIM

Using recyclate in the manufacture of our products

Recycled Content in Our Products

Working closely with our suppliers and using data from extensive research, we have steadily increased the recycled content of many of our products without detrimental effect on their durability, performance or longevity of service. Our principles are to focus on life cycle and deliver systems with extended life expectancies rather than compromising on quality by producing lower grade membranes that would consequently require replacement sooner.

Bitumen Membrane Waterproofing

Our manufacturing processes include returning any offcut waste back into production so that bituminous waste is kept to a minimum.

The reinforcement fleece within our K5K, K4E, Plant E and SL500 is made from 250g/m^2 recycled spunbond polyester for high tensile strength.

Single Ply Waterproofing

Currently, the production of our single ply membranes includes recyclate to the base layer.

Hot Melt Waterproofing

This system has recycled content incorporating post-consumer recycled rubber.

Green Roof Build Up Components

Many recycled or waste materials are used within our green roof components to enable us to provide environmental solutions to the industry.

Water Retention and Drainage Layers - Our DSE 20, 40 and 60 boards all utilise recycled high density polyethylene moulded to create the cupped profile boards that provide water retention and multi-directional drainage.

Our Attenuation Cell 100 board is manufactured from recycled PolyPropylene.

Protection Layers - Our FSM 600 and 1100 are made from a mixture of recycled reground polyester and polypropylene fibre, which are combined before being mechanically and thermally solidified to create a layer to prevent mechanical damage to the waterproofing.

ProMat for intensive green roofs is made of granulate from recycled shredded tyres reformed and bound by Polyurethane to give a protective layer against mechanical damage.

Ecomat is a protective layer created from recycled Polyester clothing and fabric.

Substrates and Growing Mediums - Our substrates are based around recycled crushed brick and composted organic material to give growing mediums which balance water storage, structural stability, water permeability and grain size distribution according to the requirements of the planting scheme

Separation and Slip Layer - PE Foil is manufactured from recycled polyethylene granulate.

Utilising these waterproofing products our clients are able to specify a green roof with 81% recycled content by volume.

Recycling, End-of-Life and Upcycling of Our Products

Single Ply Membranes

FPO membrane offcuts can be recycled by returning them to the manufacturing process to be used instead of raw materials. If, however, the membranes have become contaminated by external agents during their serviceable life, then the membranes can be downcycled in to other products .

When PVC membranes are upcycled, they can be processed and reintroduced into a manufacturing stream where they are typically converted into other components such as walkway tiles and protection or separation layers for roof systems.

Bitumen Membranes

Recycling end of life bitumen membranes from a roof is a real challenge for all manufacturers because the membranes are made up of different constituents that together create a mixed waste which is currently non-recyclable.

Our approach is to overlay an existing roof wherever possible so that the existing system doesn't have to go to landfill. Our moisture mapping technical diagnostic test, pinpoints the presence of dampness within the roof structure to depths of 300mm and is currently the only reliable way to test underlying sections of multiple layer roof systems for trapped water.

The results are delivered as a topographical map which can be analysed to identify precisely which areas of a roof need replacing and which areas are sound enough to install another solution over the top.

As an end note, energy can be generated through incineration of bitumen membranes at end of life, though the availability of suitable facilities is limited.

Insulation

Alliances with other forward thinking companies has resulted in innovative recycling opportunities, so that our PIR insulation manufacturing facilities readily recycle and upcycle offcuts and fragments for use in hand cleaners as well as for the manufacture of decking boards.

The expanded polystyrene (EPS) scrap from the manufacturing process is reintroduced back into making our EPS insulation boards to keep waste to a minimum. When it is not used to make more EPS, foam scrap can be turned into a variety of products such as clothes hangers, park benches, flower pots, toys, rulers and seedling containers.

Green Roof Components

Our green roof components are themselves made from recycled content and at the end of their life, they too can be returned to their originating recycling process to be converted again into other products and components.

To give an example, our water retention and drainage layers DSE20, DSE40, DSE60 and Attenuation Cell 100 are made from recycled high density polyethylene (HDPE), a plastic polymer with flexible properties, that continues to be commonly recycled or downcycled into other durable plastic products.

Photovoltaic Panels and Components

In Europe, solar panel disposal falls under the European Union's Waste of Electrical and Electronic Equipment (WEEE) directive and is strictly regulated. Our module supply partners are all members of PV Cycle framework which is a not-for-profit association managing a fully operational collection and recycling scheme for end-of-life photovoltaic modules. www.pvcycle.org

BauderSOLAR

The individual components of the BauderSOLAR flat roof system are single-origin and can be individually removed and completely recycled. The main support structure and locking pin are made from plastic category 05 Polypropylene and is widely recycled; with the base plate, bayonet fitting and module clamp all from plastic category 07 Polyamide which is recycled into plastic timber and other custom-made products.

Bauder BioSOLAR

The mounting boards for the BioSOLAR system that provides the water retention and drainage layer for the vegetation beneath the array are made from HDPE which is widely recycled.

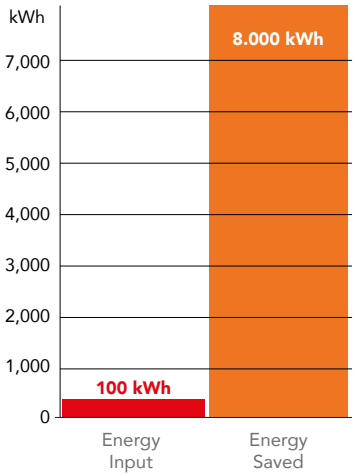
The support system for the Bauder BioSOLAR system is made from aluminium; the arms, support rails and clamps can be recycled by melting down and reforming the metal without losing quality.

SAVING ENERGY

Reducing the environmental impact of a building

Effective Roof Insulation

It has long been recognised that the insulation of a building is essential to improve thermal performance and reduce the carbon emissions associated with heating buildings, in addition this improves quality of life and increases productivity through better working conditions.



Energy profile for 1m² of BauderPIR FA 80mm foil-faced board after 50 year life span

The embodied energy of our rigid polyurethane PIR insulation accounts for as little as 4% of the energy the board can save during its serviceable life. With buildings accounting for 50% of the energy consumption in Europe, the inclusion of insulation when installing new or refurbished roofs plays a significant part in reducing CO_2 emissions.

Designing Insulation Schemes

Effective and efficient use of insulation boards on a roof is a consideration so that resource efficiency is maximised and site waste minimised. At Bauder, it is our aim to design out misuse arising from a scheme layout, though the success of this can depend more on the way the building is designed rather than the way the product is used. This is particularly important when tapered insulation schemes are required where boards are precisely positioned and less transposable.

Upgrading Insulation on Current Roofs

By utilising moisture mapping and other sophisticated diagnostics and software, we are able to offer a refurbishment service that identifies precisely where on a current roof the insulation is perfectly sound and efficient and therefore does not need replacing, and the areas suffering from water ingress which need to be removed as the insulation is ineffectual. This provision proactively analyses the exact project requirements, rather than working with assumptions, to reduce the materials required for refurbishing the roof and keeping costs to the building owner at a minimum.

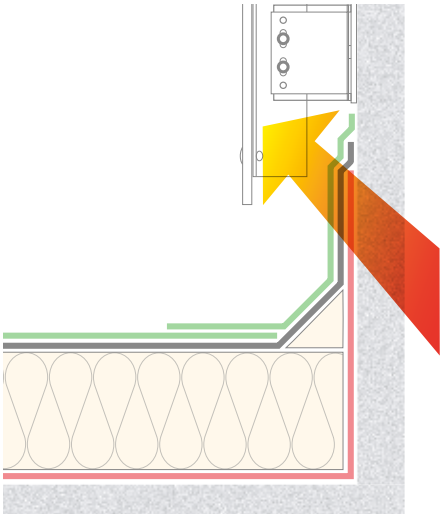
Building Research Establishment (BRE) Study on Roof Design and Detailing

The BRE has researched energy loss through air leakage and cold bridging at penetrations and junctions on roofs and estimates that 30% plus of all energy loss in a building occurs at these points.

Cold Bridging

A cold bridge, also called a thermal bridge, is an area of a building construction, which has a significantly higher heat transfer than the surrounding materials resulting in additional heat loss. This is typically where there is either a break in the insulation, less insulation or when the insulation is penetrated by an element with a higher thermal conductivity.

To eliminate cold bridging on a flat roof, our detail design focuses on identifying areas where heat transfer, and hence adverse heat loss, could occur. On warm roofs, upstands and parapets are insulated to a minimum height of 300mm above the deck. Additionally, our portfolio of accessories allows us to recommend and specify insulated outlets and soil vent pipes as well as using thermally broken fasteners in our mechanically fixed waterproofing systems.



Cold Bridging
Risk of cold bridging due to absence of upstand insulation

Air Leakage

Uncontrolled infiltration of air is generally considered undesirable, except for ventilation purposes, as it reduces the thermal efficiency of a building and therefore generally increases energy consumption. For all buildings, infiltration can be reduced via sealing cracks in a building's envelope, and for new construction or major renovations, by installing continuous air retarders.

To counteract air leakage, our roofs are detailed and installed to minimise air permeability, and therefore heat loss, by ensuring the correct sealing of membranes to all rooftop details.

BUILDING FOR THE FUTURE

Sustainable solutions for successful planning

Meeting Planning, the Merton Rule and Delivering Low or Zero Carbon (LZC) Technologies

The Merton Rule was a pioneering planning policy, developed by Merton Council, which at the time asked new commercial developments over 1000m^2 to generate at least 10% of their energy needs from site sourced renewable energy, in order to help reduce annual carbon dioxide (CO_2) emissions in the built environment. Merton Council established the rule and adopted it in 2003.

In 2008, the Government published its central planning guidance Planning Policy Statement – Planning and Climate Change – PPS1 that requires all UK local planning authorities to adopt a 'Merton Rule' policy and more specifically within PPS22 – Renewable Energy which planning authorities should have regard to when preparing local development documents and when taking planning decisions.

To date, the vast majority of councils have embraced the Merton Rule adopting pro-renewables planning policies within Unitary Development Plans (UDP) or Supplementary Planning Documents.

In Scotland, the Government has set clear targets for renewable electricity with the First Minister wanting renewable sources to generate the equivalent of 100% of Scotland's gross annual electricity consumption by 2020.

In addition to these planning resolutions, BREEAM requirements for buildings often call for site sourced renewables with a minimum of 30% CO_2 reduction from site based renewables required to achieve maximum credits.

With this background, all building designers, constructors and developers need to consider the options for on-site renewable energy and satisfying these obligations is frequently a driver for including a photovoltaic array on a roof. A flat roof being the ideal location for unobtrusive energy generation.

Our Solar PV solutions deliver these obligations on flat roofs without any penetrations of the waterproofing system to safeguard the integrity of the building. See chapter 10 for more detailed information.

Uniting the Challenges

The real challenge arises when a planning pre-requisite is placed on urban development to combine both a green roof and a renewable energy system and how to locate both within the same, and often size limited, roof area. A feasible solution is to layer the green roof and PV array with our BioSOLAR solution which means the systems can co-habit the same area where they mutually benefit each other. The advantage of this solution is that the entire roof area qualifies as a green roof, and if a biodiversity vegetation finish is chosen, this can further enhance the BREEAM credit rating for the roof element.

The distinctiveness of the system is in the design of the mounting system whereby the substrate and vegetation provide the ballasted installation mechanism to secure the array to the roof.

Synergy

The BioSOLAR system also has the advantage of increasing the efficiency of the solar array because the vegetation preserves ambient rooftop temperatures, keeping the PV modules at optimal output and increasing energy yields by 5% - 7%.

BREEAM

Building Research Establishment Environmental Assessment Method

Bauder has many systems that provide credits for BREEAM, helping towards the overall BREEAM rating of a building. On the 23rd March 2018, BREEAM UK New Construction 2014 closed for new registrations. Should your scheme be a new registration under BREEAM UK New Construction 2018, please contact our technical department for advice on how our systems can support your scheme.

Schemes Registered for BREEAM

The BREEAM assessment method evaluates the sustainability of built environments through the different stages of their life cycle. The schemes include:

Focusing on Bauder green roofs and Solar PV, these systems have the potential to count towards BREEAM:

Land Use and Ecology

LE 03 Mitigating Ecological Impact.
Criteria 1&2
Potential credit 1

LE 04 Enhancing Site Ecology.
Criteria 1&2
Potential credit 1

LE 05 Long Term Impact on Biodiversity
Criteria 8
Potential credit 1

With the verification of a suitably qualified ecologist, a Bauder green roof can be specified with our wildflower blanket or Bauder Flora seed mixes 3,5,7,9,11 which are accredited by the RHS as 'Perfect for Pollinators' and certified by Flora Locale, mitigating the impact of the building on the construction's footprint and create a long-term habitat for local flora and fauna.

Health and Wellbeing

Hea 05 Acoustic performance
Criteria 2
Potential credit 1

The Bauder Xero Flor sedum blanket system on a metal deck has been tested in accordance with BS EN ISO 140-18: 2006 to determine the sound intensity level within the building during heavy rainfall. The sedum plants intercept the impact of rainfall and mitigate the noise so that a figure of 33.5dB is achieved.

Management

Man 04 Stakeholder Participation
Criteria 12
Potential credits 1

Green roofs for recreational use provide facilities that can be shared by the relevant parties. They can be podium based, at ground level with further facilities situated below such as car parks, or at rooftop with relevant safety features.

Energy

Ene 04 Low and Zero Carbon Technologies
Compliance CN10
Potential credits 2

A BauderSOLAR and Bauder BioSOLAR Green Roof PV array each create local energy generation from renewable sources which can supply a compliant percentage of energy to the building.

Materials

Mat 01 Life Cycle Impacts
Our Eco Platform environmental product declarations are recognised by the BRE as valid and transferrable environmental documentation towards obtaining BREEAM credits within their assessment process.

Mat 03 Responsible Sourcing
Criteria 2b
Potential credits 3

Bauder green roof components contain recycled content with recyclability of the system at the end of life and can count towards the quota of 80% of materials within the site being responsibly sourced. We hold ISO 14001:2015 Environmental Management Certification.

Mat 04 Insulation
Criteria 1c
Potential credits 2

A green roof assists insulation of the building by regulating rooftop temperatures and reducing the need for additional climate control within the building.

Within a warm roof construction, our PIR is listed as achieving a generic A rating.

Waste

Wst 02 Recycled Aggregates
Criteria 3c
Potential credits 1

Our ProMat protection layer is manufactured from tyre rubber crumb from non-construction post-consumer sources which is listed in CN1 Secondary aggregates.

Crushed aggregate obtained from site is not recommended within a green roof because of the risk of introducing even small levels of contaminated content to the living roof.

BRE GREEN GUIDE

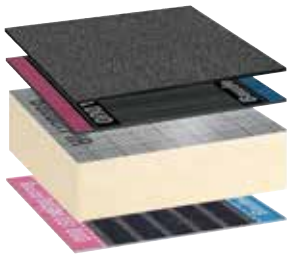
The BRE 'Green Guide' lists environmental ratings for various types of flat roof construction. Ratings are from 'E' to'A+'.

We are able to provide products and systems that are generically rated A+ in the BRE Green Guide. This assists clients in gaining additional credits under the relevant categories within BREEAM 2014.

Please note that the BRE Green Guide is not relevant to BREEAM New Construction 2018 and has been replaced by EPD certifications and building life cycle assessments.

Please contact our technical department for more advice or go to our website.
http://www.bauder.co.uk/technical-centre

Indicative build up



BAUDER BITUMINOUS SYSTEMS	Generic Rating	Element No.
With warm roof insulation on plywood deck and timber joists.	A+ rating	1212540033
With warm roof insulation on a profiled steel deck with steel supports.	A+ rating	1212540006
With warm roof insulation on concrete beam and block.	B rating	1212540042
With warm roof insulation on pre-cast concrete hollow slab with screed.	B rating	1212540021
With inverted roof insulation and pebble ballast on ply lined profiled steel deck with steel supports.	A rating	812530026

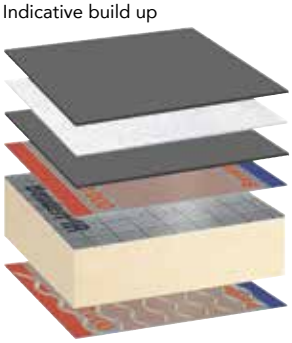
Indicative build up

BAUDER SINGLE PLY SYSTEMS	Generic Rating	Element No.
With warm roof insulation on a profiled steel deck with steel supports.	A+ rating	PVC 1212540003 FPO 1212540004
With warm roof insulation on plywood deck and timber joists.	A+ rating	PVC 1212540043 FPO 1212540044
With warm roof insulation with concrete beam and block.	B rating	PVC 1212540029 FPO 1212540036
With warm roof insulation on pre-cast concrete hollow slab with screed.	B rating	PVC 1212540023 FPO 1212540024
With inverted roof insulation and pebble ballast on ply lined profiled steel deck with steel support.	A rating B rating	PVC 812530082 FPO 812530084

Indicative build up

BAUDER HOT MELT WATERPROOFING	Generic Rating	Element No.
In situ reinforced concrete, polymer modified polyester reinforced bitumen roofing membranes, insulation, rounded pebbles.	D rating	812530040
Precast pre-stressed concrete hollow slab with screed, polymer modified polyester reinforced bitumen roofing membranes, insulation, rounded pebbles.	C rating	812530074
In situ reinforced concrete with 50% GGBS and 20% recycled coarse aggregate, polymer modified reinforced bitumen roofing membranes, insulation, rounded pebbles.	C rating	812530050
Profiled metal "deep" decking with in situ concrete, polymer modified polyester reinforced bitumen roofing membranes, rounded pebbles.	C rating	812530063
Structural steel trusses, galvanised steel purlins and deck, plywood (temperate EN 636-2), polymermodified polyester reinforced bitumen roofing membranes, insulation, rounded pebbles.	A rating	812530026

Indicative build up



BAUDER COLD LIQUID APPLIED SYSTEMS	Generic Rating	Element No.
With warm roof insulation on a profiled steel deck with steel supports.	A+ rating	1212530006
Pre-cast concrete hollow slab with screed, inverted insulation with pebble ballast.	C rating	1212540060

GREEN ROOFS

All green roofs have generic ratings of A+ within the printed version of the BRE Green Guide. We cannot confirm the element number as they are not listed within the online directory.

INSULATION

FA Insulation as well as FA-TE insulation falls into the A rated category. It also has a GWP rating of less than 5 kg CO_2 – Eq./kg and has Zero ODP.

Harwell Campus Oxford
Didcot

3

Reinforced Bitumen Membrane Systems

We manufacture to exact specification our SBS modified elastomeric bitumen membranes and highly efficient PIR insulation for complete compatibility.

Our long-established and fully integrated roof systems provide you with a single point of contact for every element of your flat roof project.

OVERVIEW OF WATERPROOFING

St. Bernard's Catholic Primary School
Ellesmere Port, Cheshire

St Bernard's School demonstrates a warm roof construction utilising the Bauder Total Roof System with BauderPIR FA-TE insulation for an extremely thermally efficient roof that lowers energy bills. The system has a life expectancy in excess of 40 years.

We offer a complete range of SBS modified bitumen based solutions to suit every project type and budget, and manufacture all membranes and insulation to exacting specifications and tolerances, ensuring full compatibility of components.

All Bauder bitumen membrane systems incorporate our torch-free detailing which is specified when roof details are located on or adjacent to combustible construction materials.

Two Layer Waterproofing

Bauder Total Roof System

Our top quality Bauder Total Roof System is based on the most advanced membranes currently available. Within this system there is a choice of products that enable it to be tailored to meet the exact needs of each individual project, from the traditional torch-applied membranes to the modern heat-activated, self-adhesive variants. There is also a special root resistant cap sheet that is used in a green roof specification.

Whichever products are chosen, the system is extremely robust with a BBA stated life expectancy in excess of 35 years and is supported by a comprehensive guarantee.

Bauderflex

The Bauderflex system offers a commercial alternative to the Bauder Total Roof System, for the specifier on a prudent budget. There is a choice of products that enable it to be tailored to meet the exact needs of each individual project, and has a BBA stated life expectancy in excess of 25 years. This is a guaranteed system.

System Airtech

When safety is of paramount importance, System Airtech is the flame-free alternative for a clean, safe and simple installation that uses a combination of the latest generation self-adhesive membranes, superior adhesives and hot air welding. The system's specific formulations give a life expectancy in excess of 30 years and a guarantee that makes it a dominant product within the marketplace.

Single Layer Waterproofing

PRO F

The PRO F system features a single layer SBS modified bitumen cap sheet, which is designed to be installed directly over thermal insulation, either by torch bonding or mechanical fixing, depending on the deck substrate and the client's requirements.

The system offers a robust alternative to traditional thermoplastic single ply membranes, with a life expectancy of approximately 30 years.

BauderTHERM 'Stripes'

This is an innovative single layer torch-applied overlay membrane that is practical, quick and cost-effective. It is designed for refurbishment projects to extend the life of existing bitumen-based roof systems by around 20 years.

ENVIRONMENTAL CREDENTIALS

Building Research Establishment (BRE) Green Guide

The BRE Green Guide to Specification gives our bituminous systems various generic ratings, depending on the type of deck construction and the support structure used. These ratings are used within BREEAM UK New Construction 2014 registered schemes.

Bituminous System Generic Ratings

- 'A+' generic rating, element number 1212540006 when used with warm roof insulation on a profiled steel deck with steel supports.
- 'A+' generic rating, element number 1212540033 when used with warm roof insulation on plywood deck and timber joists.
- 'B' generic rating, element number 1212540042 when used with warm roof insulation on concrete beam and block.
- 'B' generic rating, element number 1212540021 when used with warm roof insulation on pre-cast concrete hollow slab with screed.
- 'A' generic rating, element number 812530026 when used with inverted roof insulation and pebble ballast on ply lined profiled steel deck with steel supports.

PIR Insulation Generic Ratings.

- 'A' generic rating, element number 1415320205 for PIR FA-TE Insulation.

Environmental Product Declarations (EPD)

The Eco Platform accreditation is recognised by the BRE as valid and transferrable environmental documentation towards obtaining BREEAM credits within their assessment process for BREEAM UK New Construction 2018.

Within our bitumen membrane waterproofing systems we have the following EPD certificates for our membranes and PIR insulation.

- **Bitumen Membranes**
  S-P-00414
- **PU Insulation - Mineral Fleece Facing**
  EPD-IVP-20140206-IBE1-EN
- **PU Insulation - Aluminium Facing**
  EPD-IVP-20140207-IBE1-EN

All certificates can be downloaded from our website bauder.co.uk/technical-centre

Our Products in Practice

We are committed to reducing the impact our manufacturing has on the environment as well as how our products can support the environment through the reduction of energy usage, recycling and reusing.

Insulation

The BauderPIR insulation has extremely high thermal efficiency and is CFC and HCFC free. It has zero ODP and a Global Warming Potential of less than 5Kg CO_2 - Eq/Kg. As part of our PIR insulation manufacturing process, offcuts and waste are readily recycled and used in the production of hand cleansers and decking materials.

Recycled Content

The reinforcement fleece within our K5K, K4E, Plant E, Pro F and SL500 is made from 250g/m^2 recycled spunbond polyester for high tensile strength.

Recycling and Reusing Bitumen Membranes

Bitumen is the primary raw material used in the production of bituminous waterproofing membranes. It is a by-product of oil refining and is essentially the waste material of this petrochemical process and therefore has little additional detrimental effect on the environment.

We utilise a shredder to recycle any offcuts, and waste bituminous membranes back into production. When roofs are replaced, the bituminous layers can be incinerated for heating and electricity production.

TECHNICAL CREDENTIALS

BBA Certification
Bauder Total Roof System, Bauder Total Green Roof System, Bauderflex and Bauderflex Green Roof all carry BBA certificate No. 10/4744.

All certificates can be downloaded from our website bauder.co.uk/technical-centre

British Standards
All membranes comply with BS EN 13707 Reinforced Bitumen Membrane Sheets for Roof Waterproofing.

Deutsche Akkreditierungsstelle D-ZM-16089-01-00

ISO Accreditation for Manufacturing
Our reinforced bitumen membranes and PIR insulation are all manufactured in our factories operating a Quality Management System that has been certified to be in accordance with ISO 9001:2015, an Environmental Management System that has been certified to be in accordance with ISO 14001 2015 and ISO 50001 2011 for Energy Management.

Rain Noise Testing
The Bauder Total Roof System on a metal deck has been tested in accordance with BSEN ISO 140 - 18: 2006 to determine the sound intensity level within the building during heavy rainfall. A figure of 48.9 dB LIA was achieved, which is sufficient to gain a credit under certain BREEAM assessments and generally satisfies the requirements of 'Acoustic Design of schools: Performance Standards, Building Bullet in 93'.

Fire Performance
Our systems hold fire classification B roof (t4) for compliance with building regulations under ENV1187 test method 4 for external fire exposure to roofs.

Bauder waterproofing systems verified by the BBA are deemed 'unrestricted' and suitable for use on any part of a roof.

LEADING ROOFING EXCELLENCE

Safe2Torch REGISTERED

National Federation of Roofing Contractors (NRFC)
The NFRC is the UK's largest roofing trade association. With a history spanning over 125 years, NFRC has established itself as the voice of the roofing industry, constantly adapting to change and innovation to ensure its members are at the forefront

CE Marking
All membranes and insulations carry a CE mark as required by the Construction Products Regulations.

Root Resistance for Green Roofs
The Bauder Total and Bauderflex Green Roof Systems can each utilise a special cap sheet that has been tested and certified under FLL (Forschungsgesellschaft Landschaftsentwicklung Landschaftsbau) guidelines, which is the benchmark test for root resistance in Europe and has been for at least the last 25 years.

Product and Installation Technology
TEC Products
The TEC range of products feature heat-activated self-adhesive compound on the underside, protected by a peel-off release film. These are the products used in our torch-free detailing, and some also feature heavily in all areas of the roof, particularly in the form of vapour control layers over combustible deck substrates, and underlayers due to the increased spped of application.

DUO Products
Our patented 'DUO' range of products was developed to make installation faster, safer, simpler and more secure than previously possible. The technology features colour coded side laps. Beneath the red lap is an 80mm wide strip of glass fibre fleece to prevent immediate adhesion and allows the installer to create a secure welded lap by using flame or hot air, for guaranteed waterproofing integrity. These products feature significantly in most Bauder bituminous membrane systems.

THERM Stripes Technology
This family of products feature a low melting point bitumen adhesive, in a striped pattern, which is activated with a minimal amount of heat.

The technology is used in the BTRS system on the uppermost surface of the DS1 DUO vapour barrier to provide the adhesive for installing the insulation. It also features in the BauderTHERM 'Stripes' system on the underside of the SL500 cap sheet to enable a quickly installed, partially bonded waterproofing.

BAUDER TOTAL ROOF SYSTEM

This is our premier bituminous system, in terms of both quality and technology. It is robust and durable enough to withstand foot traffic along with most permanently sited plant, and is specified in applications where outstanding longevity is required. It can be used in warm, inverted and cold roof designs on all normal deck constructions and can be used to overlay certain types of existing roof materials. Tapered insulation can be incorporated to provide falls if required.

System Variations

Every roof has its own unique characteristics. The Bauder Total Roof System offers a choice of products allowing it to be tailored to the specific needs of the project. This means that a variety of application techniques can be used in harmony to achieve the best results. There is a choice of innovative, heat-activated self-adhesive membranes for safety and speed, along with more traditional torch-applied membranes, which offer unrivalled waterproofing integrity. There is also a choice of insulation types and bonding methods.

All of these products are of the highest quality, and all feature their own unique attributes to ensure that the roof system on your building is the best solution, rather than a standard solution which has been made to fit.

Bauder Total Green Roof System

The system incorporates an option to use a special cap sheet that has been tested by the FLL to ensure long-term root resistance. This stringent test is widely regarded as being the toughest trial currently available. Our Plant-E cap sheet incorporates chemically impregnated bitumen suitable for all green roof applications.

Key Features

- Heavy duty, robust and extremely tough.
- Service life in excess of 35 years as stated in BBA Certificate 10/4744.
- Utilises torch-free detailing on or adjacent to combustible construction materials.
- Capable of withstanding permanently sited loads of up to 2000Kg/m².
- 5.2mm cap sheets with high tensile strength and choice of three colours.
- 250g/m² recycled spunbond polyester reinforcement.
- Ability to withstand climatic extremes of 100°C variation and temperature shocks, such as at the edge of ice and water.
- DUO products incorporate patented technology to minimise the use of flame.
- Option of root resistant cap sheet for green roofs.
- Fire classification B roof (t4) and verified by the BBA as 'unrestricted' and suitable for use on any part of a roof.
- Guaranteed system.

Specification Support

Specification downloads:
www.bauder.co.uk/technical-centre

nbsPlus BIM DWG

Telephone helpline:
0845 271 8800

Safe2Torch REGISTERED

CE

BBA APPROVAL INSPECTION TESTING CERTIFICATION CERTIFICATE 10/4744

ECO PLATFORM EPD EN 15804 VERIFIED

INTERNATIONAL ACCREDITATION FORUM IAF

bre

NFRC LEADING ROOFING EXCELLENCE

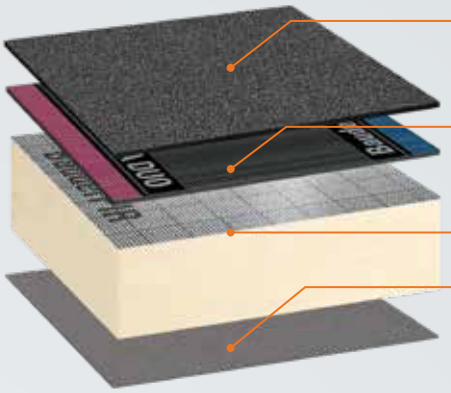
BAUDER TOTAL ROOF SYSTEM

Example System Configurations

BBA APPROVAL INSPECTION TESTING CERTIFICATION
CERTIFICATE 10/4744

BTRS INCORPORATING SELF-ADHESIVE MEMBRANES

Innovative heat-activated self-adhesive membranes for safety and speed, along with traditional torch-applied cap sheet. There is a choice of insulation types.



Bauder K5K
torch-applied, 5.2mm thick, SBS modified bitumen cap sheet reinforced with 250g/m² recycled spunbond polyester.

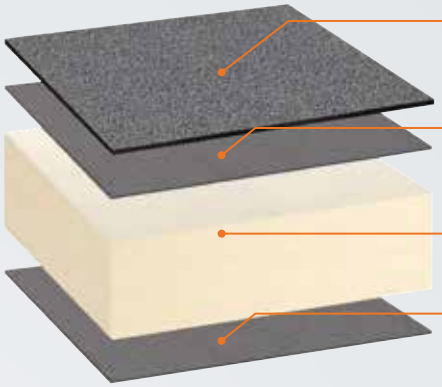
BauderTEC KSA DUO
3mm self-adhesive bitumen underlayer, for application to BauderPIR flatboard, BauderPIR FA-TE or BauderPIR Tapered Insulation.

BauderPIR FA-TE Insulation
rigid PIR flatboard with aluminium foil facings.

BauderTEC KSD Mica Vapour Barrier
self-adhesive elastomeric bituminous membrane with a mica finish. Suitable for all deck types with Bauder SA Bonding Primer or Bauder Multi-Purpose Primer.

BTRS WITH TORCH-APPLIED MEMBRANES

Traditional torch-applied membranes with a choice of insulation types.



Bauder K5K
torch-applied, 5.2mm thick, SBS modified bitumen cap sheet reinforced with 250g/m² recycled spunbond polyester.

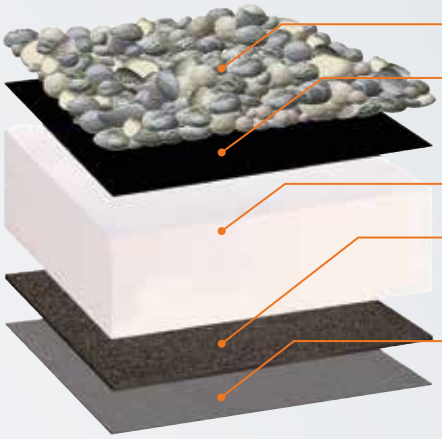
Bauder G4E
torch-applied bitumen underlayer, suitable for application to BauderPIR flat board or BauderPIR Tapered Insulation only, by partial bonding.

BauderPIR Insulation
rigid glass tissue faced flatboard bonded in Bauder Insulation Adhesive.

Bauder VB4 Expal
torch-applied vapour barrier suitable for application to new concrete or screeded decks with Bauder Quick Dry Primer or Bauder Multi-Purpose Primer.

BTRS INVERTED SYSTEM

Traditional torch-applied membranes with a choice of inverted insulation for use mainly on concrete decks.



Ballast
such as pebbles or paving.

BauderJFRI Vapour Permeable Membrane
designed to increase the thermal performance of the insulation and prevent fines from working their way beneath.

BauderJFRI
inverted insulation to achieve required 'U' value.

Bauder K5E
torch-applied, 5.2mm thick, SBS modified bitumen cap sheet reinforced with 250g/m² recycled spunbond polyester.

Bauder G4E
torch applied elastomeric bitumen underlayer suitable for concrete decks with Bauder Quick Dry Primer or Bauder Multi-Purpose Primer.

All configurations incorporate torch-free detailing on or adjacent to combustible construction materials.

Cap Sheet Colours


Natural Slate


Charcoal Grey


Brown


Plant E root barrier for green roofs

Safe2Torch REGISTERED

www.bauder.co.uk/technical-centre

PROJECTS

Highdown School & Sixth Form Centre
Reading

Royal Armouries
Leeds

Holy Trinity School

Andrew Ewing School
Hounslow, London

St. Bernard's Catholic Primary School
Ellesmere Port, Cheshire

PROJECT STUDIES

ROM Limited

BAUDER TOTAL ROOF SYSTEM

BUILDING BOARD

Project:	**ROM Ltd**
Location:	**Sheffield**
Roof Area:	**9,250m²**
Specifier:	**Mitie**
Approved Contractor:	**Mitie Tilley Roofing**

APPLIED PRODUCTS

- Bauder Total Roof System is the most technologically advanced bituminous system available, with a life expectancy in excess of 35 years.

ROM Ltd is a specialist manufacturer of reinforcement solutions that has facilities located throughout the UK and Ireland. The waterproofing on the roof of their Sheffield manufacturing facility had exceeded its serviceable life and the main-substructure was extremely corroded leaving it unstable and requiring urgent remedial work.

The client wanted the roof repair to cause as little impact on production levels at the facility as possible, so work on the 9,250m² roof was split into three separate phases. The original asphalt waterproofing was replaced with Bauder's premium bituminous system, BTRS, which is durable, robust and can withstand permanently sited loads of up to 2000Kg/m². The system build-up also included Bauder PIR insulation to achieve the required U-value.

One of the biggest challenges for this project was overcoming health and safety implications, especially considering the fragile state of the existing roof. To achieve this various control measures were implemented, such as installing safety netting below where the roofing works took place and managing the removal and addition of materials in a way that didn't cause any weight loading issues. Despite the logistical challenges encountered all works were completed on time and to budget, much to the delight of the client.

ROM

Location: **Sheffield**

"This project was by no means straight forward, however Bauder delivered expert support throughout all three phases of the work ensuring everything went as planned. The fact that the client experienced no loss in production during the refurbishment is testament to how well Bauder managed the roofing works. The client now has a high quality and visually appealing roof system that will give them confidence over its long term future performance."

Craig Hebberd, Mitie

Airedale Academy

BAUDER TOTAL ROOF SYSTEM

Airedale Academy is a secondary school and sixth form located in Castleford. As a result of a comprehensive Bauder roof survey it was identified that all of the original waterproofing at the academy had exceeded its serviceable life and was experiencing water ingress.

Prior to the work commencing on site, Bauder worked closely with the client to help them successfully secure £1.5 million of funding for the required work. All of the original waterproofing on the school's campus was then removed before being replaced with over 7,100m^2 of Bauder's premium reinforced bitumen system, BTRS, by approved contractor FRS Roofing Services. The system build-up included Bauder's PIR Insulation for superior thermal performance and tapered insulation to effectively create drainage falls.

A challenging element of this installation was the number of intricate detailing requirements, with the roof possessing over 20 separate roof areas, calling for exceptional levels of workmanship from FRS. There were also health and safety implications with there being significant amounts of asbestos that needed safely removing. Despite these challenges all works were completed as expected, much to the delight of the client.

AIREDALE ACADEMY

Location: **Castleford**

"Bauder provided us with all the technical support we needed to deliver a successful project from start to finish and we are delighted with the final outcome. Their waterproofing systems are of the absolute highest quality and they helped us overcome all of the funding, design and logistical challenges we encountered throughout."

Andrew Spurr, Premises Manager

BUILDING BOARD

Project:	**Airedale Academy**
Location:	**Castleford**
Roof Area:	**7,100m²**
Consultant:	**AHR Building Consultancy**
Approved Contractor:	**FRS Roofing Services**

APPLIED PRODUCTS

- Bauder Total Roof System is the most technologically advanced bituminous system available, with a life expectancy in excess of 40 years.

BAUDER TOTAL GREEN ROOF SYSTEM

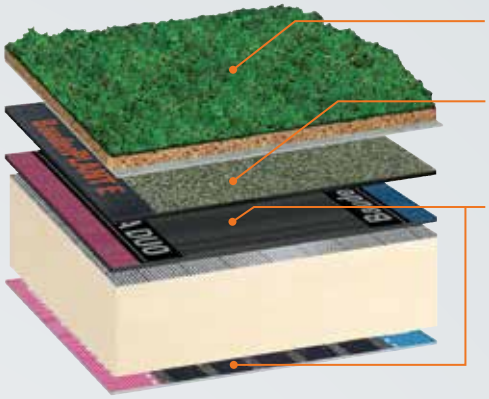
Example System Configurations

Plant-E root resistant cap sheet, which incorporates chemically treated elastomeric bitumen meets FLL requirements and complies with BS EN 13707:2004.

EXTENSIVE ROOFSCAPE SYSTEM

The extensive finishes can include biodiverse planting and associated elements, sedum, herbs or native species planting.

The system is equally suited to either new build or refurbishment.



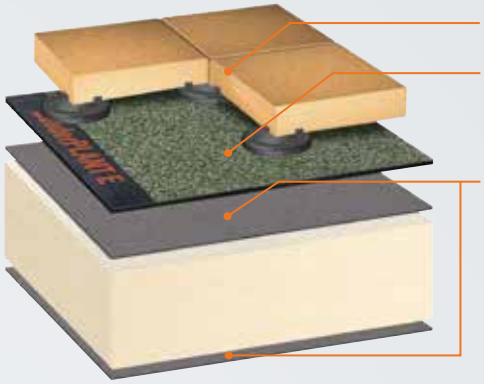
Bauder Sedum System
hardy pre-cultivated sedum plants for instant greening of a roof.

Bauder Plant-E
root resistant, 5.2mm thick, SBS modified bitumen cap sheet reinforced with 250g/m² recycled spunbond polyester.

Bauder Warm Roof Construction
self-adhesive bitumen membranes and BauderPIR insulation.

HARD LANDSCAPING SYSTEM

With decking or paving on pedestal support system for all types of terraces and balconies.



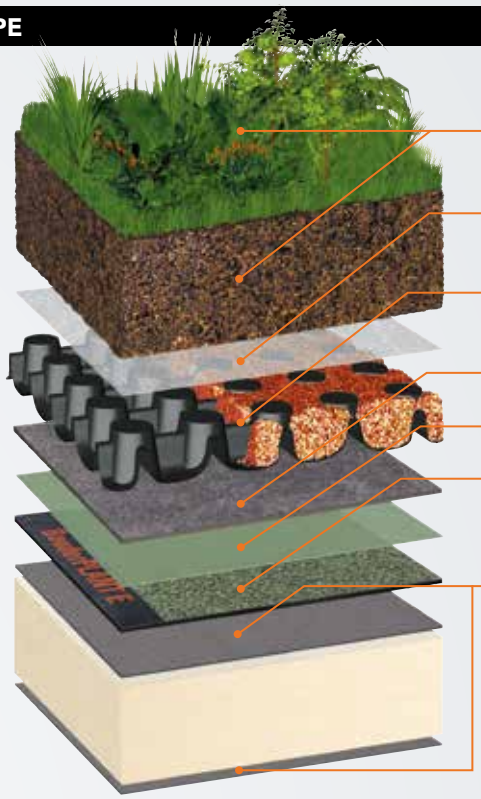
Paving or Decking
on pedestal support system.

Bauder Plant-E
root resistant, 5.2mm thick, SBS modified bitumen cap sheet reinforced with 250g/m² recycled spunbond polyester.

Bauder Warm Roof Construction
torch-bonded bitumen membranes and BauderPIR insulation.

INTENSIVE ROOFSCAPE

The intensive roofscape finishes may incorporate forms of hard and soft landscaping found within recreational gardens, including lawns, plants, shrubs or trees, pathways, roadways and raised planters.



Vegetation with Intensive Substrate
lightweight growing medium to support the planting scheme.

Filter Fleece
prevents substrate fines from washing into the drainage layer.

DSE 60
water storage and drainage layer infilled with Bauder mineral drain.

FSM 1100
protection mat.

PE Foil
separation and slip layer.

Bauder Plant-E
root resistant, 5.2mm thick, SBS modified bitumen cap sheet reinforced with 250g/m² recycled spunbond polyester.

Bauder Warm Roof Construction
torch-bonded bitumen membranes and BauderPIR insulation.

www.bauder.co.uk/technical-centre

GREEN ROOF PROJECTS

Dawyck Botanic Garden Visitor Centre
Stobo, Scottish Borders

Gunpowder Park
Lee Valley, Greater London

Waitrose
Bagshot

James Terry Court
London

BAUDERFLEX SYSTEM

Johnson Fold Community Primary School
Bolton, Lancashire

Johnson Fold Community Primary School, Bolton, Lancashire is surrounded by pleasant lawns and gardens. It was built in 1953 and was recently extended to incorporate a community room and centre. The school roofs were refurbished using the Bauderflex System.

Bauderflex utilises the same technology as the Bauder Total Roof System, but offers an alternative to the specifier on a tighter budget. It is a highly rated reinforced bitumen membrane system with a choice of self-adhesive and torch-applied membranes that are resistant to high levels of structural and thermal movement. The SBS modified elastomeric membranes provide a robust, durable and highly adaptable solution that can withstand foot traffic and most permanently sited plant and equipment.

The system is estimated to have a life expectancy in excess of 25 years and is ideal for both new build and refurbishment flat roof projects.

Key Features

- 4.2mm thick, torch bonded SBS elastomeric bitumen cap sheet reinforced with 250g/m² recycled spunbound polyester giving a tensile strength (EN 12311-1) of 800N/50mm to prevent tears and punctures.
- BBA certified life expectancy in excess of 25 years.
- Utilises torch-free detailing on or adjacent to combustible construction materials.
- Stable in extreme weather conditions for temperatures ranging from -30°C to +110°C when tested to the following European Standards; cold bending test (EN 1109) and heat stability test (EN 1110).
- BBA Certification 10/4744.
- Fire classification B roof (t4) and verified by the BBA as 'unrestricted' and suitable for use on any part of a roof.
- Guaranteed system.

Specification Support

Specification downloads:
www.bauder.co.uk/technical-centre

NBSPlus BIM DWG

Telephone helpline:
0845 271 8800

Safe2Torch REGISTERED

CE

BBA APPROVAL INSPECTION TESTING CERTIFICATION CERTIFICATE 10/4744

ECO PLATFORM EPD EN 15804 VERIFIED

INTERNATIONAL ACCREDITATION FORUM IAF

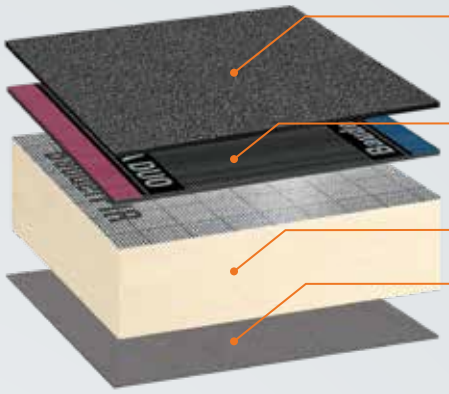
bre NFRC LEADING ROOFING EXCELLENCE

BAUDERFLEX SYSTEM

Example System Configurations

BAUDERFLEX WITH INCORPORATING - ADHESIVE MEMBRANES

Innovative heat-activated self-adhesive membranes for safety and speed, along with traditional torch-applied cap sheet for unrivalled waterproofing integrity. There is also a choice of insulation types.



Bauder K4E
torch-applied, 4.2mm thick, SBS modified bitumen cap sheet reinforced with 250g/m² recycled spunbond polyester.

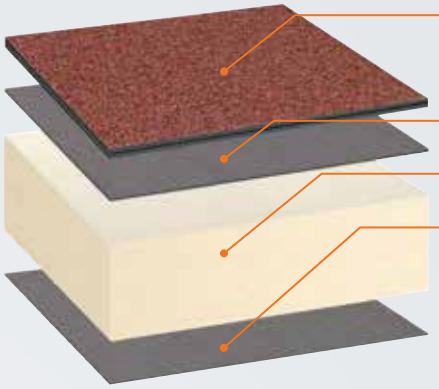
BauderTEC SPRINT DUO
2mm self-adhesive SBS modified bitumen underlayer with a glass lattice reinforcement, incorporating the patented 'DUO' lap technology.

BauderPIR FA-TE Insulation
rigid PIR flatboard with aluminium foil facings.

BauderTEC KSD Mica Vapour Barrier
self-adhesive elastomeric bituminous membrane with a mica finish. Suitable for deck types with Bauder SA Bonding Primer or Bauder Multi-Purpose Primer.

BAUDERFLEX WITH TORCH-APPLIED MEMBRANES

Traditional torch-bonded membranes with a choice of insulation types.



Bauder K4E
torch-applied, 4.2mm thick, SBS modified bitumen cap sheet reinforced with 250g/m² recycled spunbond polyester.

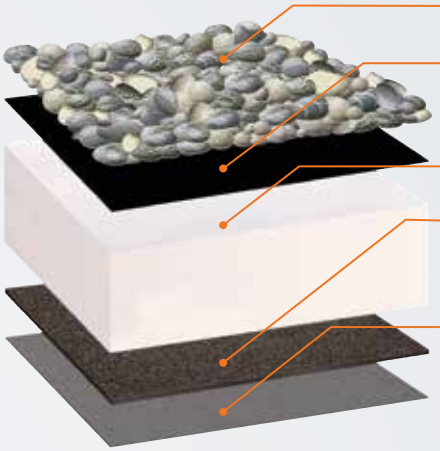
Bauder EGV3.5
3.5mm torch-applied SBS modified bitumen underlayer.

BauderPIR Insulation
rigid PIR flatboard with glass tissue facings.

Bauder EVA 35
torch-applied 3.5mm thick SBS modified bitumen vapour barrier. Suitable for metal or concrete decks with Bauder Quick Dry Primer or Bauder Bauder Multi-Purpose Primer.

BAUDERFLEX INVERTED SYSTEM - TORCH APPLIED MEMBRANES

Traditional torch-applied membranes with a choice of inverted insulation types for use mainly on concrete decks.



Ballast
such as pebbles or paving.

BauderJFRI Vapour Permeable Membrane
designed to increase the thermal performance of the insulation whilst preventing fines from working their way beneath.

BauderJFRI
inverted insulation to achieve required 'U' value.

Bauder K4E
torch-applied, 4.2mm thick, SBS modified bitumen cap sheet reinforced with 250g/m² recycled spunbond polyester.

Bauder EGV3.5
3.5mm torch-applied SBS modified bitumen underlayer suitable for concrete decks with Bauder Quick Dry Primer or Bauder Multi-Purpose Primer.

All configurations incorporate torch-free detailing on or adjacent to combustible construction materials.

Cap Sheet Colours


Natural Slate


Charcoal Grey


Brown

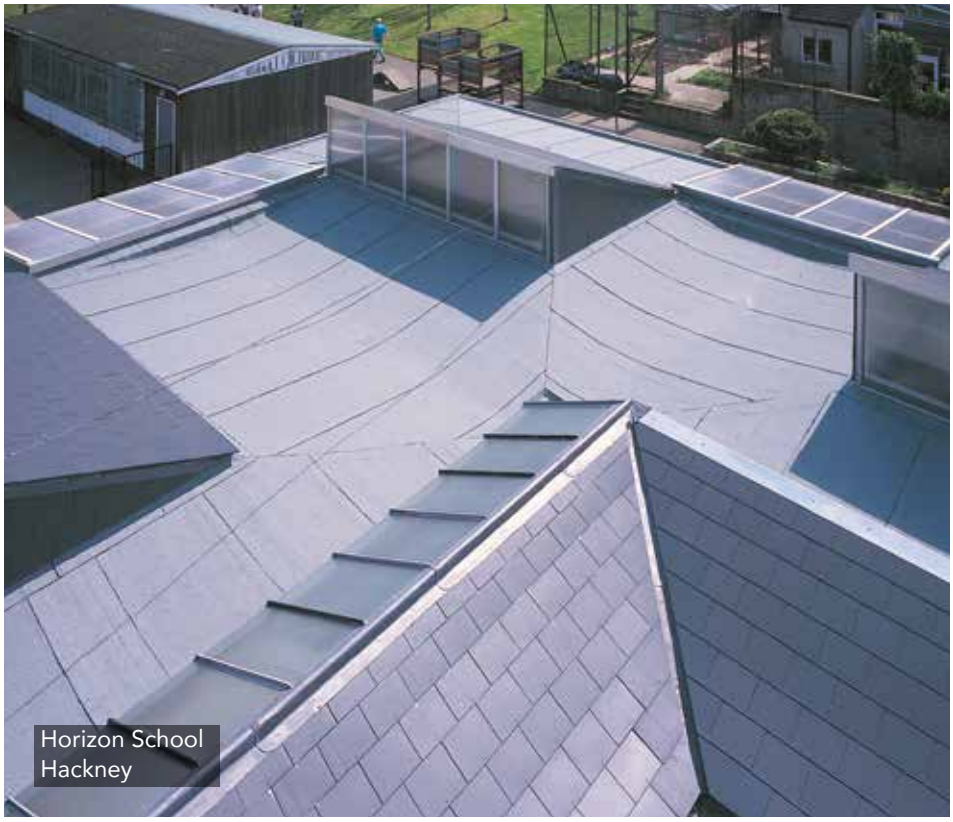

AP2 root barrier for green roofs

www.bauder.co.uk/technical-centre

PROJECTS

Johnson Fold School
Bolton, Lancashire

Oldham College
Greater Manchester



Horizon School
Hackney

Hotter Shoes
Skelmersdale, Lancashire

SYSTEM AIRTECH

System Airtech has been specifically developed to meet the demands for improved safety in the installation of bituminous roof systems. Superior self-adhesive membrane technology, and hot air welding combine to eliminate the inherent dangers of naked flame and hot bitumen.

Airtech is not only safer to install, but also faster, cleaner and quieter than traditional pour and roll or torch-applied bituminous systems.

The system has an estimated life expectancy in excess of 30 years and is ideal for both new build and refurbishment flat roof projects.

Key Features and Benefits

- 4mm thick, self-adhesive elastomeric bitumen cap sheet with hot air welding at the laps for a flame-free solution.
- Completely torch-free system.
- Able to withstand climatic extremes and temperature differences at the edges of ice and water; stable in extreme weather conditions for temperatures ranging from -30°C to +100°C when tested to the following European Standards; Cold bending test (EN 1109) and heat stability test (EN 1110).
- The system is resilient, tough, long lasting and is easily capable of withstanding foot traffic or permanent loads of up to 2000Kg/m².
- Guaranteed system.

The system can be used in both warm roof and cold roof design on most types of decking materials and also as an overlay on certain types of existing roofing materials.

The patented DUO membrane laps on the underlayer are heat sealed with hot air welding equipment, extruding a bitumen bead to provide a completely watertight layer across the whole roof.

University of Essex
Colchester

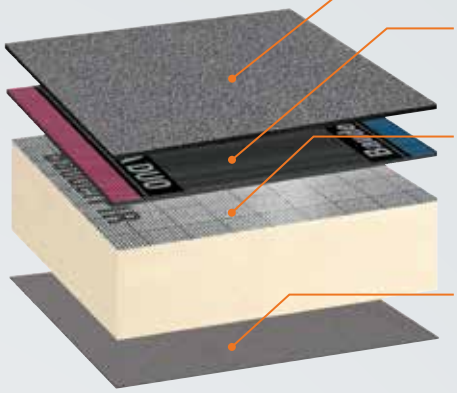
Specification Support

Specification downloads:
www.bauder.co.uk/technical-centre

Telephone helpline:
0845 271 8800

System Configuration

SYSTEM AIRTECH WARM ROOF



BauderTEC KSO SN Cap Sheet
self-adhesive elastomeric bituminous membrane with laps sealed using hot air welding equipment.

BauderTEC KSA DUO Underlayer
self-adhesive elastomeric bituminous membrane with glass lattice reinforcement that incorporates our patented 'DUO' lap technology.

BauderPIR FA-TE Insulation
extremely thermally efficient, lightweight, fire resistant and zero ODP rated. The insulation is foil faced on both sides. **BauderPIR Tapered Insulation** can be used beneath a layer of PIR FA-TE to provide improved drainage falls. Bonded to the vapour barrier using Bauder Insulation Adhesive.

BauderTEC KSD Mica Vapour Barrier
self-adhesive elastomeric bituminous membrane with a mica finish. Suitable for deck types with Bauder SA Bonding Primer or Bauder Multi-Purpose Primer.

Cap Sheet Colours


Natural Slate


Brown

www.bauder.co.uk/technical-centre

System Installation

The laps are sealed using a hot air welding machine to create a secure and watertight joint.


Fairstead Community Primary School
King's Lynn


Waddesdon Manor Aviary
Aylesbury

PRO F SYSTEM

Our PRO F system is a single layer waterproofing solution designed to be torch-applied or mechanically fixed over Bauder PIR insulation and is suitable for new build and refurbishment applications.

The system offers a real alternative to traditional single ply membranes or other bitumen single layer systems which often require the use of adhesive for attachment of the membrane.

Bauder PRO F is a high quality, heavy duty, elastomeric bitumen membrane. The product features a spunbond polyester reinforcement that allows the finished membrane to cope with structural movement without fracture, and a mineral finish to provide protection against UV degradation.

Key Features and Benefits

- 5.2mm single layer durable bitumen membrane system.
- Life expectancy of 30 years.
- Utilises Torch-free detailing on or adjacent to combustible construction materials.
- Installed over Bauder PIR insulation.
- 250g/m^2 recycled spunbond polyester reinforcement.
- Suitable for new build and refurbishment applications on flat roofs with a minimum fall of 1:60.
- Mechanically fastened or partially bonded cap sheet.
- The membrane laps can be welded together by using hot air or gas torch.
- Fire classification B roof (t4) 'unrestricted' and suitable for use on any part of a roof.
- Guaranteed system.

Specification Support

Specification downloads:
www.bauder.co.uk/technical-centre

Telephone helpline:
0845 271 8800

Safe2Torch REGISTERED

ECO PLATFORM EPD EN 15804 VERIFIED

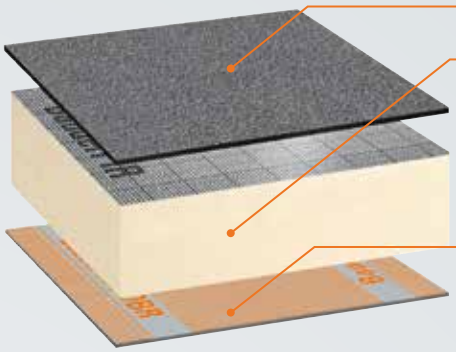
CE

NFRC LEADING ROOFING EXCELLENCE

Example System Configurations

MECHANICALLY FIXED

Attachment of the system uses high performance mechanical fasteners and extending tube, or washer plate combinations.



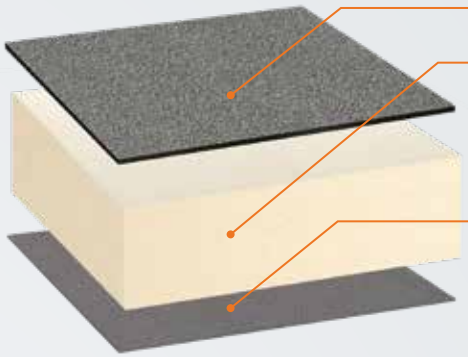
Bauder PRO F
5.2mm heavy duty elastomeric bitumen cap sheet.

BauderPIR FA-TE Insulation
extremely thermally efficient, lightweight, fire resistant and zero ODP rated. The insulation is foil faced on both sides. **BauderPIR Tapered Insulation** can be used beneath a layer of PIR FA-TE to provide improved drainage falls. Bonded to the vapour barrier using Bauder insulation adhesive.

BauderTEC DBR
self-adhesive elastomeric bitumen vapour barrier for use on all deck types with Bauder SA Bonding Primer or Bauder Multi-Purpose Primer.

TORCH-BONDED

The capping sheet is bonded with a gas torch.



Bauder PRO F
5.2mm heavy duty elastomeric bitumen cap sheet.

BauderPIR Flatboard Insulation
highly thermally efficient, lightweight, fire resistant and zero ODP rated. The insulation has mineralised glass fibre facings on both sides. As an alternative, **BauderPIR Tapered Insulation** can be used to provide improved drainage falls.

BauderTEC KSD Mica Vapour Barrier
self-adhesive elastomeric bituminous membrane with a mica finish. Suitable for deck types with Bauder SA Bonding Primer or Bauder Multi-Purpose Primer.

All configurations incorporate torch-free detailing on or adjacent to combustible construction materials.

Cap Sheet Colours

Natural Slate

Green / White

Safe2Torch REGISTERED

www.bauder.co.uk/technical-centre

BAUDERTHERM 'STRIPES'

When a roof covering is reaching the end of its serviceable life, but is still essentially waterproof, overlaying the existing system is a sensible way of considerably enhancing the life expectancy of the roof by at least 15 years; providing that the thermal properties of the roof are satisfactory.

BauderTHERM 'Stripes' can be used over existing asphalt or reinforced bitumen membrane systems; roofs with a traditional chipping finish may also be suitable if the existing finish can either be adequately removed by a suitable mechanical scarifying machine, or overlaid with a recovery board. Refurbishment of roofs containing insulation are also suitable, providing they do not suffer from moisture contamination or degradation problems.

It is possible to overlay existing waterproofing where a small amount of entrapped moisture is present, as the stripes finish to the underside of the SL500 cap sheet allows any vapour pressure to dissipate in a controlled fashion, reducing the possibility of surface blistering after installation.

Key Features

- 5.2mm thick, torch bonded elastomeric bitumen membrane.
- 250g/m² recycled spunbond polyester reinforcement to give a tensile strength of 1000N/50mm.
- Life expectancy of around 20 years.
- Utilises Torch-free detailing on or adjacent to combustible construction materials.
- Stable in extreme weather conditions for temperatures ranging from -30°C to +105°C when tested to the following European Standards; cold bending test (EN 1109) and heat stability test (EN 1110).
- Guaranteed system.

BauderTHERM 'Stripes' consists of a single layer membrane with two layers provided at all upstands and details to provide extra reinforcement at these more vulnerable areas and a longer life expectancy for the roof.

Specification Support

Specification downloads:
www.bauder.co.uk/technical-centre

Telephone helpline:
0845 271 8800

Safe2Torch REGISTERED

ECO PLATFORM EPD EN 15804 VERIFIED

CE

NFRC LEADING ROOFING EXCELLENCE

The underside of the Bauder SL500 membrane features a highly adhesive thermally activated SBS elastomeric bitumen resin, set in a 'stripes' bonding pattern at pre-determined intervals across the membrane surface.

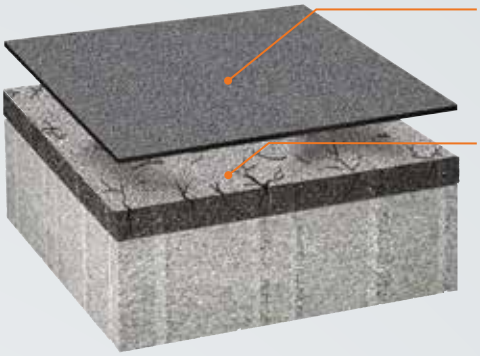
This unique bonding pattern ensures an accurate 50% bond to the existing waterproofing beneath. The area between the stripes is coated with a special mica finish that remains unbonded, allowing room for any future expansion of moisture vapour that may be present in the overlaid system. This technology helps to reduce the likelihood of interlayer blistering after installation, which is commonly associated with traditional overlays.

System Configuration

TORCH-BONDED

The Bauder SL500 membrane is torch-applied to the existing waterproofing with a 50% bond to allow for any future expansion of moisture vapour that may be present in the overlaid system.

Utilises Torch-free detailing on or adjacent to combustible construction materials.



BauderTHERM SL500
5.2mm thick heavy duty elastomeric bitumen overlay refurbishment membrane, installed over the current waterproofing with Bauder Quick Dry Primer or Bauder Multi-Purpose Primer.

Existing Roof System
e.g. Asphalt.

Cap Sheet Colour

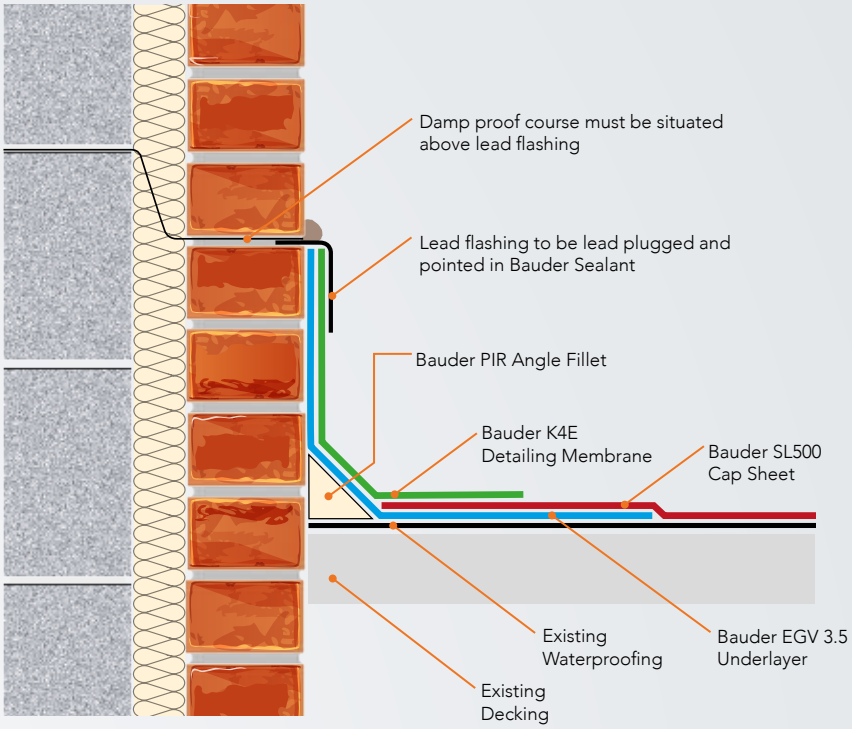
Natural Slate

Safe2Torch REGISTERED

Installation Configuration

All roof details are installed with Bauder K4E Detailing Membrane and EGV 3.5 Underlayer for robust interfacing.

Note:
Torch-safe detailing required where necessary.



www.bauder.co.uk/technical-centre

TORCH-FREE DETAILING FOR ALL

Safe Installation of Reinforced Bitumen Membrane Systems

In order to reduce risk when installing torch-applied systems, consideration must be given to avoiding the use of a gas-torch in the vicinity of combustible materials.

Our torch-free detailing is integral within all Bauder bituminous waterproofing solutions, and is designed specifically to deliver secure and safe application where necessary.

The foundation for our torch-free detailing is the group of hot air welded, self-adhesive, SBS modified bitumen membranes for the vapour control layer, underlayer and cap sheet. These membranes and their application techniques conform to the recommendations given in the 'Safe 2 Torch' guidance published July 2017 by the National Federation of Roofing Contractors (NFRC).

Bauder was the first flat roof waterproofing manufacturer to promote and pledge support to the NFRC's Safe*2*Torch campaign, recognising our role as an industry leading supplier to endorse safety best practice through our products and to promote to our approved contractors the safest installation methods possible in every flat roof project we are involved in.

BITUMEN MEMBRANE SYSTEMS

Industry Best Practice

The key to industry best practice for the application of bituminous membranes is the responsible identification of combustible construction materials on the roof and specifying the correct combination of detailing and field area membranes. In addition specific installation methods need to follow the British Standards 8217:2005 code of practice and NFRC guidelines.

Principally, this installation best practice will impact on refurbishment roof projects, though responsibilities also reside with all parties involved in the design and construction of a new build project under the Construction Design and Management (CDM) Regulation 2015 to ensure that hazardous details are fully considered or designed out. In some instances, this could impact on sequencing of construction works to ensure that the roof materials are installed prior to other combustible elements being constructed.

Torch-Free Roof Zones

The roof areas which have details formed with, or are adjacent to, combustible construction materials require an exclusion zone to be identified in a minimum 900mm radius from the material. This sanction demands specific membranes, particular design, and accurate torch-free installation techniques.

Our torch-free detailing design utilises our self-adhesive membranes for all three built-up waterproofing layers comprising the vapour control layer, underlayer and cap sheet. All laps for these membranes are sealed using hot air welding.

In a warm roof construction, the insulation is bonded to the vapour control layer with Bauder PU Insulation Adhesive.

A completely torch-free installation option is available for an entire roof project with our Bauder Airtech System incorporating the KSO SN cap sheet in natural slate or brown.

Safe to Torch Roof Zones

In certain situations, it is perfectly safe to use torch-bonded bitumen membranes and roof areas involving non-combustible materials.

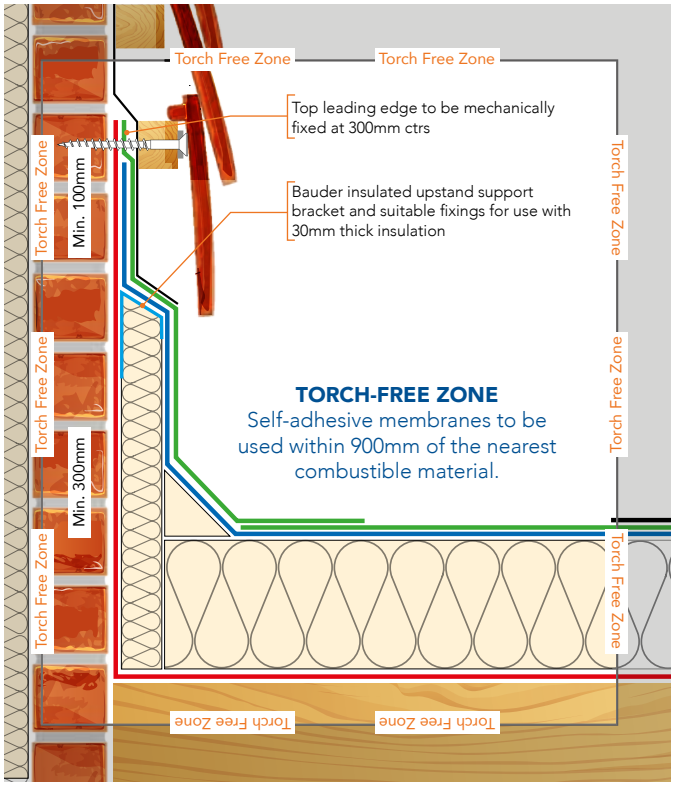
There are two options for safe to torch application and these are dependent on the specific detail and the construction materials used:

1. The roof area does not have any combustible materials within its construction and is safe to accept torch-applied membranes, such as a concrete deck.

or

2. Full encapsulation of the exposed combustible detail with self-adhesive underlayer, installed using hot air welding so that the detail is now risk-free and a torch-bonded cap sheet is subsequently safe to install.

Be safe, make safe, is safe



Specification Support

Specification downloads:
www.bauder.co.uk/technical-centre

Telephone helpline:
0845 271 8800

Safe2Torch REGISTERED

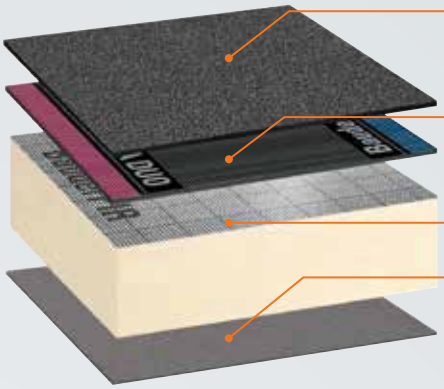
LEADING ROOFING EXCELLENCE

TORCH-FREE DETAILING

System Configuration

TORCH-FREE DETAILING WITH SELF-ADHESIVE MEMBRANES

Innovative self-adhesive membranes for safety first installation using hot air welding to seal the laps. There is a choice of insulation types.



Bauder KSO SN or KSO-P SN
hot air welded, 4mm thick, SBS modified bitumen detailing cap sheet.

BauderTEC KSA DUO
3mm self-adhesive bitumen underlayer, for application to BauderPIR flatboard, BauderPIR FA-TE or BauderPIR Tapered Insulation.

BauderPIR FA-TE Insulation
rigid PIR flatboard with aluminium foil facings.

Bauder KSD Mica
self-adhesive vapour barrier reinforced with polyester coated aluminium foil and 60g/m² glass fleece.

Cap Sheet Colours

KSO SN	KSO-P SN
Natural Slate	Charcoal Grey
Brown	

Safe2Torch REGISTERED

www.bauder.co.uk/technical-centre

System Installation

Release film removed from the self-adhesive vapour control layer for installation on the primed combustible deck.

The torch-free zone is marked out around all combustible detailing.

Hot air welding the underlayer within the torch-free zone.

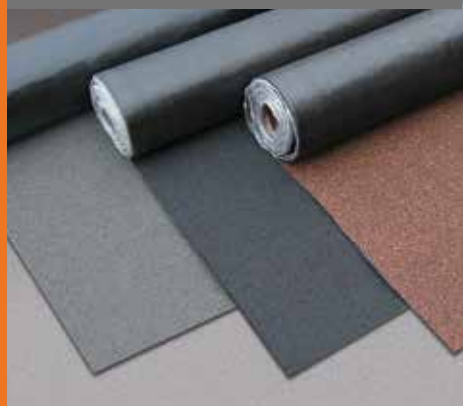
Cap sheet detailing membrane hot air welded within the torch-free zone.

EXAMPLES OF TORCH-FREE DETAILS

Technical Guide

Reinforced Bitumen Membrane Systems

Bitumen membranes >>



DOWNLOADS

- BIM
- NBS
- CAD
- Product Data Sheets
- BBA Certificates
- FM Approval
- EPD Certificates
- ISO
- DoP
- Design Guides

www.bauder.co.uk/technical-centre

SYSTEM APPLICATION

MEMBRANE APPLICATION

Bitumen Membrane Primers

Following suitable preparation of the substrate, the first stage of any Bauder reinforced bitumen membrane system is the application of a suitable primer. This will ensure a satisfactory bond of the first layer to provide resistance against wind uplift throughout the system's lifespan. Three Bauder primers are currently available.

Bauder Quick Dry Primer

This roller applied product is designed for use beneath torch-bonded membranes and helps to seal the substrate and improve adhesion.

Bauder SA Bonding Primer

Developed for use with Bauder self-adhesive bitumen membranes, this roller applied product activates the self-adhesive bitumen on the underside of the membrane to ensure a good bond strength, particularly at lower temperatures.

Bauder Multi-Purpose Primer

Our latest development is a spray-applied primer which is suitable for the preparation of substrates prior to the installation of both torch-bonded and self-adhesive bitumen membranes. It can also be used as an activator to improve the bond between a self-adhesive cap sheet and underlayer, particularly in colder temperatures.

Torch Bonded Membranes

The method of torch bonding bituminous membranes is widely used throughout the industry and provides a reliable method for securing a watertight installation across the roof. Only suitable in the presence of non-combusible substrates/materials.

Self-Adhesive Membranes

These membranes are always specified when combustible substrates are involved, and can be installed simply by removing the peel off release film.

'DUO' Lap Bonding

The self-adhesive 'DUO' products require the laps to be heat sealed red over blue to extrude a bitumen bead – the sign of a homogenous bond.

Click Watch Follow

Watch the installation videos on our website bauder.co.uk/technical-centre/installation-videos

INSULATION APPLICATION

There are two methods of bonding insulation that can be used depending on the system specified:

Factory Therm Applied Bitumen Adhesive

Bauder DS1 DUO vapour barrier has strips of bitumen adhesive factory bonded to its uppermost surface, covered with a thin polyethylene film to prevent it sticking to itself inside the roll. Once the product is installed, the surface can be heated with the flame of the gas torch causing the polythene to disappear and the adhesive to become activated. The insulation is then placed into position immediately, and a strong bond is achieved instantly.

Bauder Insulation Adhesives

Two types of insulation adhesive are available in the Bauder product range.

The most versatile product is a twin-cartridge chemically curing polyurethane adhesive for all insulation bonding applications, especially for use on vertical surfaces due to its initial grab characteristics. It is also the only adhesive suitable for bonding aluminium faced insulation boards together.

Alternatively, our foaming polyurethane adhesive is available in a tin for pouring on to the vapour barrier in strips so that each insulation board is set into three rows across the field area of the roof and in four rows at the perimeters to ensure effective resistance to wind uplift.

DETAILING

General Detailing

At all perimeters and details the vapour barrier is taken up the detail to lap with the underlayer by a minimum 100mm. This applies to all Bauder RBM systems, and is important to give security to the system during high winds. This practice also ensures that any water ingress at details will not contaminate the insulation as it is totally encapsulated. Our detail drawings are available to download from our website bauder.co.uk/technical-centre

Protection at System Termination

Protection must be provided at all vulnerable edges of the system to prevent water ingress behind. This may be a metal coverflashing or a cladding system in the case of an upstand to a wall, or a welded collar around a plant support leg. Bauder will provide a range of standard drawings showing preferred solutions to common problems on request.

Angle Fillets

At all 90° internal bends, at horizontal / vertical interfaces, Bauder angle fillets are provided above the insulation in order to soften the angle and make it easier to seal where the membrane laps occur at the interface. In a cold roof design fillets should be used prior to installing the waterproofing membranes.

Separate Flashings

The cap sheet should never be taken across the roof and up a detail in one piece as the polyester within the cap sheet may shrink over time causing ripples and de-bonding of the membrane. All Bauder details show separate cap sheet flashings to counteract this.

Welted Drips

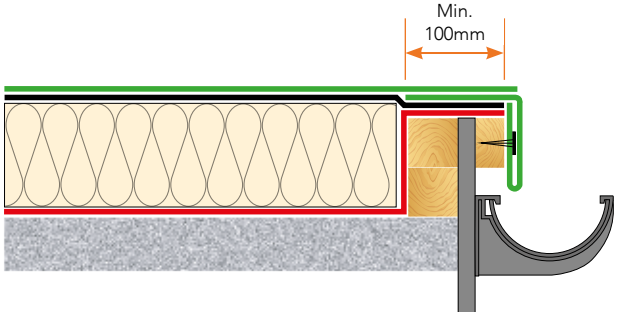
This traditional method of terminating the membranes at the roof edge, whether at a kerb or external gutter, remains a favourite. The method of creating a welted drip is detailed in Codes of Practice BS8217 and shown on many Bauder detail drawings.

GRP Edge Trims

A more aesthetically pleasing alternative to a welted drip at the edge kerb is a GRP trim. We can supply these in black as standard. We advise against the use of metal trims (particularly aluminium) as these have been a common cause of problems in past years - their high rate of expansion and contraction causing splits to traditional felt membranes and asphalt on the top of the kerb directly above trim joints.

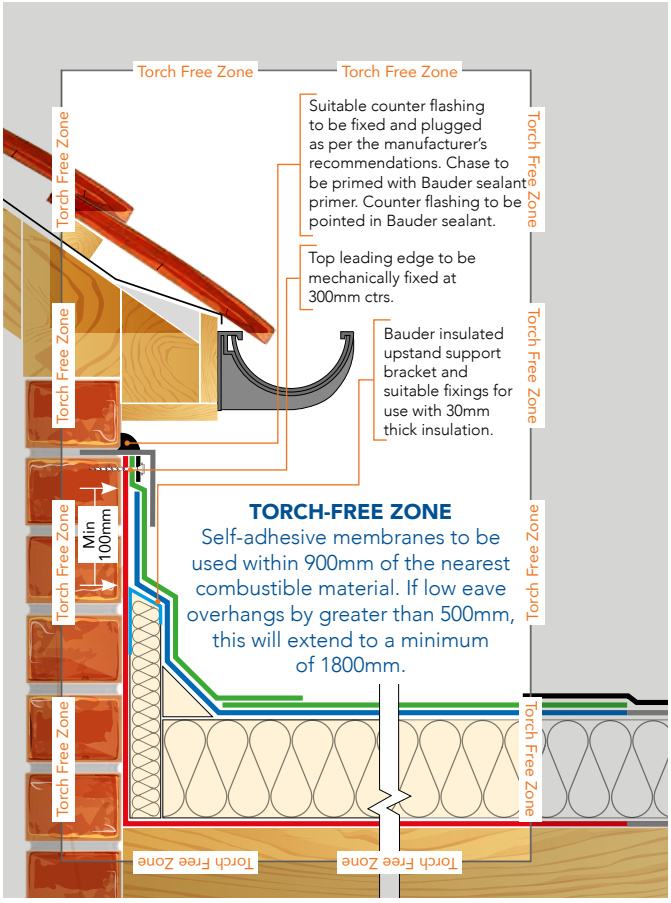
Timber Protection Plates

These are to be provided against the exposed edges of insulation to prevent mechanical damage (gutter edges, drip edges etc.). The use of a batten or timber plate will depend upon the actual situation. A 100mm timber plate should be used where water drains off or over the detail and the thickness of the waterproofing build-up must be accommodated to avoid the creation of a water check. The plate must be at least 15mm less than the thickness of the insulation.



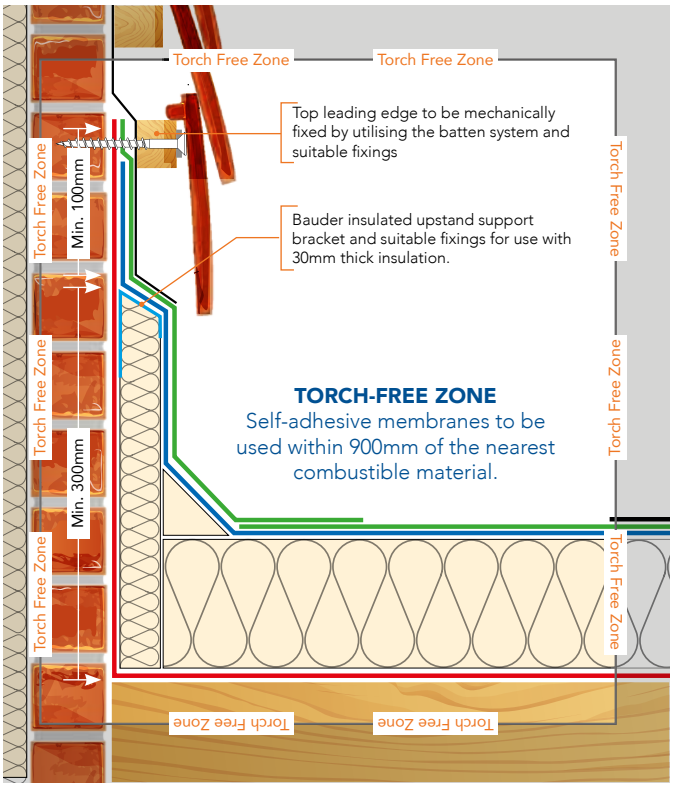
All CAD details can be downloaded from our website bauder.co.uk/technical-centre

TORCH-FREE DETAILS



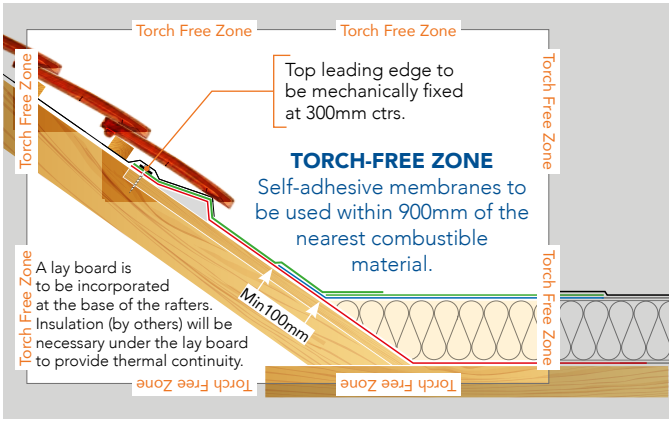
Insulated Upstand to Exisiting Low Eaves

Some details of this nature have a very large overhang, in which case it will be necessary to increase the amount of torch-free products accordingly to enable the torch-free zone to be maintained.



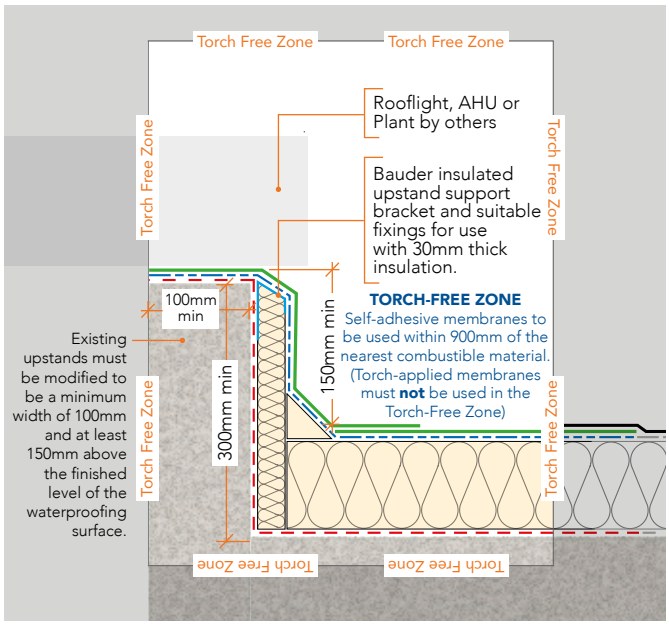
Insulated Upstand to Vertical Tiles

This detail will always require torch-free application due to the potential presence of combustible products behind the vertical tiles. The top leading edge of the waterproofing upstand will need to be mechanically fixed at 300mm centres, by utilising the batten system fixings or a separate fixing bar.



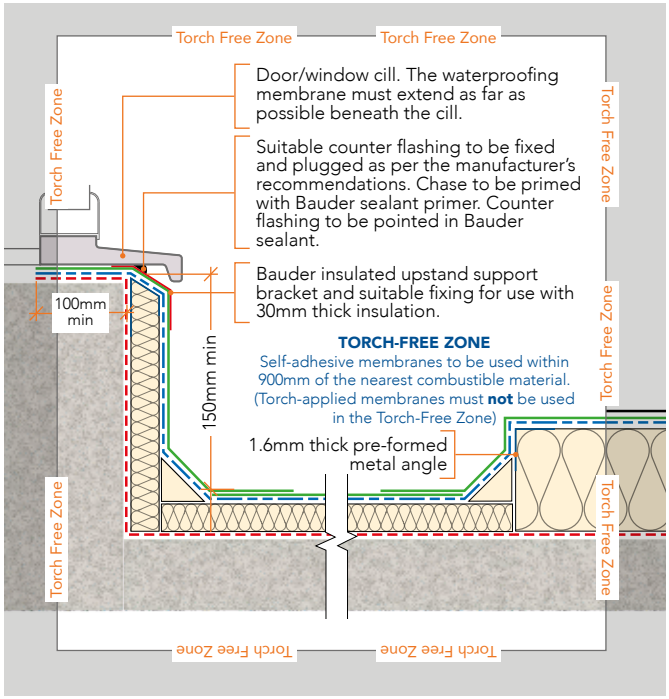
Upstand to Pitched Roof

This detail will always require torch-free application due to the potential presence of combustible products beneath the tiles. The bottom rows of tiles must be removed and the underslating pinned back as necessary to allow the roof membranes to be taken to a minimum upstand height of 150mm using torch-free installation methods.



Insulated Upstand to Builder's Kerb

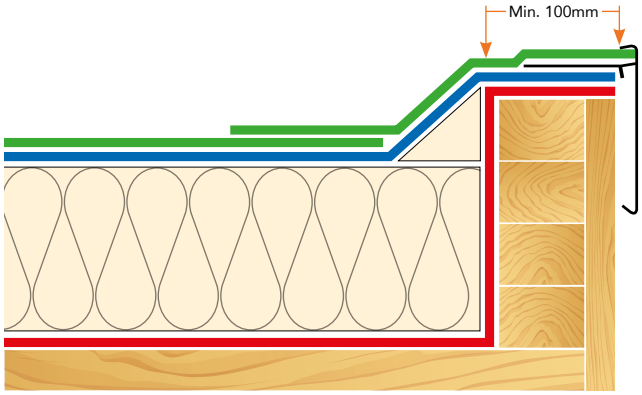
This detail will always require torch-free application due to the potential presence of combustible products within the unit above the waterproofing. The top leading edge of the waterproofing upstand will need to be mechanically fixed at 300mm centres using appropriate fastened, and suitable termination bar if required.



Internal Gutter Clerestory Window

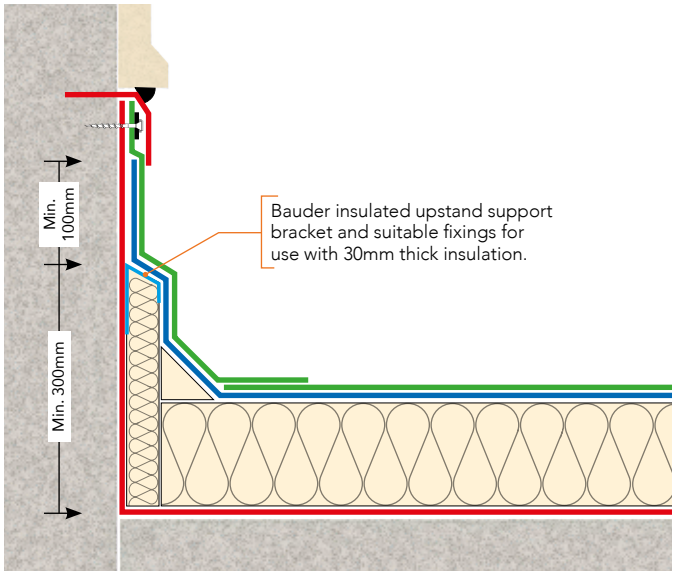
This detail will always require torch-free application due to the potential presence of combustible products behind the cill and also the cill itself. The top leading edge of the waterproofing upstand will need to be mechanically fixed at 30mm centre using appropriate fasteners, and suitable termination bar if required.

SAFE TO TORCH DETAILS



Perimeter Kerb

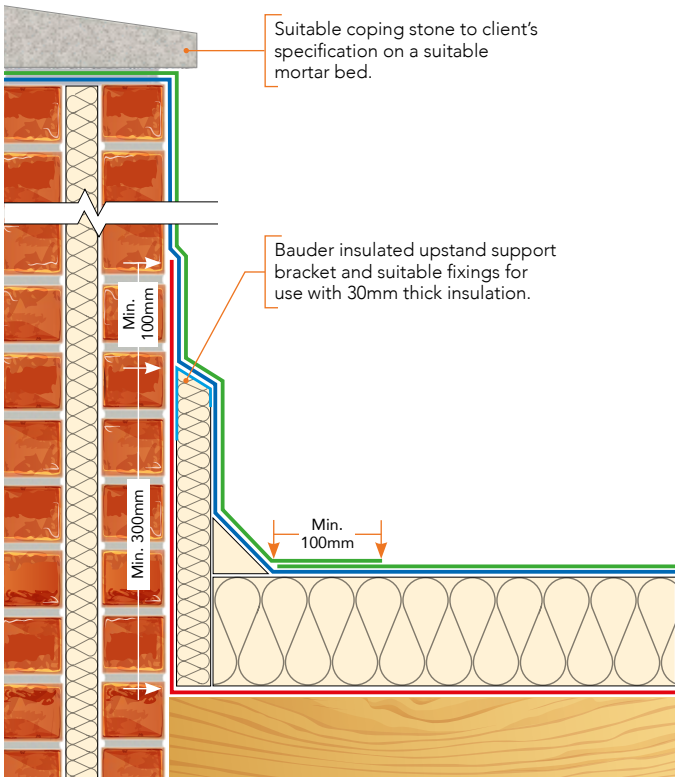
Providing a self-adhesive vapour control layer and self-adhesive underlayer are used there is no need for a minimum 900mm torch-free zone on perimeter details of this type.



Insulated Upstand

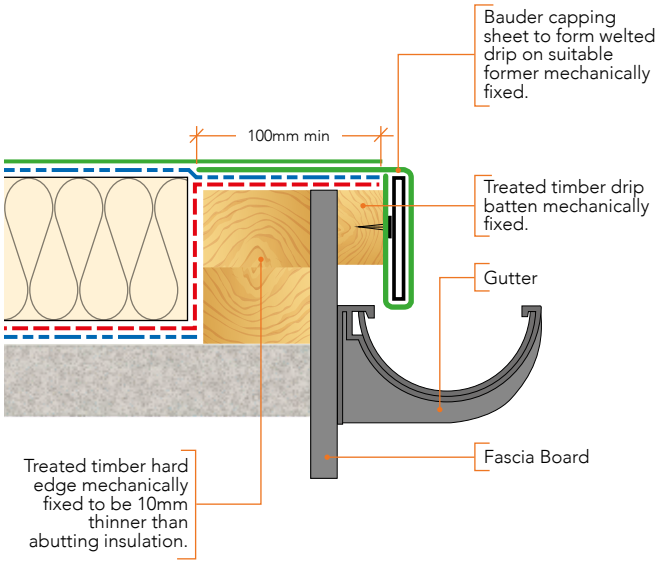
Upstands to brickwork can be treated as torch-safe, unless cavity weepholes are present, in which case they should be treated as torch-free.

Suitable counter flashing to be fixed and plugged as per the manufacturer's recommendations. Chase to be primed with Bauder sealant primer. Counter flashing to be pointed in Bauder sealant.



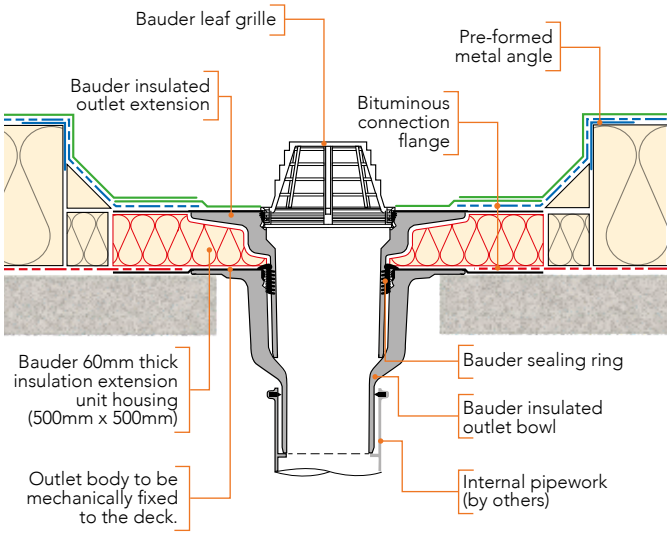
Insulated Parapet Upstand

Self-adhesive vapour control layer and self-adhesive underlayer can be used to cover all combustible substrates making the detail torch-safe for subsequent application of the capping sheet.



External Gutter

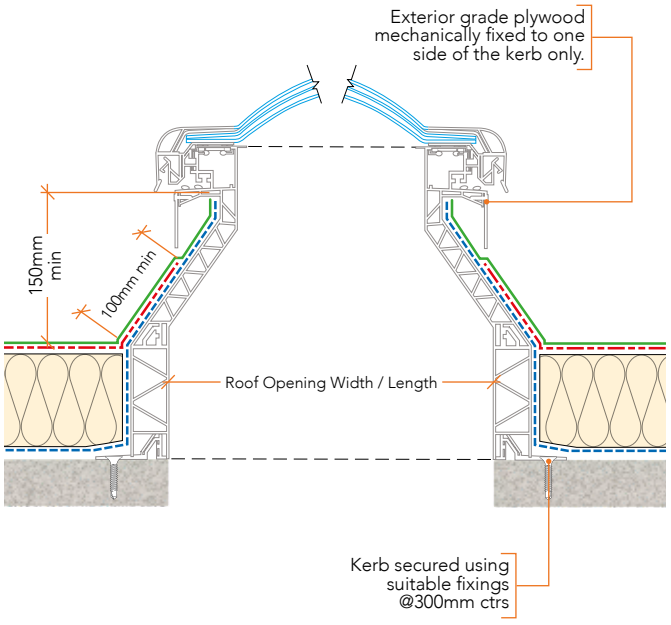
This detail can be torch-free or torch-safe depending on location. For torch-free detailing, a self-adhesive capping sheet must be used. For torch-free detailing, a self-adhesive underlayer must be used to encapsulate the timber, and a suitable former (pre-primed) must be incorporated.



Outlet - Compact

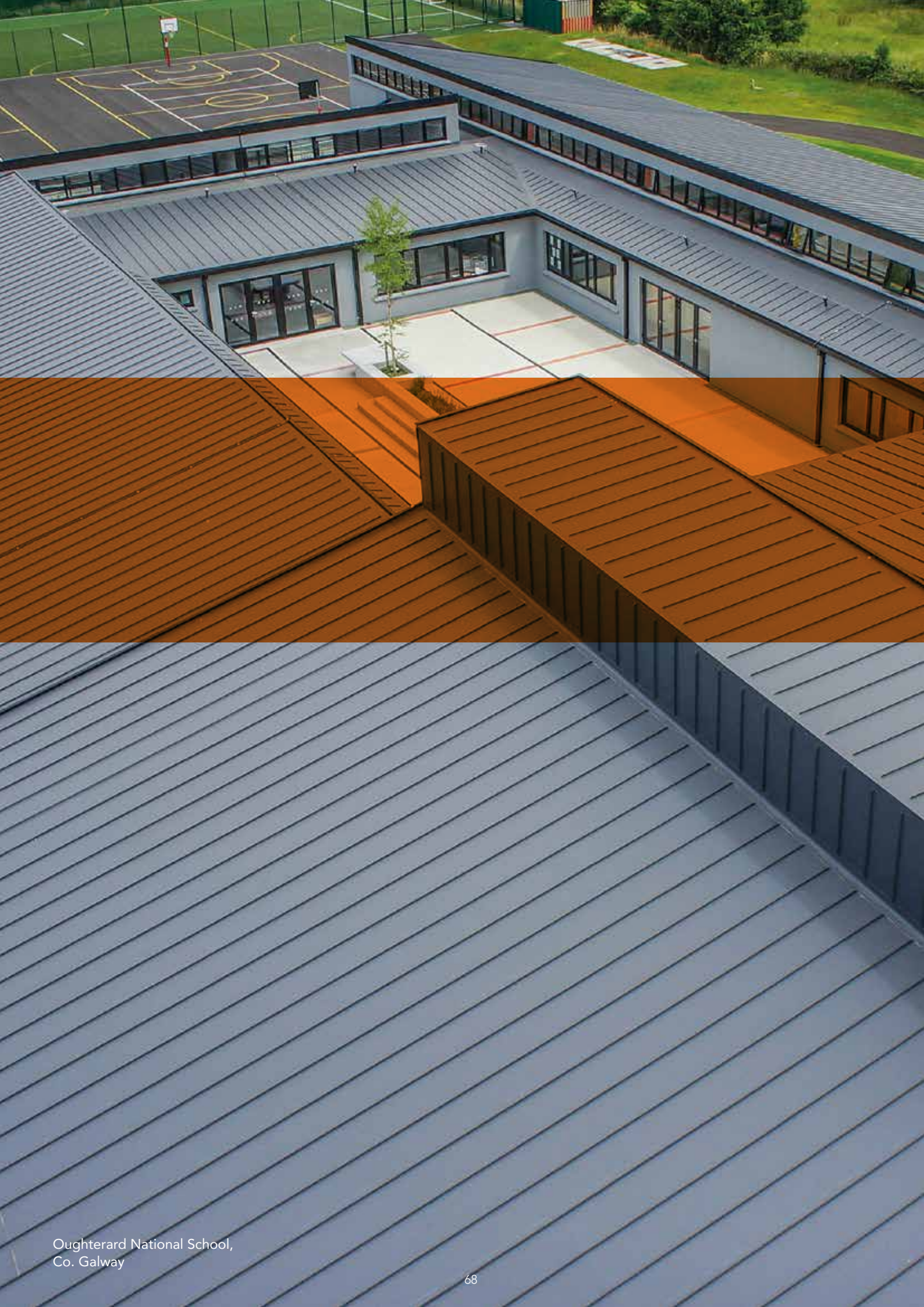
This detail using our insulated outlet helps maintain thermal continuity of drainage points. The BRE Certified high thermal value of the rigid foam body prevents condensation from forming on the underside of the outlet body.

One of the benefits of using a two part outlet is that the first section, the outlet bowl can be installed to the deck, allowing the vapour control layer to be installed and the internal pipe work connected. This provides waterproof integrity and allows internal work to commence.



Upstand to Bauder Rooflight - Euroglaze

This rooflight detail ensures waterproofing integrity is maintained with the incorporation of a UPVC weather flange. Bauder rooflights are designed to be fully compatible with our roof waterproofing systems.



Oughterard National School,
Co. Galway

4

Single Ply Systems

Copyright: Ulrich Brunner GmbH Ofen- und Heiztechnik
Photographer: Christine Schaum

Our single ply roofing systems are ideal for lightweight, fast track and cost effective construction projects with performance characteristics expected in today's industry.

The systems provide solutions that are durable, resistant to the natural elements and able to support extensive green roofs and photovoltaic arrays.

OVERVIEW OF WATERPROOFING

BATTLE OF BRITAIN MEMORIAL

Location: **Capel-le-Ferne, Kent**

"The roof is one of the main features of 'The Wing' and is highly visible. Its construction presented numerous challenges as complex detailing was required. The Bauder single ply system has proved to be a very attractive, practical and cost effective solution and the technical support has been excellent."

Nick Lawn from Godden Allen Lawn, Project Specifier

SYSTEMS

The new visitor centre building replicates the shape of the iconic spitfire wing and is waterproofed with our single ply roofing that is aesthetically pleasing from all visual aspects.

A single ply system provides many advantages to the modern building, particularly if weight and load bearing limits are an important consideration. Single ply waterproofing offers fast track, flame-free installation.

Our systems suit all dimensions, sizes and shapes of flat roof, offer different advantages and provide solutions to many flat roof projects, as well as being suitable for extensive green roof landscaping.

The systems are installed using hot air welding techniques with mechanical fastenings or adhesive bonding to provide solutions that are durable and resilient to the natural elements.

We have two systems within our single ply portfolio.

Thermofol PVC

This is a PVC single ply waterproofing membrane that ensures a fast track, flame-free installation. The membranes have high levels of elasticity and tensile strength to provide a robust solution. The BBA certificate relating to this product indicates a service life in excess of 30 years.

Thermoplan FPO

Our flexible polyolefin (FPO) single ply membrane is long lasting and represents a major advancement in synthetic waterproofing technology. The BBA certificate relating to these membranes states that the products should have a life in excess of 20 years, however we are confident that with correct installation and maintenance the life expectancy will be at least 30 years.

All products within the systems are manufactured by us, providing a single point of contact and exact specification formulations for complete compatibility.

ENVIRONMENTAL CREDENTIALS

British Research Establishment (BRE) Green Guide

The BRE Green Guide to Specification gives our products and systems various generic ratings, depending on the type of deck construction and the support structure used.

These ratings are used within schemes registered under BREEAM UK New Construction 2014

Generic Ratings

- 'A'+ generic rating, element numbers 1212540003 for PVC and 1212540004 for FPO when used with warm roof insulation on a profiled steel deck with steel supports.
- 'A'+ generic rating, element numbers 1212540043 for PVC and 1212540044 for FPO when used with warm roof insulation on plywood deck and timber joists.
- 'B' generic rating, element numbers 1212540029 for PVC and 1212540036 for FPO when used with warm roof insulation on concrete beam and block.
- 'B' generic rating, element numbers 1212540023 for PVC and 1212540024 for FPO when used with warm roof insulation on pre-cast concrete hollow slab with screed.
- 'A' generic rating, element number 812530084 for FPO when used with inverted roof insulation and pebble ballast on ply lined profiled steel deck with steel supports and 'B' rating for PVC, element number 812530082.

Environmental Product Declaration (EPD)

The Eco Platform accreditation is recognised by the BRE as valid and transferable environmental documentation towards obtaining BREEAM credits within their assessment process for BREEAM UK New Construction 2018.

Within our bitumen membrane waterproofing systems we have the following EPD certificates for our membranes and PIR insulation.

- **Thermofol PVC Membranes**
  EPD-BAU-20130188-IBCC-EN
- **Thermoplan FPO Membranes**
  EPD-BAU-20130189-IBCC-EN
- **PU Insulation - Mineral Fleece Facing**
  EPD-IVP-20140206-IBE1-EN
- **PU Insulation - Aluminium Facing**
  EPD-IVP-20140207-IBE1-EN

All certificates can be downloaded from our website bauder.co.uk/technical-centre

Our Products in Practice

We are committed to reducing the impact our manufacturing has on the environment, as well as how our products can support the environment through a reduction of energy usage, recycling and reusing.

Insulation

Our BauderPIR insulation has extremely high thermal efficiency and is CFC and HCFC free. It has zero ODP and a Global Warming Potential of less than 5Kg CO_2 - Eq/Kg. As part of our PIR insulation manufacturing process, offcuts and waste are readily recycled and used in the production of hand cleansers and decking materials.

Recycled Content

We have proactively recycled factory production waste back into new PVC membrane since production began in 1960 and currently includes recyclate into the backing layer of the membrane. However, as with many high quality, long life products, we include this relatively low percentage content of recyclate to ensure that whole life performance is maintained while providing a good environmental profile. Higher volumes of recyclate could be used, but this would reduce the durability of the membrane, shorten life expectancy, increase building life-cycle costings and environmental impact.

Recycling and Reusing Single Ply Membranes

The mechanically fastened option for either of our single ply systems makes it possible to independently remove all the component parts. If only the membrane needs renewal, but the insulation and vapour barrier are still sound, then this element can be replaced separately.

All our single ply production waste is recycled into the manufacturing process, enabling us to keep the use of raw materials to a minimum. Our manufacturing production plants use closed rotation cooling systems, which drastically reduces water consumption and avoids environmental pollution. The systems are automated and concentrate on recycling waste and by-products and reducing emissions.

Single ply membranes comprise high quality polymer and at end of life stage, polymer waste is a high value commodity with many re-uses; though if re-use is not possible, ultimately the carbon content can be recovered by high temperature incineration.

TECHNICAL CREDENTIALS

BBA Certification

Our single ply systems have been tested and approved by the BBA and carry certificate No 06/4354 for Thermofol PVC and 04/4120 for Thermoplan FPO.

Factory Mutual (FM) Approval

Our Thermofol PVC and Thermoplan FPO systems are FM approved. FM Approvals is the independent testing arm of international insurance carrier, FM Global. FM Approvals uses scientific research and testing to make sure construction products, components and systems conform to the highest standards for safety and property loss prevention. Products that pass get the 'FM APPROVED' mark and are recommended to FM Global clients for use within a building construction or refurbishment.

Single Ply Membranes are tested under Category 4470 for Class 1 Roof Covers, which incorporates assessment with different deck structures, insulation types, installation and fixing methods, vapour control layers and test resistance to fire and climatic conditions, such as wind uplift and hail resistance. Each combination of products is given a rating and assembly number to assist a specifier in selecting the correct build up for their requirements.

TYPICAL EXAMPLE (more assembles are available on request)

Assembly Number	Deck Type	Rating	Membrane & Installation	Insulation
230103	Steel	105	Thermofol U15 mechanically fixed	FA
230098	Steel	90	Thermoplan TS15 mechanically fixed	FA

Further testing maybe required to validate a small change within a system if required.

Deutsche Akkreditierungsstelle D-ZM-16089-01-00

ISO Accreditation for Manufacturing

Our single ply membranes and PIR insulation are manufactured in our factories operating an Environmental Management System that has been certified to be in accordance with ISO 14001 and ISO 50001 for Energy Management.

CE Marking

All membranes and insulations carry a CE mark as required by the Construction Products Regulations.

Root Resistance for Green Roofs

Our single ply systems are manufactured to FLL (Forschungsgesellschaft Landschaftsentwicklung Landschaftsbau) guidelines, which is the benchmark test for root resistance in Europe and has been for the last 25 years.

Fire Performance

Our systems hold fire classification B roof (t4) for compliance with building regulations under ENV1187 test method 4 for external fire exposure to roofs.

Bauder waterproofing systems verified by the BBA are deemed 'unrestricted' and suitable for use on any part of a roof.

Our Single Ply membranes and systems have also been fire tested to the globally recognised FM Approvals assessment and meet the Standards and Category 4470 for Class 1 Roof Covers.

Product and Installation Technology

Welding Techniques for Thermoplastic Membranes

Hot air welding fuses the two adjacent pieces at temperatures between 380 - 500°C to form a monolithic seam, which has proven to be a superb method of assuring a watertight join.

There are principally two types of welding equipment, hand held and automatic machines; both require an electrical supply to the roof.

Single Ply Roofing Association

We are a manufacturer member of the Single Ply Roofing Association (SPRA). As an association SPRA represents membrane manufacturers, associated component manufacturers and specialist subcontractors and aims to ensure the delivery of best value single ply roofing systems, through a quality assured partnership.

By specifying products and specialist installation by SPRA Manufacturer, Associate and Contractor members it assures that all parties meet strict quality criteria. Compliance with these criteria and with the Code of Conduct is assessed at application, by annual audit and by random spot checks.

For further information and to download the industry design guide, visit www.spra.co.uk or call 0115 914 4445.

THERMOFOL PVC

OUGHTERARD NATIONAL PRIMARY SCHOOL

Location: **Oughterard, County Galway**

"Bauder provided all the roofing materials needed and delivered a comprehensive solution and guarantee. They satisfied all delivery commitments and the new single ply roof looks and performs just as we expected."

Martin Keaveney, JJ Rhatigan & Company

Award winning new build primary school in West Ireland consisting of eight roof areas totalling over 3,400m² waterproofed with Thermofol PVC.

Our Thermofol is a PVC membrane with a formulation of high grade virgin polymer and superior fire retardants ensuring optimum membrane characteristics to deliver high performance and a life expectancy in excess of 30 years BBA stated.

With over 50 years of technical and production experience of PVC membranes and over 60 million m² of Thermofol PVC installed, this system has a proven track record.

Suitable for either new build or refurbishment projects, our Thermofol is a lightweight, fast track and cost effective waterproofing solution that is resilient to the natural elements. It is flexible with a high tensile strength that is easy to install and weld.

Key Features

- Developed to withstand climatic extremes and temperature shocks. Our experience in chemical formulation and commitment to only using superior polymers and blending techniques gives this product cold-bending flexibility at less than -30°C without losing elasticity.
- The high tensile strength of over 1100N is achieved by incorporating a high quality polyester reinforcement within the membrane to resist tears and punctures to ensure durability.
- BBA certified 06/4354 with stated life expectancy in excess of 30 years.
- Tested and approved for green roof landscaping by the FLL.
- Suitable for ballasted or green roofs.
- FM Approved.
- Fire classification B roof (t4) and verified by the BBA as 'unrestricted' and suitable for use on any part of a roof.
- Guaranteed system.

When to Specify

The Thermofol PVC System has a high grade virgin polymer formulation with superior fire retardants that is suitable for either new build or refurbishment projects. The PVC formulation ensures it is resistant to chemicals and microorganism attack making it ideal for green roof situations.

This waterproofing solution can also be specified with the BauderSOLAR PV for flat roofs or the Bauder BioSOLAR green roof system.

Specification Support

Specification downloads:
www.bauder.co.uk/technical-centre

NBSPlus BIM DWG

Telephone helpline:
0845 271 8800

FM APPROVED

MEMBRANE MEMBER SPRA Single Ply Roofing Association

BBA APPROVAL INSPECTION TESTING CERTIFICATION CERTIFICATE 10/4744

ECO PLATFORM EPD EN 15804 VERIFIED

ISO 14001:2004 REGISTERED FIRM

CE bre

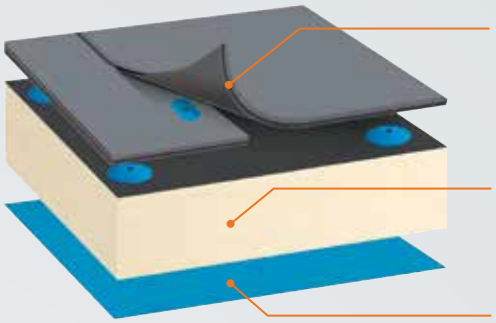
THERMOFOL PVC

Example System Configurations

Thermofol PVC is suitable for extensive green roofs, which can incorporate XF301 sedum system to make it the most lightweight solution available on the market.

MECHANICALLY FIXED SYSTEM

Ideally suited for metal or timber decks, though it can be used on concrete if required. It gives outstanding performance if there is a high risk of wind uplift and provides a secure, durable and economical installation.



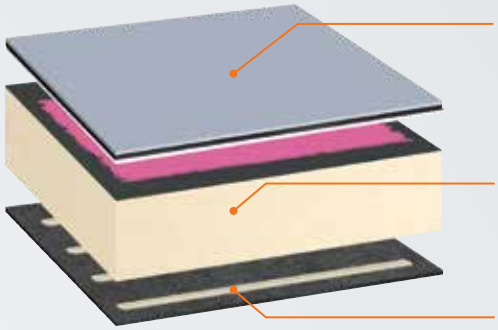
Thermofol U12, U15, U18 & U20
stocked membranes, with thicknesses of 1.2, 1.5, 1.8, and 2.0mm respectively. The membranes are reinforced with a pre-coated polyester cross weave matting which provides the high levels of tear resistance required of a mechanically fastened membrane.

BauderPIR FA Insulation
foil faced insulation which is thermally efficient, lightweight, fire resistant and zero ODP rated. As an alternative, **BauderPIR Tapered Insulation** can be used to improve drainage falls.

Bauder Vapour Control Layer
we manufacture a range of torch bonded bituminous, self adhesive or loose laid vapour control layers and a recommendation can be made according to cost plan and project programme.

ADHERED SYSTEM

Particularly suitable for complex building shapes, where mechanical fastenings are unsuitable such as on concrete decks with a high proportion of stone or where the visibility of the fixings from within the building are undesirable.



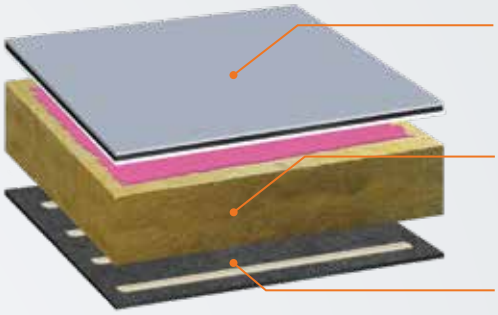
Thermofol U15 FB
1.5mm membrane (2.5mm with fleece), which can be easily adhered to glass tissue faced insulation using the Bauder Fleece-Backed Membrane Adhesive. The standard Thermofol membrane may also be bonded using Bauder Thermofol Full Bond Contact Adhesive.

BauderPIR FA Insulation
foil faced insulation which is thermally efficient, lightweight, fire resistant and zero ODP rated. As an alternative, **BauderPIR Tapered Insulation** can be used to improve drainage falls.

Bauder Vapour Control Layer
we manufacture a range of torch bonded bituminous, self adhesive or loose laid vapour control layers and a recommendation can be made according to cost plan and project programme.

ACOUSTIC PERFORMANCE SYSTEM

Combining a fleece-backed single ply membrane with BauderROCK mineral fibre insulation and a self-adhesive bituminius VCL provides a build up that delivers high acoustic and fire performance.



Thermofol U15 FB
1.5mm membrane (2.5mm with fleece) can be adhered to BauderROCK with many of our membrane adhesives, including contact spray adhesive and PU FB adhesive canister.

BauderROCK
mineral fibre insulation ideally suited for projects that require a high level of sound induction. PIR insulation can be combined with mineral wool if height restrictions are a consideration.

Bauder KSD Mica Vapour Control Layer
we manufacture a range of torch bonded bituminous, self adhesive or loose laid vapour control layers and a recommendation can be made according to cost plan and project programme.

System Variations
The Thermofol membrane can be aesthetically enhanced with the use of extruded PVC profiles to replicate lead or standing seam roof appearances.

www.bauder.co.uk/technical-centre

Membrane Colours

RAL 7035	RAL 7031	RAL 7016
Light Grey	Blue Grey	Anthracite

PROJECTS

The Walnuts School
Hazeley

PROJECT STUDIES

Battle of Britain Memorial

BAUDER
THERMOFOL PVC

BUILDING BOARD	
Project:	**Battle of Britain Memorial**
Location:	**Capel-le-Ferne**
Roof Area:	**700m²**
Specifier:	**Godden Allen Lawn**
Approved Contractor:	**Byford Roofing Services**

APPLIED PRODUCTS

- Bauder Thermofol is a top quality single ply PVC system with a life expectancy in excess of 30 years.
- Bauder PIR insulation is highly effective, lightweight and dimensionally stable.

Challenges

The client wanted the new visitor centre building to replicate the shape of the iconic spitfire wing and to be waterproofed with a roofing system that would be aesthetically pleasing due to its high visibility. A particularly challenging element of the installation was the amount of intricate detailing requirements due to the elliptical shape and 5° pitch of the wing areas. The waterproofing system needed to incorporate insulation that would achieve a 0.16 U-value and the memorial site had to remain open throughout the works causing logistical challenges.

Solutions

Bauder's anthracite coloured Thermofol single ply system was specified because it is high-quality, long lasting and with the addition of welded roof profiles gives the appearance of a standing seam metal roof. The system build-up included Bauder's 160mm PIR Insulation for superior thermal performance and all deliveries were timed as not to conflict with vehicles moving in and out of the facility. Despite the challenges encountered the project was completed in time for its official opening by the Queen in March 2015.

Scoil Phadraig School

BAUDER
THERMOFOL PVC

Formed in 2006 after the amalgamation of the CBS Boys School and Convent Girls School, Scoil Phadraig National School is situated in the heart of Westport. Being the largest school in the town, it now provides education to over 300 children. The constant increase in the number of pupils enrolling at the school soon called for a new building to cater for all its students.

In 2014, after several false starts it was finally confirmed that Scoil Phadraig was included in the 2015 School Building Programme, allowing the five-million-euro new building to be funded through the Department of Education. Designed by Westport based SJK architects, the new state of the art school comprises of 16 classrooms, a general-purpose room and ancillary accommodation, creating the best learning environments for the school's pupils.

Located on the west coast of Ireland and facing the Atlantic, one of the major challenges was the meteorological factors. With high winds and storms occurring frequently, the new building had to be waterproofed rapidly in order to allow other trades to progress and to keep in line with the building programme schedule. Consequently, the plywood decking of the building was immediately installed with the Bauder DS1 DUO vapour control layer making the building weathertight.

Bauder approved contractor, Priority Roofing, installed the 2300m² roof areas with the mechanically fastened Bauder Thermofol PVC system which provides a high tear resistance waterproofing membrane and a strong fixation system to resist the high wind loads of the area

.

Aesthetics also being paramount for this project, careful attention was given to the detailing of the upstands. Vertical pitches and decorative profiles at 460mm centres were also installed, disguising the laps of the thermofol membrane and ensuring a stunning finish to the building.

BUILDING BOARD

Project:	**Scoil Phadraig**
Location:	**Westport, County Mayo**
Roof Area:	**2,300m²**
Client:	**SJK Architects**
Approved Contractor:	**Priority Roofing & Cladding Ltd**

APPLIED PRODUCTS

- Bauder Thermofol PVC
- Bauder PIR Insulation
- Bauder DS1 DUO

THERMOPLAN FPO

The Mount Wolseley Golf and Country Club, Co. Carlow
(photograph prior to the installation of Bauder XF301 sedum system)

Set in the idyllic Irish countryside, Mount Wolseley offers visitors an exceptional place to play golf or simply relax. The new extension developments have greatly enhanced the facilities to guests.

The main criteria for the roofing material was that the low level roofs had to be a green roof, low in maintenance and aesthetically pleasing, the high level roofs had to withstand large amounts of foot traffic due to the positioning on the roof of M & E equipment, both roofs had to be economically viable and be covered by a robust guarantee.

Our Thermoplan is a flexible polyolefin (FPO) single ply membrane that is long lasting and represents a major advancement in synthetic waterproofing technology.

The BBA certificate relating to these membranes states that the products should have a life in excess of 20 years, however, we are confident that with correct installation and maintenance, the life expectancy will be at least 30 years.

Leading specifiers are now increasingly demanding construction materials that meet their requirements for environmental impact and sustainability, the Bauder Thermoplan System matches both these needs.

Key Features

- Low embodied energy used in its production and free from halogens and heavy metals.
- BBA stated life expectancy 20 years.
- With high tensile strength in excess of 1200N, the closed fibre polyester cross weave reinforces the membrane and makes it resistant to tears and punctures.
- The membrane has no inherent memory and therefore will not shrink.
- Our use of high quality polymers and constituents in the formula ensures the membrane remains flexible at -45 °C.
- The FPO formulation ensures it is resistant to chemicals and micro-organism attack, which is vital to the membrane's success in ballasted or green roof situations.
- BBA Certificate 04/4120.
- Tested to FFL.
- Fire classification B roof (t4) and verified by the BBA as 'unrestricted' and suitable for use on any part of a roof.
- Guaranteed system.

When to Specify

The Thermoplan FPO system is free of plasticisers, halogens and heavy metals and is suitable for either new build or refurbishment projects. The FPO formulation ensures it is resistant to chemicals and micro-organism attack making it ideal for green roof situations.

The mechanically fastened system is ideally suited for metal and timber deck constructions and the adhered option is favoured for concrete decks.

This waterproofing solution can also be specified with the BauderSOLAR PV for flat roofs or the Bauder BioSOLAR green roof system.

Specification Support

Specification downloads:
www.bauder.co.uk/technical-centre

nbsPlus BIM DWG

Telephone helpline:
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FM APPROVED

MEMBRANE MEMBER SPRA Single Ply Roofing Association

BBA APPROVAL INSPECTION TESTING CERTIFICATION CERTIFICATE 10/4744

ECO PLATFORM EPD EN 15804 VERIFIED

ISO 14001:2004 REGISTERED FIRM

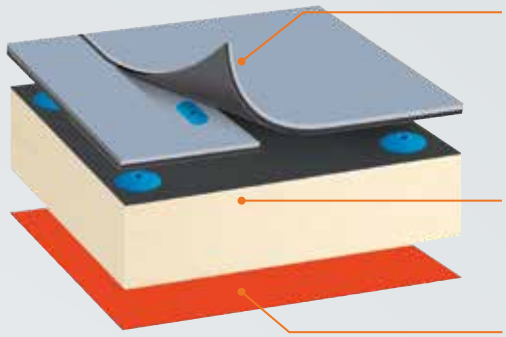
CE bre

THERMOPLAN FPO

Example System Configurations

MECHANICALLY FIXED SYSTEM

Ideally suited for metal or timber decks, though it can be used on concrete if required. It gives outstanding performance if there is a high risk of wind uplift and provides a secure, durable and economical installation.



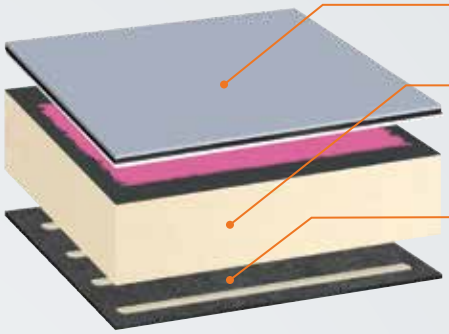
Bauder Thermoplan T-SV
1.5mm membrane is one of our stocked products, with other thicknesses available for specific project types. The product is reinforced with a pre-coated polyester cross weave matting, which provides the high levels of tear resistance required of a mechanically fastened membrane.

Bauder PIR FA Insulation
foil faced insulation which is thermally efficient, lightweight, fire resistant and zero ODP rated. As an alternative, **BauderPIR Tapered Insulation** can be used to improve drainage falls.

Bauder Vapour Conrol Layer
we manufacture a range of torch-bonded bituminous, self-adhesive or loose laid vapour barriers. All of these products can be used within a Thermoplan mechanically fastened system and a recommendation can be made according to cost plan and project programme.

ADHERED SYSTEM

Particularly suitable for complex building shapes, where mechanical fastenings are unsuitable such as on concrete decks with a high proportion of stone or where the visibility of the fixings from within the building are undesirable.



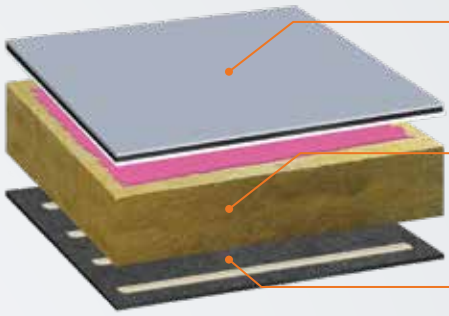
Bauder Thermoplan T-SV 15FB
easily adhered to insulation using the Bauder Fleece Backed Membrane Adhesive.

Bauder PIR FA Insulation
foil faced insulation which is thermally efficient, lightweight, fire resistant and zero ODP rated. As an alternative, **BauderPIR Tapered Insulation** can be used to improve drainage falls.

Bauder Vapour Control Layer
we manufacture a range of torch applied bituminous or self adhesive vapour barriers. All of these types of product can be used within a Thermoplan adhered system and a recommendation can be made according to cost and project programme.

HYBRID SYSTEM

Frequently specified when a balance between enhanced aesthetics and commercial pressures are prevalent. This installation method combines both adhered and mechanically fastened techniques. Typically a polyethylene VCL with mechanically fixed insulation and an adhered fleece-backed membrane.



Thermofol U15 FB
1.5mm membrane (2.5mm with fleece) can be adhered to BauderROCK with many of our membrane adhesives, including contact spray adhesive and PU FB adhesive canister.

BauderROCK
mineral fibre insulation ideally suited for projects that require a high level of sound induction. PIR insulation can be combined with mineral wool if height restrictions are a consideration.

Bauder KSD Mica Vapour Control Layer
we manufacture a range of torch bonded bituminous, self adhesive or loose laid vapour control layers and a recommendation can be made according to cost plan and project programme.

Membrane Colours	
RAL 1013	RAL 7001
Pearl White	Silver Grey

www.bauder.co.uk/technical-centre

PROJECTS

Thurlton Primary School, Norfolk
(embossed walkway membrane with Thermoplan T installed in harmony with bituminous membrane)

Copyright: Ulrich Brunner GmbH Ofen- und Heiztechnik
Photographer: Christine Schaum

HMP Pentonville
London
(Overlay Refurbishment)

PROFILED OVERLAY SYSTEM

Our Profiled Insulation Overlay System incorporates a bespoke expanded polystyrene (EPS) insulation board that is manufactured to match profiled sheet metal and roof structures, typically comprised steel, composite panels or aluminium. The system includes a single ply waterproofing membrane to provide a long term, lightweight and durable solution.

Key Features

- The EPS insulation has a generic Green Guide A+ rating (Element no. 815320024).
- Fire classification B roof (t4) and verified by the BBA as 'unrestricted' and suitable for use on any part of a roof.
- Tested with Bauder Spray Contact Adhesive.
- Suitable for use with Thermofol (PVC) & Thermoplan (FPO) systems.
- BBA certified products.
- Single source supply.
- One point guarantee.
- No building interruption.
- More cost effective than re-cladding.

When to Specify

The EPS overlay system is primarily intended for refurbishing profiled sheet metal roofs or increasing the thermal performance of existing insulated cladding systems, bringing the construction up to current building regulation requirements.

The profiled insulation boards are manufactured to order and samples are produced to ensure that the profiles match the existing roof sheets. U-values are calculated using the average thickness of the profiled insulation board.

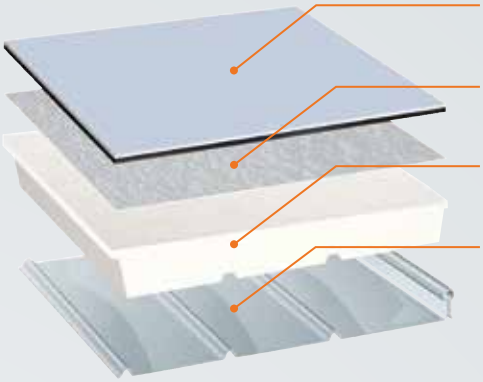
Measuring Service

Our measuring service will ensure that the boards are manufactured to match the profile of the metal roof to be overlayed.

MEMBRANE APPLICATION

Our EPS profiled insulation board can be installed by mechanically fastening it with a suitable fastener and washer. When a non fleeced-backed Thermofol PVC membrane is used our GV120 glass separation fleece is also required to protect the upper surface of the insulation product.

If the single ply membrane is to be adhered to the profiled EPS then the membrane will need to be fleece backed and the GV120 can be omitted.



Bauder Single Ply Membrane
Thermofol or Thermoplan membranes are suitable for installation with this system.

GV120
Glass separation fleece used only when non-fleeced-backed Thermofol PVC is specified.

Profiled EPS
Expanded polystyrene profiled board manufactured to order to match the existing roof sheets.

Existing Profiled Metal Roof

www.bauder.co.uk/technical-centre

SINGLE PLY GREEN ROOF SYSTEMS

Single ply extensive green roof systems can be the lightest weight option available for a building and consist of low maintenance vegetation on landscaping components tested to meet FLL guidelines. Both our Thermofol and Thermoplan systems are suitable for an extensive green roof.

Our Sedum System combines the vegetation support layer with a moisture retention fleece to provide the perfect base without the need for additional components.

An extensive substrate green roof vegetation can comprise the WB wildflower blanket, SB sedum blanket, plug plants or a seeded option for natural colonisation.

Key Features

- Simple, lightweight green roof solutions.
- Environmental masking or biodiverse habitats are easily created.
- Extends the life of the waterproofing and thereby reduces life cycle costings.
- Meets planning requirements.
- Cost effective.
- Low maintenance.

When to Specify

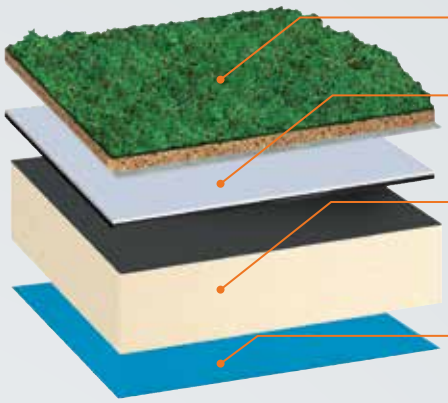
A lightweight green roof that delivers aesthetic masking and environmental benefits and will satisfy planning requirements and conditions for a building. These systems are also ideal for refurbishment projects where a green roof can generally be retrofitted, subject to a structural report on the building.

RSPB Nature Reserve Lakenheath

Example System Configurations

XF301 SEDUM SYSTEM

Our unique patented lightweight carrier fleece and specially developed growing medium creates one of the few sedum blankets available that can be installed and retained on slopes as steep as 25°, using our special retention strips and drainage edge trims.



Bauder Sedum System
pre-cultivated plants for instant greening of a roof.

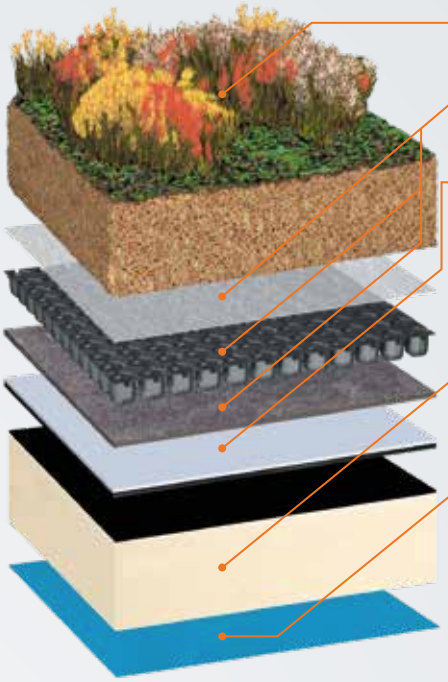
Bauder Single Ply Membrane
resistant to micro-organism attack and tested to meet FLL standards for root resistance.

BauderPIR FA Insulation
foil faced insulation which is thermally efficient, lightweight, fire resistant and zero ODP rated. As an alternative, **BauderPIR Tapered Insulation** can be used to improve drainage falls.

Bauder Vapour Control Layer
we manufacture a range of torch-applied bituminous, self adhesive or loose laid vapour control layers and a recommendation can be made according to cost and project programme.

EXTENSIVE SUBSTRATE SYSTEM

These systems incorporate a greater depth of substrate for improved levels of water retention and a broader variety of vegetation.



Extensive Substrate Vegetation
planted with vegetation blanket, plug plants, seeding or with a biodiversity finish.

Bauder Landscaping Components
will vary to suit planting scheme and water retention requirements.

Bauder Single Ply Membrane
resistant to micro-organism attack and tested to meet FLL standards for root resistance.

BauderPIR FA Insulation
foil faced insulation which is thermally efficient, lightweight, fire resistant and zero ODP rated. As an alternative, **BauderPIR Tapered Insulation** can be used to improve drainage falls.

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www.bauder.co.uk/technical-centre

Technical Guide

Single Ply Systems

Synthetic membranes >>

DOWNLOADS

- BIM
- NBS
- CAD
- Product Data Sheets
- BBA Certificate
- FM Approval
- EPD Certificates
- ISO
- DoP
- Design Guides

www.bauder.co.uk/technical-centre

INSTALLATION OPTIONS

Bauder Membrane Colour Options

Our PVC and FPO single ply membranes come in a variety of colour options to suit the most popular preferences of building specifiers in today's market.

PRODUCT	DESCRIPTION	RAL NUMBER
Thermoplan FPO	Silver Grey	7001
	Pearl White	1013
	Walkway	7016
Thermofol PVC	Light Grey	7035
	Blue Grey	7031
	Anthracite	7016
	Walkway	7012

Vapour Control Layers

The selection of either bituminous or polyethylene vapour control layers can have a number of different benefits to the overall design of the scheme.

DB100 Air and Vapour Control Layer

Extremely cost effective 0.16mm polyethylene VCL that is loose-laid and laps sealed with Bauder Tape 03 and Tape 20.

KSD Foil and Air Vapour Control Layer

Self-adhesive elastomeric bitumen vapour control layer for specification on most deck types within adhered or mechanically fastened systems. The membrane is 1.5mm thick and has aluminium foil facing for high vapour resistance.

BauderTEC KSD Mica Vapour Control Layer

Self-adhesive elastomeric bitumen vapour control layer with a mica finished upper surface to allow easy bonding of insulation.

The membrane is 2.5mm thick and has a polyester coated alluminium foil + 200g/m2 glass fleece reinforcement.

This vapour control layer is suitable for metal, timber and concrete decks.

Thermal Insulations

There are a number of insulation options with PIR foam, the main type available as either a flat, uniform thickness board or as a tapering board to create falls on a flat roof deck.

PIR FA Insulation

This foil faced insulation can be mechanically fixed or adhered directly to the surface of a vapour control layer which has been fully bonded to the structural deck, or mechanically fixed.

EPS Insulation

Polystyrene insulation can be incorporated into either a warm roof ballasted or profiled overlay application. There is a requirement when using non fleece-backed Thermofol PVC membrane to create a separation layer between the membrane and the insulant.

XPS Insulation

In ballasted applications with XPS, a separation layer of GV 120 is required over the upper surface of the membrane. In warm roof applications either a fleece-backed membrane can be used in adhered applications or the GV 120 can be loose laid between the upper surface of the insulation and the underside of the membrane.

Adhered or Mechanically Fastened Systems

As with the insulation, the two main types of attachment methods can be adopted with the membrane itself.

A general guide can be given here, but early discussion with your Bauder area technical manager can ensure the correct details for a specific project build up.

Adhered Systems

This option can be used effectively when the structural decking is either difficult to mechanically fasten into, or the use of fasteners will compromise the air leakage or internal aesthetics of the project. The adhered system can be used with either a fleece-backed membrane or the standard non fleece-backed membrane.

Adhered systems still require an amount of mechanical restraint installed around the perimeter of the roof area, which is designed to assist in the resistance of wind uplift.

ADVANTAGES OF ADHERED	DISADVANTAGES OF ADHERED
Non penetration of vapour barrier	Weather dependant
No internal aesthetic issues	Cost and time of installation
Membrane is fully restrained over roof surface	Reduced possibilities of recycling

Mechanically Fastened

This option can be used on most decking types, metal and timber being the most common. A concrete deck with a high proportion of stone can be difficult to mechanically fasten to, though it is possible if no other option is suitable. If this type of system is selected then consideration should be given to the aesthetic appearance of the protruding fasteners on the underside of the structural decking. The inclusion of an internal ceiling readily solves this issue.

Mechanical fastening is not affected by the ambient weather conditions or temperature and is therefore suitable for installation all year round.

ADVANTAGES OF MECH FIX	DISADVANTAGES OF MECH FIX
Calculated to BS EN 1991-1-4:2005	Concrete needs pre-drilling
Fast track installation	Membrane can tent or bag
Not affected by adverse weather or temperature	Fasteners visible on underside

INSTALLATION TECHNIQUES

Fasteners

We have a strategic alliance with SFS Intec to ensure that when its products are selected the warranty for the mechanical fixings installed with our single ply system matches that of our guarantee so all components are covered.

We require that any fasteners used are tested and approved to UEAtc guidelines. Within our Single Ply system we require the use of a tube and screw type fastener for both the attachment of the membrane and insulation. These types of fasteners provide a thermal break in the system and reduce the transfer of heat from inside to out and are therefore far more thermally efficient than a traditional type of fastener.

Welding Techniques

Hot air welding is the method used to securely join the laps of single ply membranes. There are principally two types of welding equipment, hand held and automatic machines. Both require an electrical supply to the roof which is fed through a residual circuit breaker and is normally obtained direct from the mains supply or by generator where appropriate.

SURFACE PROTECTION

The life expectancy of a flat roof system is extended if it incorporates an aesthetic finish, which provides protection of the membrane from the natural elements. This includes finishes such as ballast, paving or an extensive green roof.

Ballasted or Paved

This particular finish is ideal where regular access is required, such as on a roof terrace. It is also specified where wind uplift is a risk, as the membrane is loose-laid and then held on the deck by the weight of the ballast or paving. If this type of surface protection is to be incorporated, it needs to be considered at the design stage as provision has to be made for the supporting structural deck and the associated cost implications.

Walkways

Clearly identified walkways should be installed from roof access points to areas of plant and equipment. Walkway material should be considered for use on all areas likely to carry foot traffic.

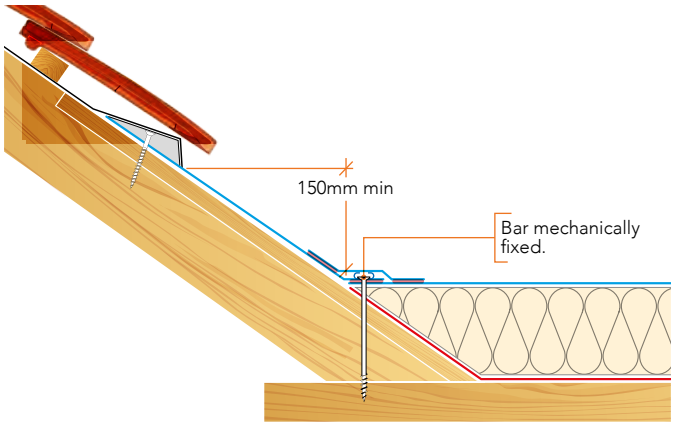
Our walkway materials have a specially embossed slip resistant finish, as well as being a distinctive contrast colour.

Working platforms may be created by placing coated flat metal sheet on the surface of the insulation and mechanically fastening to the deck. The area should be waterproofed as normal and then the walkway material placed onto the surface of the waterproofing to be hot air welded into place.

Extensive Green Roofs

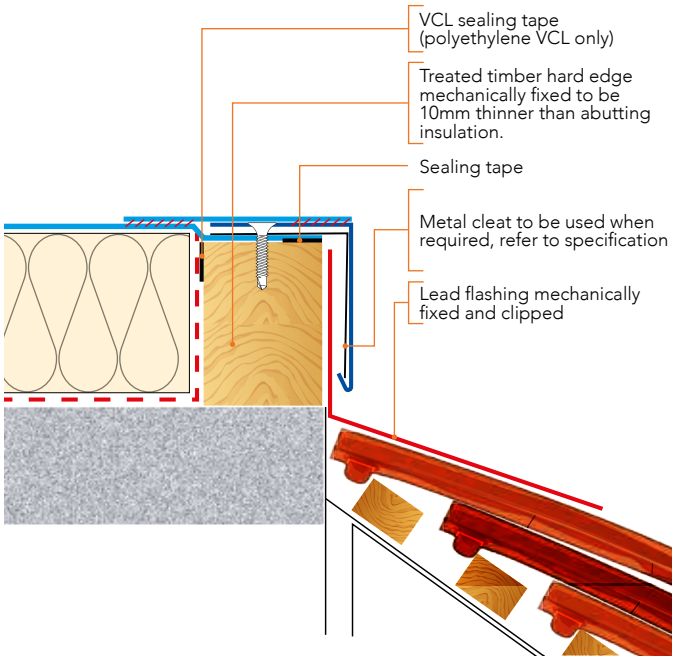
Creating an extensive green roof as a surface protection gives many environmental benefits and helps to mask the building into its surroundings, particularly if it is positioned in areas sensitive to construction. It uses low maintenance, frost and wind hardy vegetation, such as sedum plants. The roof is lightweight and cost effective, though it is not suitable for recreational use and should only be accessed for routine maintenance.

GENERAL DETAILING



Upstand to Pitched Roof

To ensure waterproofing integrity at an upstand to a pitched roof a lay board should be incorporated at the base of the rafters. This provides the substrate required to run the Bauder single ply membrane up behind the tiles. A tilt fillet can then be mechanically fastened to the lay board. This ensures the tiles cannot damage the membrane and provides a further mechanical restraint at the termination of the waterproofing. A fixing bar or pre-fabricated Bauder metal should be employed at the base of the upstand and the flexible detailing membrane welded securely.

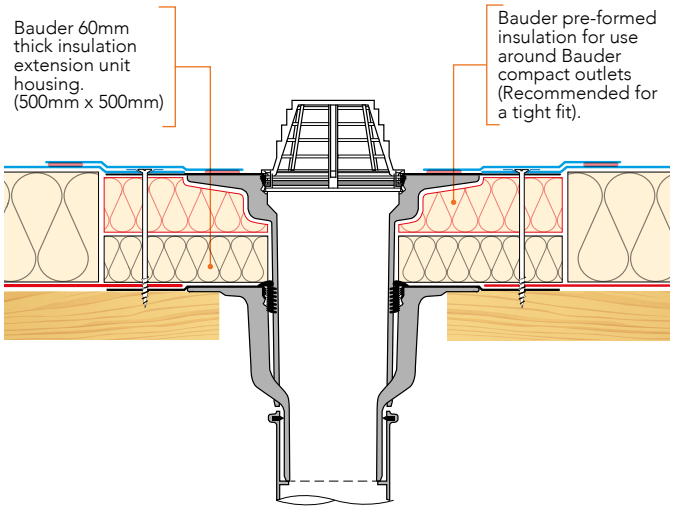


Mansard Roof

The field sheet membrane should be clamped under the pre-fabricated metal drip section at the perimeter and then a 200mm cover-strip heat welded to the metal and the membrane ensuring a encapsulated system.

This detail will require the addition of a pre-formed galvanised metal cleat mechanically fastened behind the pre-fabricated metal trim; if the roof is more than 8m high or if the trim face depth is ≥ 100mm.

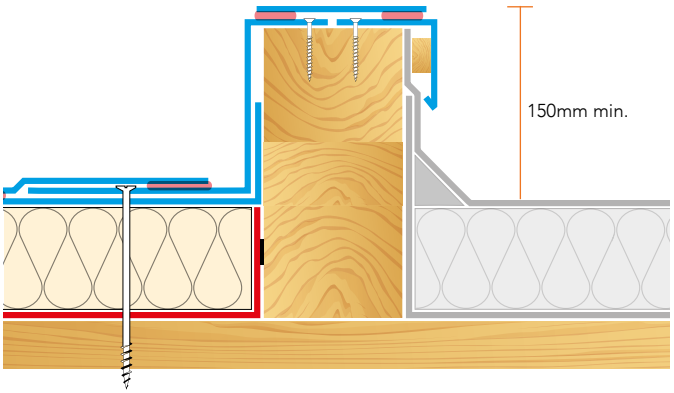
A lead flashing should be mechanically fastened to counter flash the tiles.



Outlet within Gutters

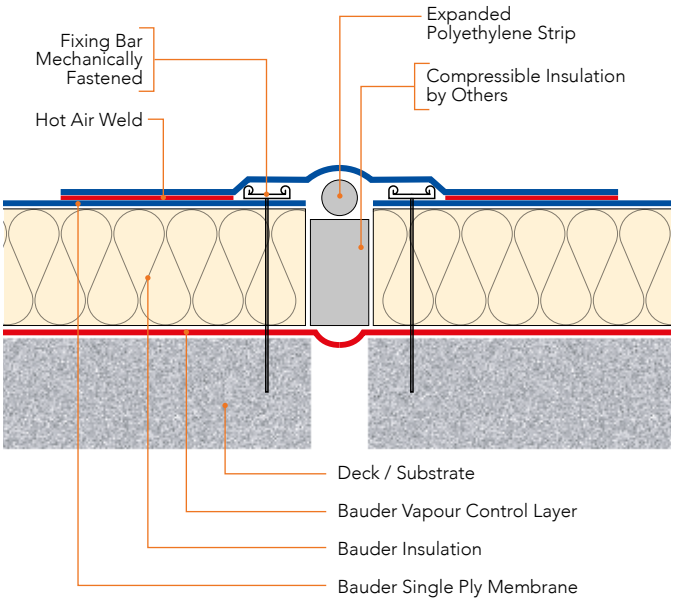
Key to a successful installation is a full range of compatible accessories. One of the most important of these is the rainwater outlets. With all of the surface water being directed to the outlets by the use of falls in either the deck or insulation the joint of the waterproofing membranes to the outlet itself is a critical area.

Bauder outlets are manufactured with a compatible membrane flange to ensure a watertight joint at this point. Each Bauder FPO and PVC system has its own range of compatible outlets to suit either vertical or horizontal drainage. Our range of standard outlets is designed to fit directly into the preformed socket of UPVC drainage down pipes.



Separation Kerb

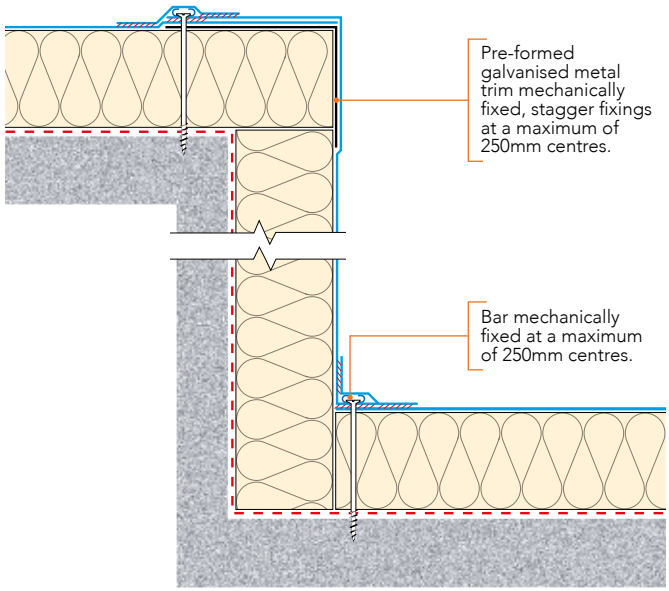
Whenever the Bauder single ply system is to abut an adjacent existing waterproofing system it is advisable to incorporate a separation kerb. This has two purposes, firstly it forms a defined edge to the roof, and secondly it ensures that any incompatibility of dissimilar products is avoided as they do not need to come into direct contact with each other. However, consideration must be given to avoid interruption of any drainage falls that may currently exist. Pre-formed metal flashings should be used in the same way as all operimeter details.



Expansion Joint

When exaggerated movement is anticipated within the substrate then a movement joint should be incorporated to ensure the waterproofing integrity is not compromised. An unreinforced detailing membrane is to be used for covering this junction providing greater flexibility.

Fixing bars should be employed for mechanically fastened installations and peel bars for fully adhered projects.

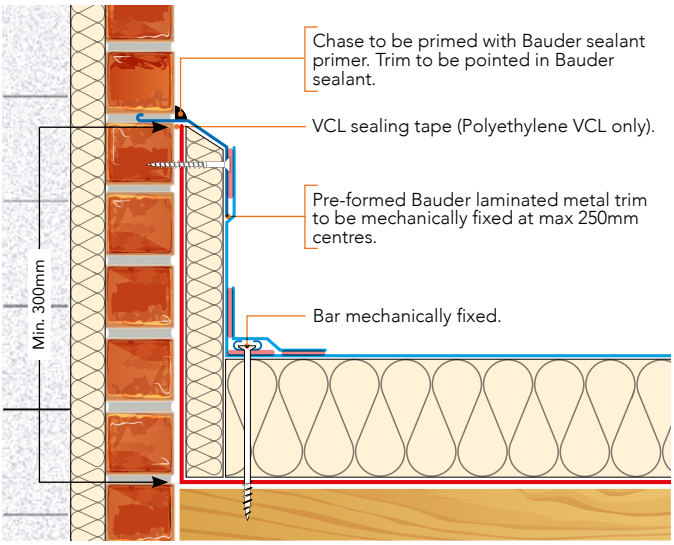


Change in Levels

Wherever there is a change in direction on a single ply roof it is good practice to mechanically restrain the membrane. This provides additional security at areas that are potentially under the greatest tensile stress.

Within a warm roof build up, the insulated external angle should be protected from compression with either pre-fabricated Bauder metal trim or a once bent galvanised metal angle mechanically fastened under the membrane.

GENERAL DETAILING



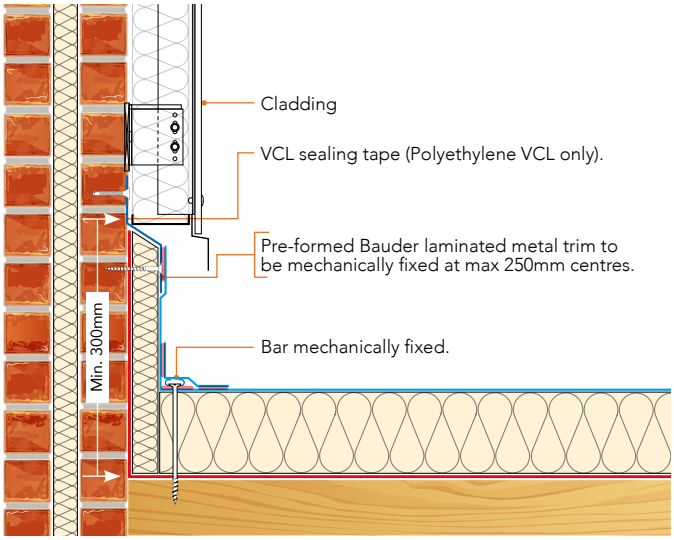
Insulated Upstand

The pre-formed metal flashing plays an important part in the integrity of the roof and should be pointed with Bauder mastic sealant. Pre-formed metal angles are mechanically fixed where the angles change by 90° and the flexible detailing membrane welded securely.

It is important that any cavity tray that exists is situated above the metal flashing to avoid water ingress behind the Bauder single ply waterproofing system.

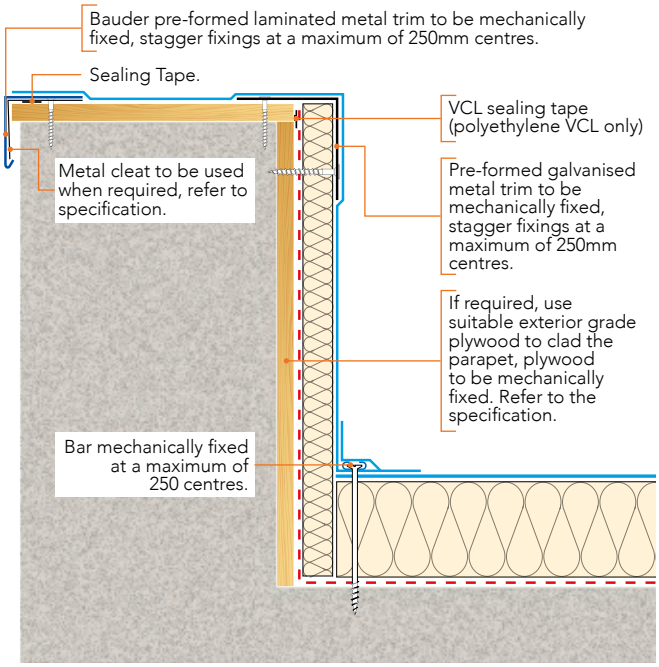
All upstands should be a minimum 150mm high in order to conform to Codes of Practice BS 8217:2005.

The vertical section of insulation needs to be provided to prevent cold bridging through the inner skin of brickwork whenever an insulated wall is present.



Insulated Upstand to Vertical Cladding

It is important that any waterproofing is situated behind the cladding system is positioned in front of the Bauder products to ensure water is nor directed behind the upstand flashing. Pre-formed metal angles are mechanically fixed where the angles change by 90° and the flexible detailing membrane welded securely.

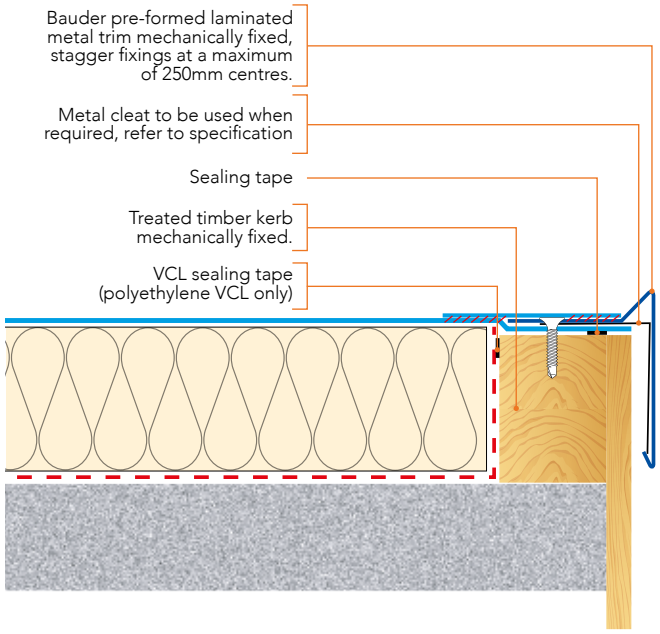


Insulated Parapet Upstand

Fully encapsulating a parapet upstand with a combination of membrane and pre-fabricated Bauder metal ensures the waterproofing is not compromised by the potential for cappings or coping stones damaging the membrane. This detail ensures the responsibility for the waterproofing extends to the termination of the drip edge on the outside of the building.

If the parapet upstand height exceeds 500mm then additional fasteners may be required to restrain the membrane. Refer to Bauder technical dept for further details.

The parapet drip edge will require the addition of a pre-formed galvanised metal cleat mechanically fastened behind the pre-fabricated metal trim in the event that the roof is more than 8m high or if the trim face depth is ≥ 100mm.



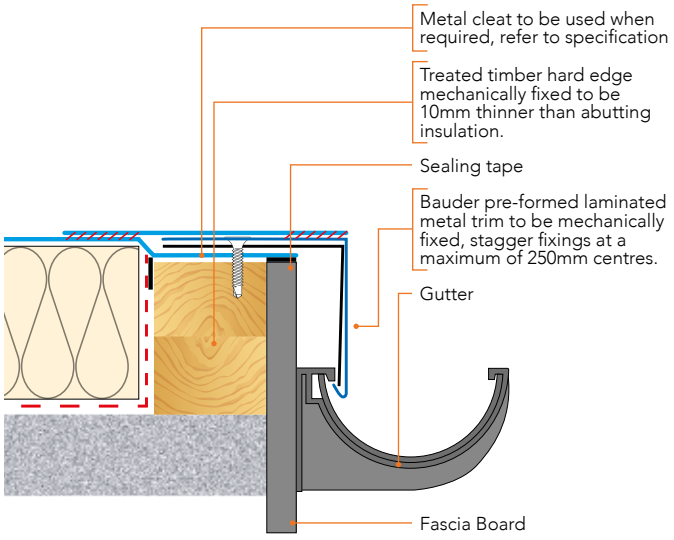
Perimeter Kerb

A water check kerb is a frequently requested detail and there is more than one method to ensure compliance within our system.

A prefabricated metal check kerb combined with a drip edge is ideal since it ensures complete continuity of the waterproofing membrane to the termination of the building.

The kerb drip edge will require the addition of a pre-formed galvanised metal cleat mechanically fastened behind the pre-fabricated metal trim in the event that the roof is more than 8m high or if the trim face depth is ≥ 100mm.

An alternative to the kerb created using Bauder pre-fabricated metal (illustrated) is to employ the decorative profile heat welded to the membrane around the perimeter.



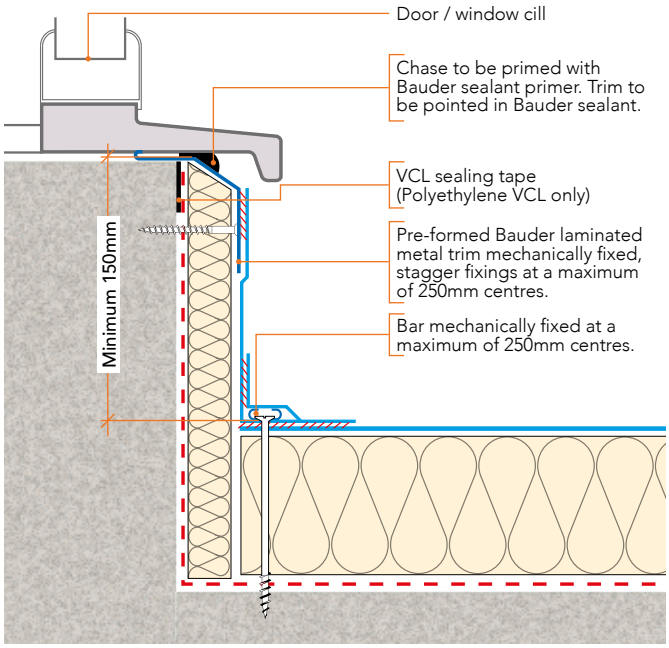
External Gutter

A treated timber hard edge must be installed at the perimeter of the roof to ensure the fastening of the Bauder pre-fabricated metal can be carried out.

The treated timber hard edge should be 10mm thinner than the abutting insulation.

The drip edge must be a minimum of 75mm.

The drip edge will require the addition of a pre-formed galvanised metal cleat mechanically fastened behind the pre-fabricated metal trim in the event that the roof is more than 8m high or if the trim face depth is ≥ 100mm.



Upstand to Door / Window

It is essential for this detail to be completed in compliance with our recommendations that pre-fabricated Bauder laminated metal is installed prior to the window cill or door framework.

A minimum 150mm upstand height is also required to ensure the waterproofing is not compromised.

The field sheet membrane should be terminated at the base of the upstand with either a fixing bar (mechanically fastened system) or peel bar (adhered system). Alternatively, pre-fabricated Bauder metal can be used at this junction. Membrane is then used to join the field sheet with the metal that is chased underneath the cill or door.

Finally Bauder sealant should be used at the chase trim to ensure complete integrity is maintained to the detail.

Marischal Square,
Scotland

5 Hot Melt System

Our Hot Melt Waterproofing is a monolithic installation designed to last the lifetime of the roof structure.

The system is robust, flexible, can be installed on decks with zero degree falls and with its method of application, it is an extremely cost effective waterproofing system.

OVERVIEW OF WATERPROOFING

SYSTEM

Situated at ground level of the British Airways i360 in Brighton, the tallest moving observation tower in the world, is an accessible roof terrace area that features over 1,500m² of our reinforced, inverted hot melt waterproofing system with hard landscaping.

Our Hot Melt System provides a monolithic, fully bonded waterproofing membrane that is tough, flexible and self healing to minor punctures for use on most protected roofs such as inverted, paved, ballasted, terraces, car parks, podiums and plazas or green roof applications.

The system has formulation modifications that promote adhesion and improve low temperature flexibility to ensure technical performance.

The BBA certificate relating to this system states that when fully protected and subjected to normal service conditions, it will provide an effective barrier to water and water vapour for the design life of the roof in which it is incorporated.

Key Features

- Seamless application provides monolithic waterproofing.
- BBA stated life expectancy to match the design life of the roof.
- Can be installed on zero falls.
- Bridges minor cracks.
- Infills minor irregularities.
- Full adhesion to deck restricts lateral water movement.
- BBA Certificate 06/4350.
- Guaranteed system.

When to Specify

Our Hot Melt Structural Waterproofing System is designed to last the lifespan of the roof and ideally suited as a waterproofing system beneath paved or ballasted surfacing, car parks, podiums, plazas, green roofs and substructures.

This waterproofing solution can also be specified with the Bauder BlueROOF or the Bauder BioSOLAR green roof system.

HOT MELT SYSTEM

Specification Support

Specification downloads:
www.bauder.co.uk/technical-centre

NBS Plus BIM DWG

Telephone helpline:
0845 271 8800

BBA APPROVAL INSPECTION TESTING CERTIFICATION CERTIFICATE 10/4744

bre

Safe2Torch REGISTERED

LRWA Liquid Roofing and Waterproofing Association

ENVIRONMENTAL CREDENTIALS

British Research Establishment (BRE) Green Guide

The BRE Green Guide to Specification gives our products and systems various generic ratings, depending on the type of deck construction and the support structure used. These ratings are used within BREEAM UK New Construction 2014 registration schemes.

Product ratings

- 'D' generic rating, element number 812530039 when used with in-situ reinforced concrete, polymer modified polyester reinforced bitumen roofing membranes, insulation, paving slabs.
- 'D' generic rating, element number 812530040 when used with in-situ reinforced concrete, polymer modified polyester reinforced bitumen roofing membranes, insulation, rounded pebbles.
- 'D' generic rating, element number 812530073 when used with precast pre-stressed concrete hollow slab with screed, polymer modified polyester reinforced bitumen roofing membranes, insulation, paving slabs.
- 'C' generic rating, element number 812530074 when used with precast pre-stressed concrete hollow slab with screed, polymer modified polyester reinforced bitumen roofing membranes, insulation, rounded pebbles.
- 'D' generic rating, element number 812530049 when used with in situ reinforced concrete with 50% GGBS and 20% recycled coarse aggregate, polymer modified reinforced bitumen roofing membranes, insulation, paving slabs.
- 'C' generic rating, element number 812530050 when used with in situ reinforced concrete with 50% GGBS and 20% recycled coarse aggregate, polymer modified reinforced bitumen roofing membranes, insulation, rounded pebbles.
- 'D' generic rating, element number 812530062 profiled metal "deep" decking with in situ concrete, polymer modified polyester reinforced bitumen roofing membranes, paving slabs.
- 'C' generic rating, element number 812530063 profiled metal "deep" decking with in situ concrete, polymer modified polyester reinforced bitumen roofing membranes, rounded pebbles
- 'B' generic rating, element number 812530002 structural steel trusses, galvanised steel purlins and deck, plywood (temperate EN 636-2), polymer modified polyester reinforced bitumen roofing membranes, insulation, paving slabs.
- 'A' generic rating, element number 812530026 structural steel trusses, galvanised steel purlins and deck, plywood (temperate EN 636-2), polymer modified polyester reinforced bitumen roofing membranes, insulation, rounded pebbles

Our Products in Practice

We are committed to reducing the impact our products have on the environment through a reduction of energy usage and the addition of recyclate in the composition of our waterproofing and system components.

Life cycle costings

The durability of the hot melt waterproofing is such that there is no need to replace the product during the roof's expected life, the life cycle costing of the system is therefore excellent.

Insulation

The Bauder inverted insulation options are HCFC and CFC free with zero ozone depletion potential (ODP) and low Global Warming Potential (GWP).

The expanded polystyrene (EPS) scrap from the manufacturing process is reintroduced back into making our EPS insulation boards to keep waste to a minimum. When it is not used to make more EPS, foam scrap can be turned into a variety of products such as clothes hangers, park benches, flower pots, toys, rulers and seedling containers.

TECHNICAL CREDENTIALS

BBA Certification

Our Hot Melt Waterproofing has been tested by the British Board of Agrément (BBA) and carries certificate number 06/4350.

The BBA certificate relating to this system states that when fully protected and subjected to normal service conditions, it will provide an effective barrier to water and water vapour for the design life of the roof in which it is incorporated.

Fire Performance

When our Hot Melt Waterproofing System is used in protected or inverted roof specifications and covered with an inorganic finish it can be considered to be unrestricted under national requirements and suitable for use anywhere on a roof.

Root Resistance for Green Roofs

The Bauder Hot Melt System for a green roof uses our AP2 root resistant protection sheet that has been tested and certified under FLL (Forschungsgesellschaft Landschaftsentwicklung Landschaftsbau) guidelines, which is the benchmark test for root resistance in Europe.

Product and Installation Technology

The nature of the hot melt product is to remain 'live' throughout its lifespan so that any minor punctures during service will self-heal and therefore should not require any remedial action.

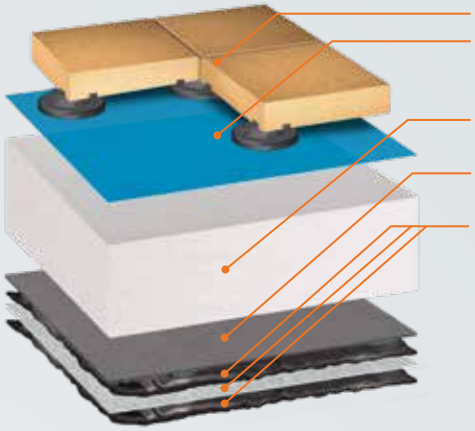
The technology of the primer and the excellent adhesion properties of the hot melt mean that the membrane is fully bonded to the deck and gives a tough yet flexible waterproofing.

HOT MELT WATERPROOFING

Example System Configurations

Safe2Torch REGISTERED

HOT MELT INVERTED SYSTEM WITH PAVING



Paving on Supports

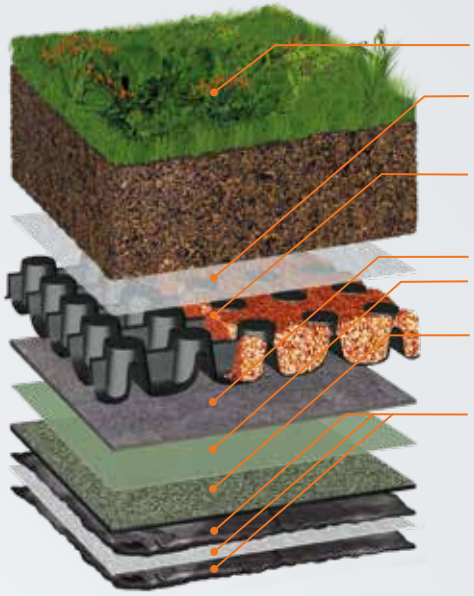
BauderJFRI or Bauder U-Max Vapour Permeable Membrane
increases the thermal capacity of the insulation.

BauderJFRI or Bauder XPS Insulation
thickness to suit U-value required.

Bauder AP1 Access Protection Sheet
fully bonded into the hot melt liquid.

Hot Melt with Polyester Reinforcement
first 3mm layer of hot melt infills and fully bonds to all minor deviations and the deck. The polyester reinforcement strengthens the system and the second 3mm layer of hot melt bleeds through the reinforcement to create a 6mm monolithic waterproofing membrane. The deck is primed with Bauder Polymer Primer to create a 50% increase in bond strength.

HOT MELT PODIUM GREEN ROOF



Vegetation and Substrate
lightweight Bauder intensive growing medium.

Bauder Filter Fleece
is a filtration layer that prevents substrate fines from washing into the drainage or water storage layer.

DSE60
water storage and drainage layer infilled with Bauder mineral drain to provide multi-directional drainage.

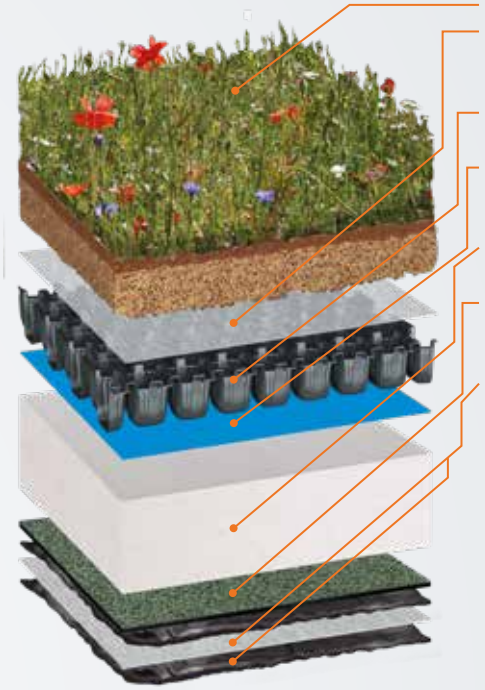
FSM 600 Protection Mat

Bauder PE Foil
polyethylene foil separation and slip layer.

Bauder Root Barrier AP2
fully bonded into the hot melt liquid, this protection layer is root resistant and meets FLL guidelines.

Hot Melt liquid with Polyester Reinforcement
first 3mm layer of hot melt infills and fully bonds to all minor deviations and the deck. The polyester reinforcement strengthens the system and the second 3mm layer of hot melt bleeds through the reinforcement to create a 6mm monolithic waterproofing membrane. The deck is primed with Bauder Polymer Primer to create a 50% increase in bond strength.

HOT MELT INSULATED BIO-DIVERSE GREEN ROOF



WB Wildflower Blanket and Biodiverse Substrate

Bauder Filter Fleece
is a filtration layer that prevents substrate fines from washing into the drainage or water storage layer.

DSE40
water storage and drainage layer.

BauderJFRI or Bauder U-Max Vapour Permeable Membrane
increases the thermal capacity of the insulation.

BauderJFRI or Bauder XPS Insulation
thickness to suit U-value required.

Bauder Root Barrier AP2
fully bonded into the hot melt liquid, this protection layer is root resistant and meets FLL guidelines.

Hot Melt liquid with Polyester Reinforcement
first 3mm layer of hot melt infills and fully bonds to all minor deviations and the deck. The polyester reinforcement strengthens the system and the second 3mm layer of hot melt bleeds through the reinforcement to create a 6mm monolithic waterproofing membrane. The deck is primed with Bauder Polymer Primer to create a 50% increase in bond strength

PROJECT INSTALLATION

Hot Melt Waterproofing

Quick drying polymer primer

Hot Melt being installed

AP2 - FLL root resistant protection layer

Landscaping Components

Bauder DSE60 and Mineral Drain

Substrate prior to turf

Vegetation and Hard Landscaping Finish

The Vibe
Lower Broughton, Manchester

Leaky pipe irrigation system

PROJECT STUDIES

Marischal Square

HOT MELT SYSTEM

BUILDING BOARD	
Project:	**Marischal Square**
Location:	**Aberdeen**
Roof Area:	**5,400m²**
Client:	**Muse Development & Morgan Sindall**
Approved Contractor:	**Briggs Amasco**

APPLIED PRODUCTS

- The Bauder Hot Melt Structural Waterproofing System is ideally suited as a waterproofing system beneath paved or ballasted surfacing, car parks, podiums, plazas, green roofs and substructures.

Marischal square is a mixed use complex in the centre of Aberdeen based on the site of the former council headquarters building, St. Nicholas House. In 2011 Muse Developments undertook a £107m redevelopment of the site creating space for two new office buildings, seven restaurants and café bars, a 126-room hotel, a modern civic space and a new public space area in between the new buildings.

One of the key challenges for the project was the fact that Muse Developments and Morgan Sindall, who were working jointly on the development, were looking for a single source waterproofing. Bauder proved to be the perfect fit, covering and delivering all elements of the waterproofing systems.

With large parts of the new roofing areas being accessible terraces and areas which will experience a significant amount of foot traffic, the Bauder Hot Melt Structural System was a natural choice. The system was combined with hard and soft landscaping to provide the different aspects of the various terraces, stairways, podium decks and rooftops.

Approved contractor Briggs Amasco carried out the works on the 5400m² of the separate roof areas, whilst expert Bauder site technicians carried out a total of 26 site visits over the duration of the project to ensure the quality of the installations. Following a final inspection, Bauder was able to issue a 20 year product and workmanship guarantee on the project.

Belvedere Court

HOT MELT SYSTEM

The impressive Belvedere Court 4-storey building, which was converted from a hotel into 16 prestigious residential apartments in 2008, recently underwent further development including extensions for additional accommodation, basement housing, a communal swimming pool, a theatre and an underground car park.

As part of the refurbishment of the site, the failing waterproofing of the green roof on the car park roof deck needed to be removed and replaced. Bauder approved contractor, The Complete Roofing Company (TCRC), initially proceeded to remove the existing pathways and landscaping before removing the failed system and providing remedial repairs to the damaged roof.

With the car park roof also being used as a recreational green roof for the residents of Belvedere Court, the Bauder Hot Melt System was an obvious choice. Installed with the Bauder AP2 root barrier for root resistance the recreational green roof was installed above.

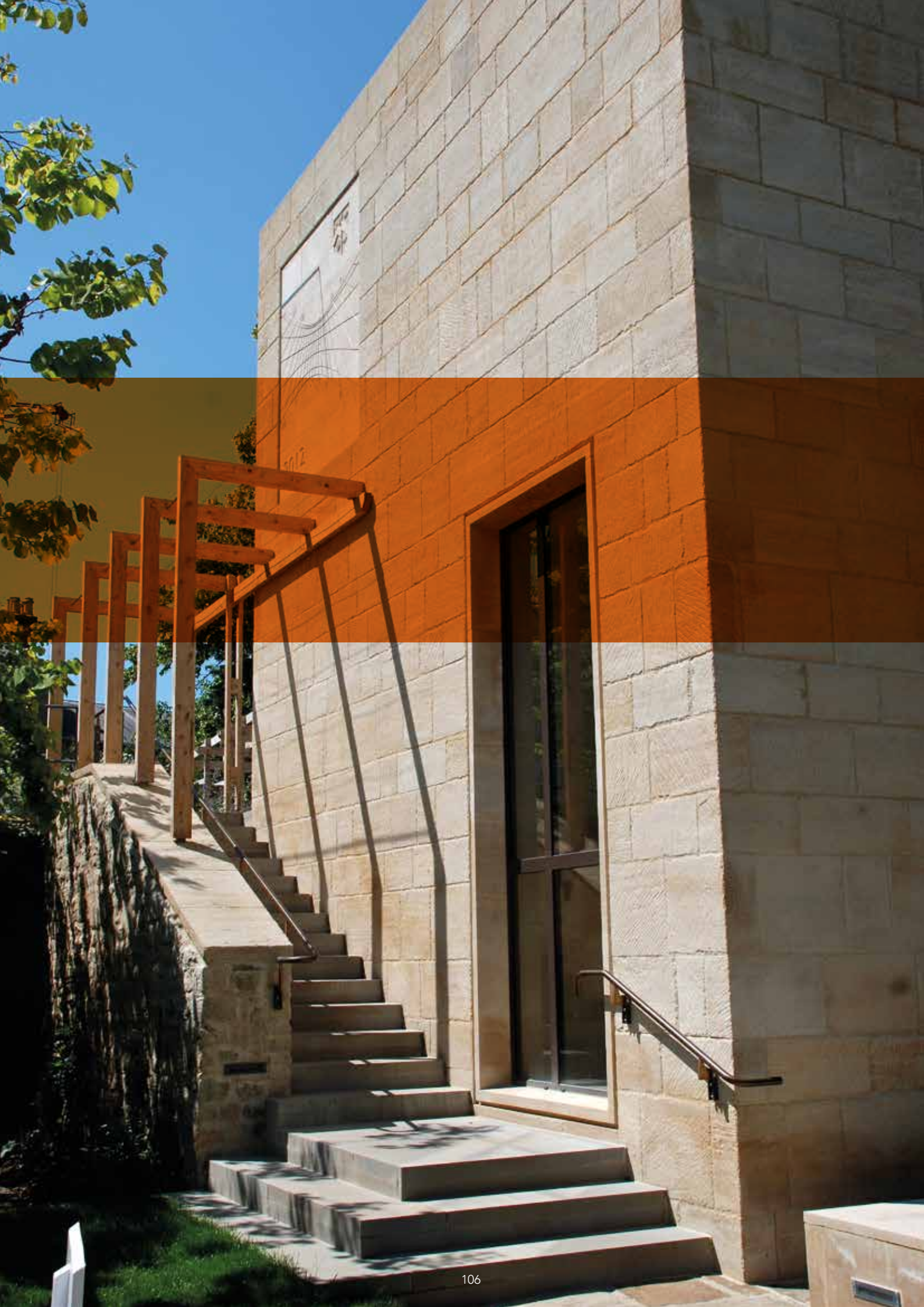
On completion of the waterproofing elements the roof was leak tested to ensure the roof's integrity. TCRC then installed the Bauder green roof components; PE foil, FSM600 protection membrane, DSE40 drainage layer, filter fleece and over 300 tonnes of Bauder intensive substrate. Finally, Rowland Gold turf was then installed with a drip line irrigation system under the turf.

BUILDING BOARD

Project:	**Belvedere Court**
Location:	**Sidmouth, Devon**
Roof Area:	**1,316m²**
Specifier:	**The Complete Roofing Company Ltd**
Approved Contractor:	**The Complete Roofing Company Ltd**

APPLIED PRODUCTS

- Bauder Bakor Hot Melt Waterproofing System with AP2 root resistant protection membrane.
- Bauder green roof components:
- FSM600
- DSE40
- Filter fleece
- Bauder intensive substrate.



Technical Guide

Hot Melt System

Hot melt >>

DOWNLOADS

- BIM
- NBS
- CAD
- Product Data Sheets
- BBA Certificates
- FM Approval
- EPD Certificates
- ISO
- DoP
- Design Guides

www.bauder.co.uk/technical-centre

PRECONDITIONS AND PREPARATION

Acceptable Deck Substrates

Not every form of deck substrate construction is suitable to receive our hot melt.

Structural Concrete Deck - The concrete deck should be properly cured. The recommended curing time is 28 days. Depending on site conditions and weather, it can be possible to install Bauder Hot Melt monolithic membrane onto a concrete deck after only 14 days curing - provided the membrane has successfully passed a bond strength test.

Lightweight Structural Concrete Deck - The lightweight concrete should have a wood float finish. The recommended curing time is 28 days. A bond test is carried out to confirm proper adhesion to the deck.

Concrete Deck Installed into Vented Profiled Metal Deck - A wood float finish will be required, and may have to cure for up to 60 days before proper adhesion is achieved. A bond check must be carried out to check for the correct adhesion.

Plywood, OSB or Dens-Deck (gypsum) - Providing the correct preparation has been carried out i.e. fixings counter-sunk, joints properly taped, and the deck correctly supported to withstand the inverted build up loading weight.

Unacceptable Deck Substrates

Lightweight Insulating Concretes

Concrete made with aggregates such as Perlite, Pumice, Vermiculite will have a very low density and by their very porous make up, will retain a high degree of moisture. This high moisture content can create a problem in achieving a good bond with the deck surface. However, this type of lightweight concrete can be modified with a suitable latex, resin, or polymer treatment to provide an appropriate surface onto which the membrane will adhere satisfactorily.

Screeds

Please note that we discourage the specification of screeded surfaces, because although a good adhesion can be obtained once prepared, they will permit water to track and become absorbed beneath the system in the event that the waterproofing is damaged.

Drainage Falls

Although our hot melt waterproofing is suitable for use at zero falls, in applications where inverted insulation is to be installed, it is imperative that ponding water and back falls are in accordance with good design practice.

Curing Compounds

These additives are a popular method of speeding the curing time of concrete, due to their ease of application, and low material cost. Typically, the liquid type curing compounds tend to form a film on the concrete surface that significantly slows the evaporation rate of retained moisture. Below is an indicative listing of types suitable for use in conjunction with Bauder Hot Melt and also those considered unsuitable.

Acceptable Compounds

Sodium Silicate Based Compounds - These compounds when properly applied do not leave a film or residue on the concrete surface, which would otherwise affect the bond strength of the membrane to the concrete surface.

Resin Based Compounds - These form a residue that can take between 45 - 60 days to oxidize and flake off, when exposed to the elements,and must be completely removed prior to the application of the membrane.

Unacceptable Compounds

Wax Based Curing Compounds - These cease to be an effective curing compound after about 28 days, but take 90 - 100 days to fully dissipate when exposed to the elements. The wax residue will weaken the bond of the monolithic membrane, and is also difficult to remove.

Acrylic Silicate Based Curing Compounds - These form a permanent film on the surface of the concrete, and could prevent the monolithic membrane from forming an acceptable bond with the concrete.

The use of any liquid curing compound in conjunction with our Hot Melt Waterproofing must be approved by Bauder Ltd. Please contact our technical department on +44 (0)845 271 8800.

Cleaning

Preparing a concrete deck generally consists of thoroughly removing dirt debris and dust by means of sweeping and blow/suction cleaning the deck prior to applying the surface primer. However, the deck can be affected by surface contaminants that are not easily removed by sweeping such as oil or diesel spills, laitance, liquid curing compounds or form release agents. When any of these substances have been spilled, applied or have transferred to a concrete surface; or when laitance occurs, it must be removed prior to the application of our Hot Melt Waterproofing. Below are listed some methods of preparation:

- Chemical Cleaning
- Scarification
- Blast Cleaning
- Acid Etching

Priming

The deck surface must be thoroughly primed ideally with Bauder Polymer Primer. This greatly enhances the adhesion between the membrane and the substrate and dries very quickly.

Alternatively, Bauder Quick Dry Bitumen Primer delivers a cost competitive solution.

METHOD OF APPLICATION

Typically, hot melt monolithic rubberised bitumen systems are installed, by first waterproofing the details of the deck such as upstands and outlets, before applying the membrane to the main field area of the deck.

CAD drawings for standard detailing are available for download on our website or we can advise, design, and provide CAD drawings to illustrate the detailing to any structure on receipt of drawings, for guidance.

www.bauder.co.uk/technical-centre/cad-detail-drawings

Installation of the Hot Melt

The application of the Bauder Hot Melt system to the main deck area is carried out in a planned and organised manner to achieve an even monolithic application of the system across the deck.

First Layer of Bauder Hot Melt

The hot melt membrane is applied in two 3mm thick layers using a grid method to accurately control the consistent application rate of the membrane across the whole area of the deck.

Reinforcement Sheet

When the first section of hot melt membrane has been spread and is still hot, the reinforcement layer is carefully placed into the first layer of hot melt, and rolled out, fully bedding into the hot melt membrane.

Second Layer of Hot Melt

The second layer of membrane is installed on the same day as the first and is also applied to a 3mm depth, creating a combined 6mm depth of hot melt.

As the installation of the second layer progresses, the appropriate access/protection sheet is bedded into the membrane while it is still hot.

Access and Protection Layers

For all applications the membrane requires an access/protection layer bedded into it to protect it from trafficking and likely damage from following trades. The protection layer also allows for access for the safe installation of the landscape finish.

The type of protection layer will depend on the proposed build-up and the expected period of time that the system is going to be exposed to following trades.

Bauder AP1

This is a 1.5mm reinforced modified bitumen membrane for use on horizontal and vertical surfaces to provide access and solar protection.

Bauder AP2

A 4.2mm reinforced modified mineral surfaced bitumen membrane root barrier for horizontal and vertical surfaces, and solar protection to exposed areas.

Bauder AP3

This is a rigid 3mm composite board for horizontal and vertical surfaces. It is used for heavy landscaping, tarmac and areas requiring substantial protection.

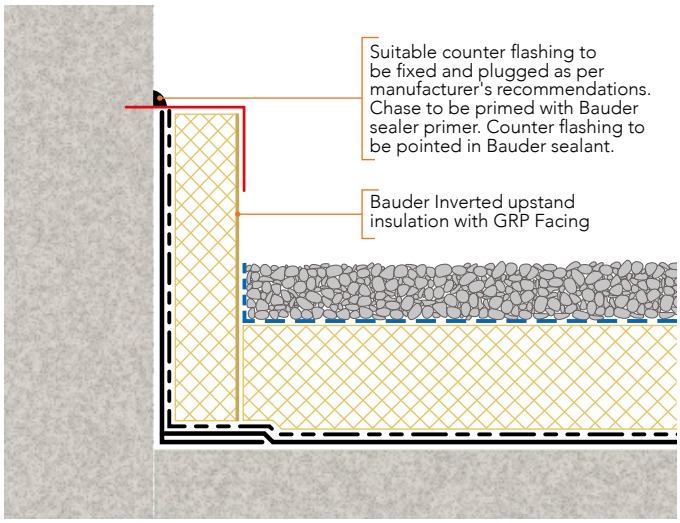
Testing and Quality Assurance

As part of their own quality control procedures, the installing Bauder approved contractor will mechanically test the membrane as it is installed to ensure that the membrane is at least 6mm thick beneath the protection sheet. Additionally, our site technicians will randomly inspect the work during installation.

To meet the criteria of our System Guarantee, we will carry out the final inspection with the approved contractor in attendance to ensure the integrity of the finished roof and that it meets the required standards of installation.

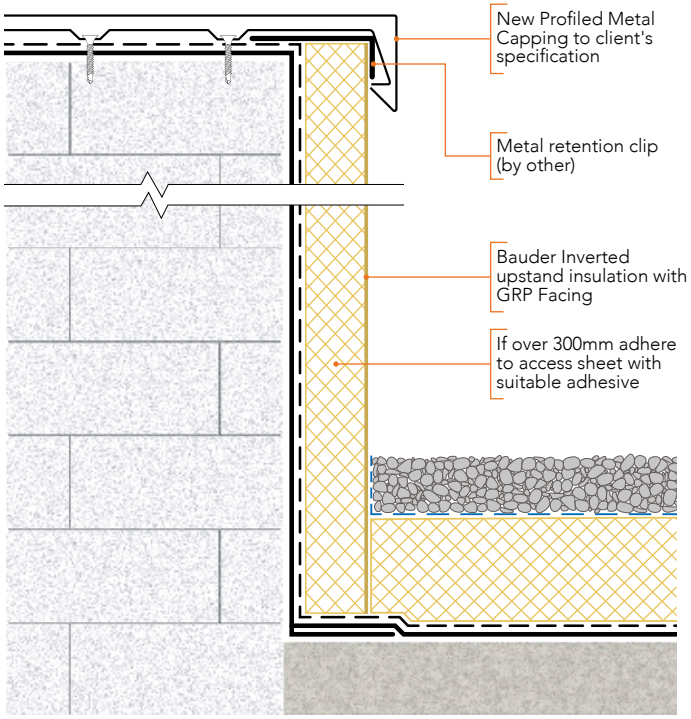
Any issues identified will be reported to the Bauder approved contractor for immediate rectification. Any remedial work will then be re-tested.

GENERAL DETAILING



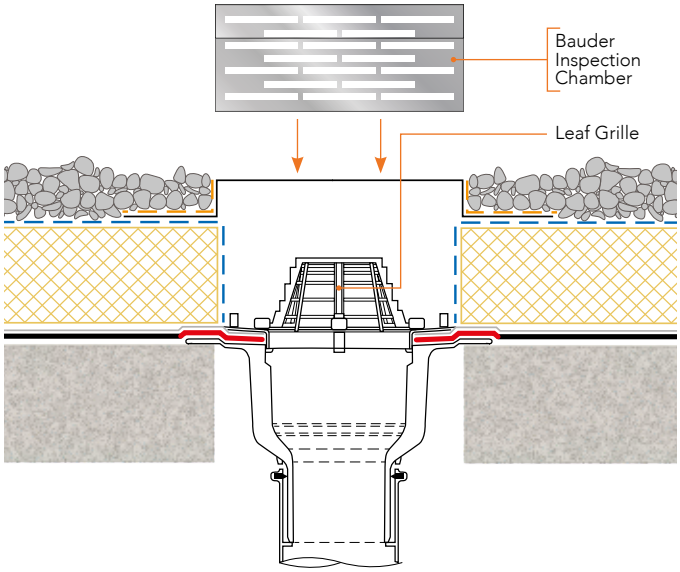
Typical Wall

Bauder inverted upstand insulation boards must be wedged in place at deck level by the horizontal inverted insulation and clipped or mechanically fixed at the top edge to hold in place. Intermediate securing may be required depending on upstand height. As with other interfaces between two dissimilar materials the joint between horizontal and vertical surfaces must be reinforced with un-cured neoprene and the surfaces primed to receive the Bauder Hot Melt Waterproofing System. The protection of a waterproofed upstand requiring insulation would (as shown) be by using inverted insulation with a protective coating. In a non- insulated upstand, protection from solar degradation would be by the incorporation of Bauder AP2 protection sheet.



Typical Parapet

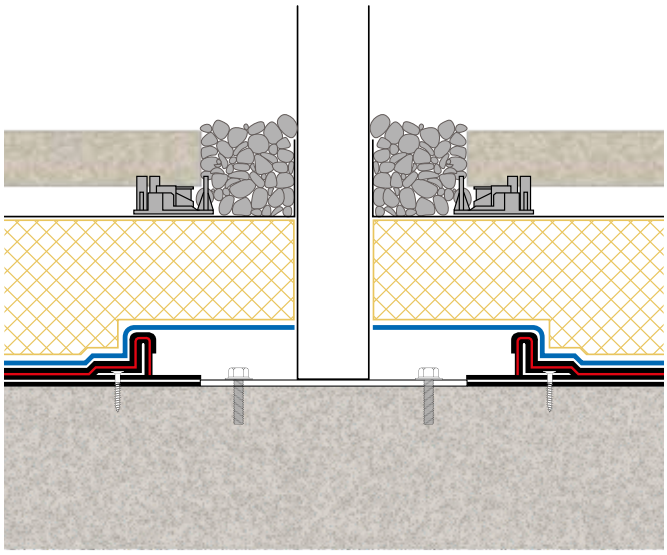
Many types of parapet upstand can be formed using the Bauder Hot Melt Waterproofing system. This example of an insulated upstand has the exposed areas of waterproofing protected from solar degradation by the vertical GRP faced insulation. The flat areas of waterproofing will be protected from solar degradation by the inverted insulation and or ballast can be therefore be installed with an AP1 protection sheet. As can be seen in this example. It is most common practice for the detailing waterproofing to be installed prior to the main roof areas.



Rainwater Outlet

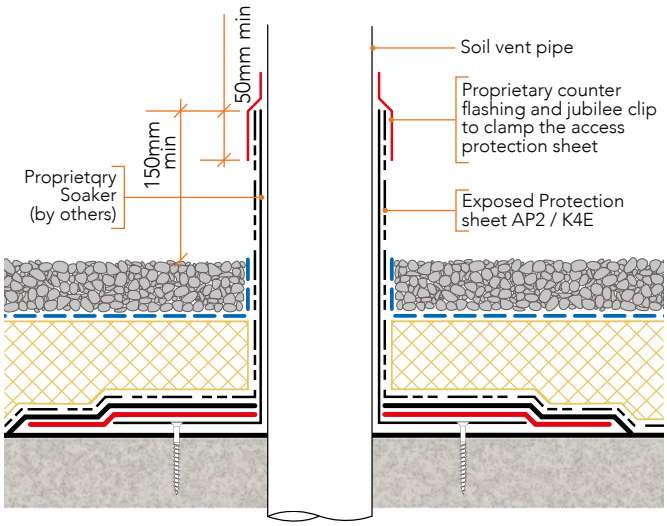
In many applications a proprietary rainwater outlet and/or down pipe will be cast in the concrete at the time of installation. An alternative is for a core to be drilled through the cured concrete structure. Using the Bauder Hot Melt Compact Vertical Outlet it is relatively easy for the Bauder Hot Melt Waterproofing System to be bonded directly to the outlet.

The outlet must be primed to receive the waterproofing and any bridge between the outlet and concrete structure must be reinforced with the un-cured neoprene flashing.



Pitch Pocket Detail

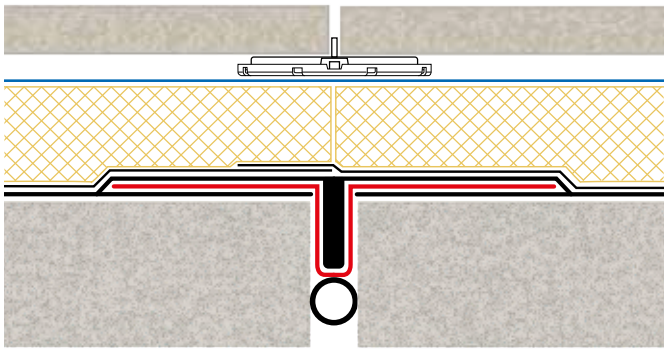
One of the major advantages of the Bauder Hot Melt Waterproofing System is ability to create pitch pocket details around difficult and awkward penetrations on the roof surface. The creation of a pocket using 0.7mm galvanized steel, reinforced at the intersection with the deck structure using un-cured neoprene is a common principal of this type of system. The pocket is filled with the hot melt material which seals effectively around any primed surface. The pocket and hot melt must be covered by the protection sheet of the main system.



Soil Vent Pipe

With a pipe penetration shown in this detail a proprietary soaker (by others) is installed with a base flange that can be suitability secured to the deck and primed to receive the Bauder Hot Melt Waterproofing System. The joint between propriety soaker and concrete deck structure must be reinforced using and un-cured neoprene flashing. The propriety soaker must be tall enough to ensure a 150mm height above the finished roof.

It is good practice to ensure that the top of the pipe is finished with either a cowl or cap to close off the pipe and protect the waterproofing.

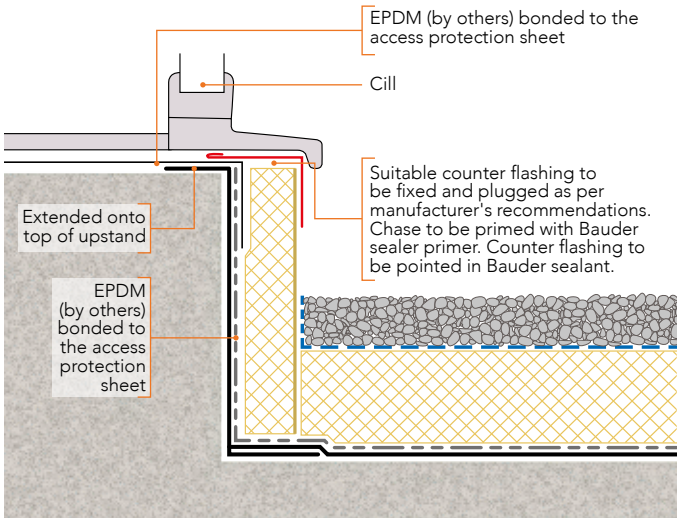


Expansion Joint

A simple but effective way of creating an expansion joint within the material is to utilize the un-cured neoprene flashing sheet and a foam rod or tube. This method of detailing allows the creation of the expansion joint without major disruption to the flow of water to the drainage points.

However, the design and required performance of any type of expansion joint should be discussed at the design stage of the project to ensure that the specification of the join movement can be achieved with this method of detailing. Other expansion joint details are available for use with the Bauder Hot Melt Waterproofing System.

GENERAL DETAILING

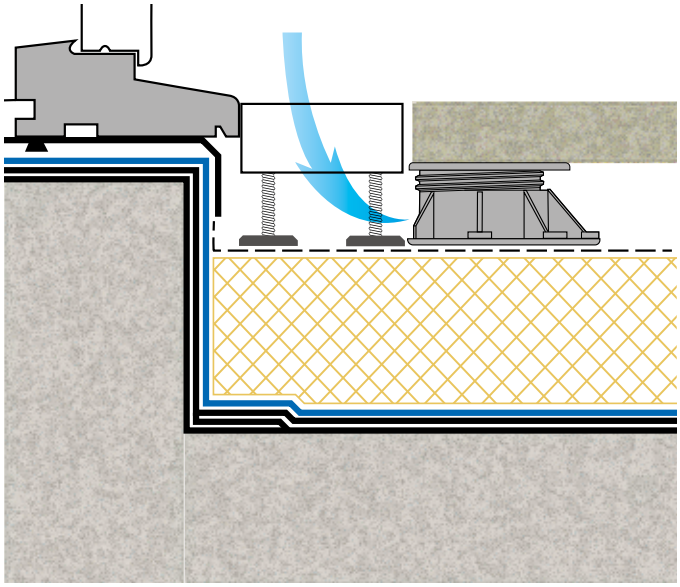


Insulated Upstand to Raised Cills

Not all situations require a level threshold. For those situations that do not a minimum upstand of 150mm should be attained.

This example of an insulated upstand to a door / window cill has the exposed areas of waterproofing protected from solar degradation by the vertical GRP faced insulation. The flat areas of waterproofing will be protected from solar degradation by the inverted insulation and ballast. Both vertical and horizontal can be protected with an AP1 Access Sheet.

Upstand derailing is generally installed first.

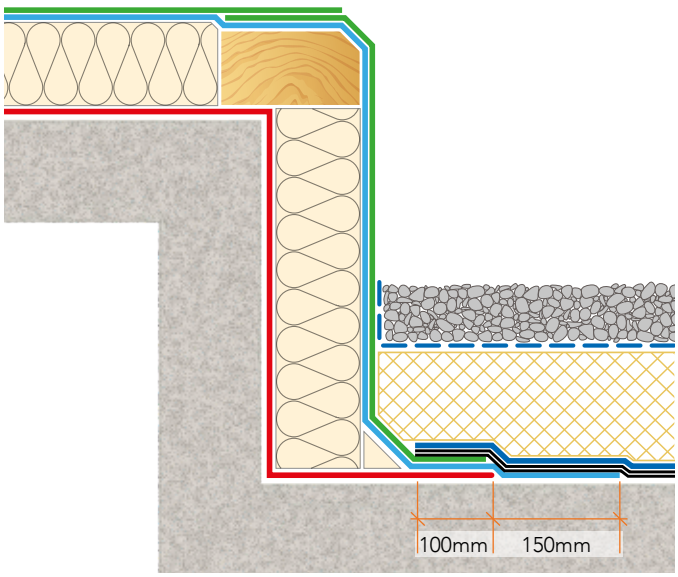


Upstand Detail Linear Drain

Many threshold details to balconies and terraces may need to comply with Building Regulations Part M. They may also need to be required to comply with NHBC Chapter 7.1.

Bauder Hot Melt is installed to all horizontal and vertical surfaces and reinforced using either polyester or un-cured neoprene reinforcement depending on the substrate.

Bauder Hot Melt Waterproofing should be installed prior to the door / window frames being installed. An EPDM flashing attached to the door / window frame should be bonded to the waterproofing.

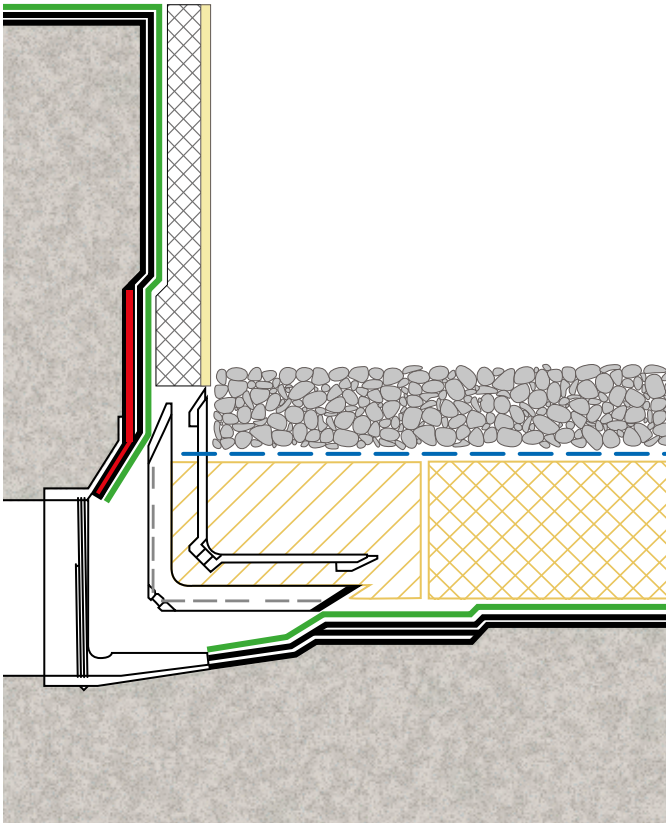


Lift Well Upstand (Lift Over-Run)

In insulated lift over-run details this detail can easily be dealt with by marrying our Bauder Hot Melt and Bauder Warm Roof Waterproofing Systems.

The Bauder warm roof will be installed to the lift-run initially comprising vapour control layer / insulation / underlay and cap sheet. The Bauder Hot Melt Waterproofing System will then be bonded to the warm roof (see diagram).

Inverted insulation and landscape finish will be installed to complete the detail.



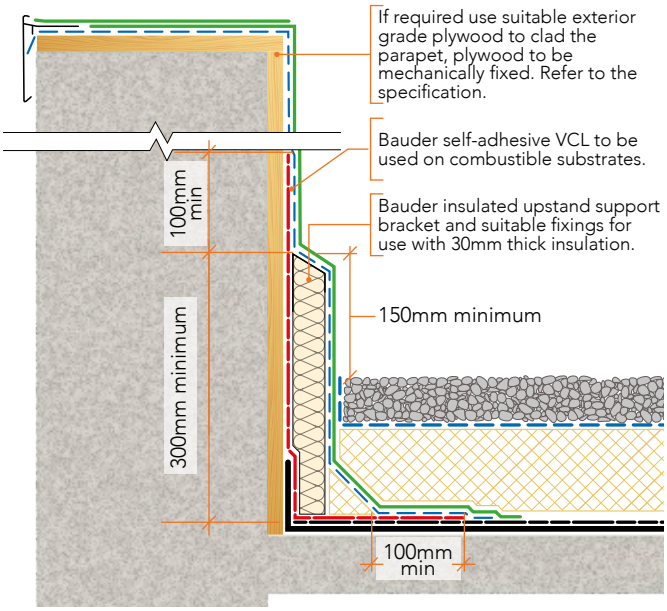
Two Way Outlet

A propriety two way outlet (by others) will generally be cast into the concrete deck at time of installation.

The clamped grill is removed to enable the Bauder Hot Melt Waterproofing to be installed.

The two way outlet must be primed to receive the Bauder Hot Melt Waterproofing and the bridge between the outlet and concrete structure must be reinforced with un-cured neoprene.

The clamping is then replaced.



PIR Insulated Upstand to Parapet

On a partially insulated upstand to parapet, this can be dealt with by marrying our Bauder Hot Melt and Bauder Warm Roof Waterproofing Systems.

The Bauder warm roof will be installed to the minimum of 300mm from the deck surface comprising vapour control layer / insulation / underlay and cap sheet. The Upstand above this will be completed using a suitable Bauder underlay and cap sheet that does not require to be insulated. Inverted insulation and landscape finish will be installed onto Bauder Hot Melt Waterproofing System to complete the detail.


£10 OFF
£20
£12
£5 OFF

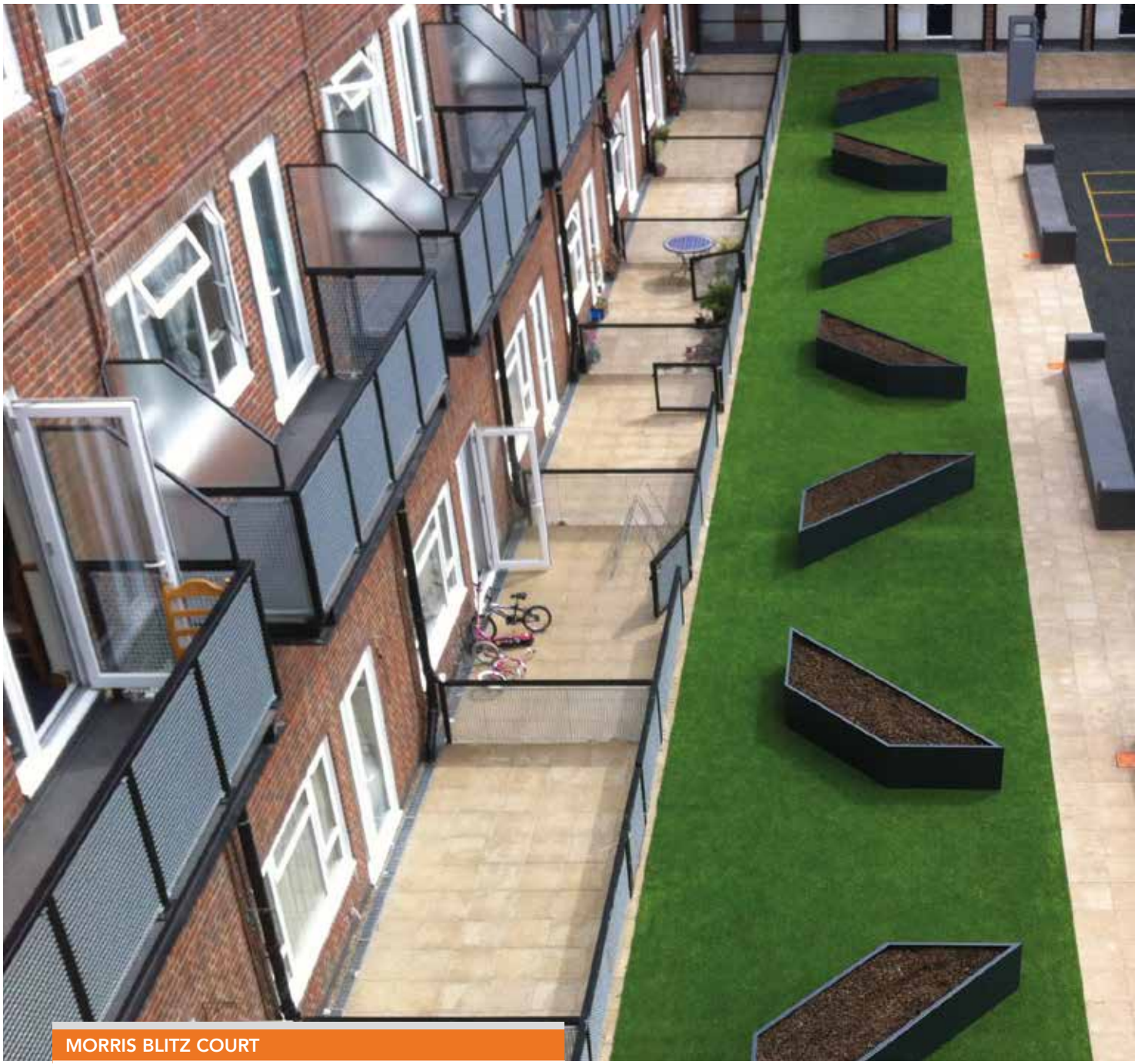
6

Cold Liquid Applied Systems

Our cold liquid applied systems are based on the most advanced Poly Methyl Methacrylate (PMMA) technology.

They are simple to install, fast curing and long lasting. This makes them suitable for use on all kinds of flat roof, balcony, walkway and terrace waterproofing and surfacing applications, whether the project is new build or refurbishment.

OVERVIEW OF WATERPROOFING



MORRIS BLITZ COURT

Location: **Hackney**

"Bauder delivered a comprehensive waterproofing solution of the highest quality; providing expert technical support throughout the project. They have successfully transformed this housing estate in terms of appearance and functionality."

Harsha Amin, Project Manager from Hackney Homes

SYSTEMS

Our cold liquid applied systems are based on PMMA resin technology. This combines ease of application without using any hot works, exceptionally fast cure, and durability, to provide a cold liquid applied waterproofing product second to none.

Bauder LiquiTEC Roof System

This polyester reinforced system is intended for both new build or refurbishment projects and can be applied to a wide variety of substrates including concrete and timber decks, as well as most existing waterproofing membranes such as asphalt, bitumen membranes, and even synthetic single ply, subject to condition and suitability. The system is covered by our guarantee.

The BBA certificate relating to this system states that under normal service conditions the system will have a service life in excess of 25 years.

Bauder LiquiTEC Balcony, Walkway and Terrace System

This incorporates the technology of the Bauder LiquiTEC Roof System with the added benefit of a wearing course to make it suitable for use in both light and heavily trafficked areas. If an insulated system is required this will be an inverted roof construction, with a surfacing such as pavers or timber decking. The system is supported by a comprehensive guarantee.

The BBA certificate relating to this system states that under normal service conditions the system will have a service life in excess of 15 years.

Key Features

- Totally cold applied.
- Installation possible at very low temperatures.
- Withstands ponding water.
- Thick layer system.
- Exceptionally fast curing.
- Short trafficking times.
- Compatible with a wide range of substrates.
- Seamless – no joints or fixings.

Specification Support

Specification downloads:
www.bauder.co.uk/technical-centre

NBSPlus BIM DWG

Telephone helpline:
0845 271 8800

BBA APPROVAL INSPECTION TESTING CERTIFICATION CERTIFICATE 14/5152

CE bre LRWA Liquid Roofing and Waterproofing Association

ENVIRONMENTAL CREDENTIALS

Building Research Establishment (BRE) Green Guide

The BRE Green Guide to Specification gives our products and systems various generic ratings, depending on the type of deck construction and the support structure used. These ratings are used within BREEAM UK New Construction 2014 registered schemes.

Generic Product Ratings

- 'A+' generic rating, element number 1212530006 when used with warm roof insulation on a profiled steel deck with steel supports.
- 'C' generic rating, element number 1212530060 when used with pre-cast concrete hollow slab with screed, inverted insulation with pebble ballast.

Environmental Product Declarations (EPD)

The Eco Platform accreditation is recognised by the BRE as valid and transferable environmental documentation towards obtaining BREEAM credits within their assessment process for BREEAM UK New Construction 2018.

Within our cold applied systems we have the following EPD certification.

- **Liquitec Products**
  EPD-DBC-20130101-IBE1-EN.
- **PU Insulation - Aluminium Facing**
  EPD-IVP-20140207-IBE1-EN.

All certificates can be downloaded from our website bauder.co.uk/technical-centre

Product and System Composition

All our LiquiTEC products are solvent and halogen free; and unlike many other systems, they do not contain styrene or isocyanate, which are linked to serious health risks.

Insulation within a Warm Roof Construction

The BauderPIR insulation used within the warm roof construction of a cold applied waterproofing system has extremely high thermal efficiency and is CFC and HCFC free. It has zero ODP and a Global Warming Potential of less than 5Kg CO_2 - Eq/Kg. As part of our PIR insulation manufacturing process, offcuts and waste are readily recycled and used in the production of hand cleansers and decking materials.

The embodied energy of our rigid polyurethane PIR insulation accounts for as little as 4% of the energy the board can save during its serviceable life. With buildings accounting for 50% of the energy consumption in Europe, the inclusion of insulation when installing new or refurbished roofs plays a significant part in reducing CO_2 emissions.

TECHNICAL CREDENTIALS

BBA Certification
Bauder LiquiTEC systems have been tested and approved by the BBA and carry certificate No. 14/5152

Fire Performance
Our LiquiTEC Warm Roof System and LiquiBALKON system hold ENV1187 fire classification B roof (t4) and are verified by the BBA as 'unrestricted' and suitable for use on any part of a roof.

An unreinforced system with LiquiPAVE RF has been tested to EN ISO 11925-2 and 9239-1 and satisfied the criteria for Euroclass Bfl-S1 according to EN 13501-1

Root Resistance for Green Roofs
The Bauder LiquiTEC system meets FLL (Forschungsgesellschaft Landschaftsentwicklung Landschaftsbau) guidelines, which is the benchmark test for root resistance in Europe.

Durability
The waterproofing products are resistant to ponding water and also incorporate a polyester fleece to provide increased membrane strength, life expectancy and resistance to cracking.

Safety Conscious Installation Technology
The Construction, Design and Management Regulations 2015 place specific duties on designers, contractors and building owners to take fire safety into account throughout a building's life cycle, making sure that all people on site are protected if a fire does ever occur.

By utilising the LiquiTEC Cold Applied System, this flame-free solution not only eliminates any risk of fire from hot works but also means that in refurbishment situations buildings can remain fully operational throughout, with minimal disruption.

Bonding Superiority
The PMMA system delivers superior adhesion between layers as well as to most deck structures or existing waterproofing that requires an overlay solution.

LIQUITEC ROOF SYSTEM

Our cold liquid applied roof system, LiquiTEC, is an extremely durable PMMA resin with fast curing times, completely cold applied and suitable for use on most structural substrates. The roof area can be accessed within hours of installation and it delivers a UV stable, seamless waterproof membrane of the highest quality.

The system can be configured for a cold or warm roof construction and is fully reinforced with a tough polyester fleece for increased membrane strength, life expectancy and resistance to cracking. Within the insulated solution, our self-adhesive KSD DUO elastomeric bitumen membrane is used as both a vapour control layer and as the carrier membrane on which the LiquiTEC products are applied.

Key Features

- Totally cold applied.
- BBA life expectancy in excess of 25 years.
- Polyester reinforced.
- >2mm dry film thickness.
- Exceptionally fast curing.
- Compatible with a wide range of substrates.
- Seamless - no joints or fixings.
- Solvent, isocyanate and halogen free.
- Fire classification B roof (t4) and verified by the BBA as 'unrestricted' and suitable for use on any part of a roof.
- Root resistant.
- Single point guaranteed system.

When to Specify

Apart from the main benefit of being cold applied, LiquiTEC is particularly suited to areas where membrane systems would be impractical due to a high degree of detailing, or when access to install waterproofing is restricted. The system is appropriate for both new build or refurbishment projects onto most substrates and can be used with extensive and intensive green roofs.

Specification Support

Specification downloads:
www.bauder.co.uk/technical-centre

Telephone helpline:
0845 271 8800

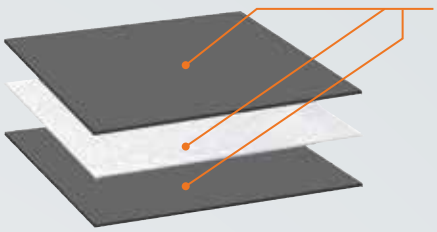
BBA APPROVAL INSPECTION TESTING CERTIFICATION
CERTIFICATE 14/5152

LIQUITEC ROOF SYSTEM

Example System Configurations

COLD ROOF SYSTEM

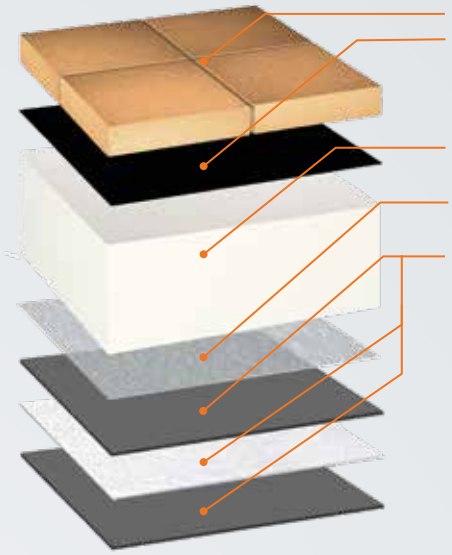
Used in new build or refurbishment applications in a cold roof construction. It is compatible with most existing waterproofing products, making it suitable for use as an overlay system.



Bauder LiquiDEK
cold liquid applied waterproofing, fully reinforced with a tough polyester fabric. The deck is sealed using Bauder LiquiPRIME to improve adhesion.

INVERTED ROOF SYSTEM

Used in new build or refurbishment applications in an inverted roof construction. It is compatible with most existing waterproofing products, making it suitable for use as an overlay system.



Paving/Pebble Ballast

BauderJFRI Vapour Permeable Membrane
designed to increase the thermal performance of the insulation whilst preventing fines from working their way beneath.

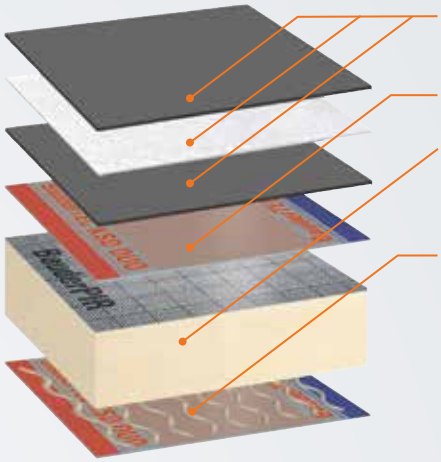
BauderJFRI
inverted insulation to achieve required 'U' value.

Bauder Filter Fleece
separation and filtration membrane.

Bauder LiquiDEK
cold liquid applied waterproofing, fully reinforced with a tough polyester fabric. The deck is sealed using Bauder LiquiPRIME to improve adhesion.

WARM ROOF SYSTEM

Used in new build or refurbishment applications in a warm roof construction and incorporates BauderPIR FA-TE insulation and self-adhesive bitumen membranes.



Bauder LiquiDEK
cold liquid applied waterproofing, fully reinforced with a tough polyester fabric.

BauderTEC KSD DUO
self-adhesive elastomeric bitumen carrier membrane.

BauderPIR FA-TE Insulation
extremely thermally efficient, lightweight, fire resistant and zero ODP rated. The insulation is foil-faced on both sides for increased thermal efficiency.

BauderTEC KSD DUO
self-adhesive elastomeric bitumen vapour barrier the deck is sealed using Bauder SA Bonding Primer to improve adhesion.

System Variations
The standard system colour is blue grey (approx. RAL 7031), although other colours can be achieved by installing an additional finish coat.

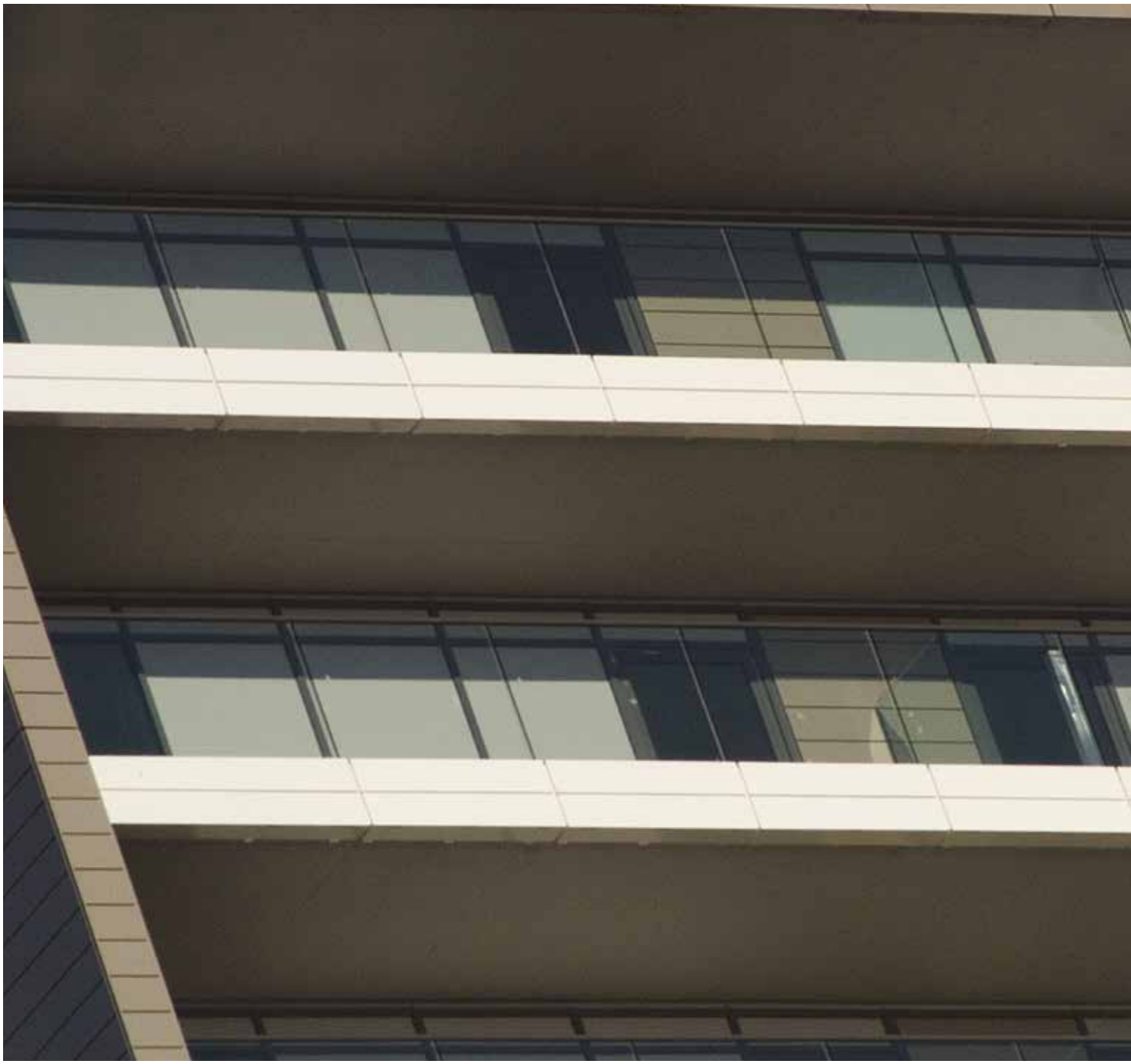
Finish Colours

RAL 7030	RAL 7031	RAL 7043
Stone Grey	Blue Grey	Traffic Grey

www.bauder.co.uk/technical-centre

PROJECTS

LIQUITEC BALCONY, WALKWAY AND



TERRACE SYSTEM

The Bauder LiquiTEC balcony, walkway and terrace system was developed to provide the optimum combination of aesthetic and functional requirements; designed to be slip resistant and hard wearing they can also be used for stairs and stairwells.

Cold application and exceptionally fast cure times are a distinct advantage when carrying out work on areas continuously in use by the building's occupants; inconvenience is kept to a minimum.

Key Features

- Suitable for new build and refurbishment.
- BBA stated life expectancy in excess of 15 years.
- Totally cold applied.
- Exceptionally rapid cure times.
- Seamless with no fixings.
- Flexible, anti-skid, thick layer system.
- Fully bonded with excellent interlayer adhesion.
- Resistant to chemicals.
- Tough and durable enough to withstand all types of balcony traffic.
- Choice of two surface finishes.
- Can be installed all year round in the majority of climatic conditions.
- Compatible with almost all substrates.
- Quick and simple to install.
- Can be overlaid or repaired as required at any time in the future.
- Fire classification B roof (t4) and verified by the BBA as 'unrestricted' and suitable for use on any part of a roof.
- Guaranteed system.

When to Specify

The system is suitable for application over almost all structural substrates commonly used for balcony, walkway and terrace construction and in refurbishment can be applied directly to asphalt and most other waterproofing and surfacing products typically found on existing structures. This avoids the unnecessary expense, risk and disruption of removing existing waterproofing and minimises installation time on site.

COLD APPLIED SYSTEMS

Specification Support

Specification downloads:
www.bauder.co.uk/technical-centre

NBS Plus BIM DWG

Telephone helpline:
0845 271 8800

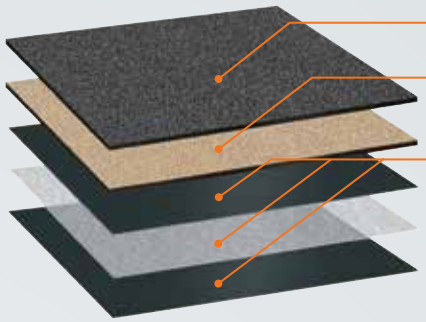
BBA APPROVAL INSPECTION TESTING CERTIFICATION CERTIFICATE 14/5152 CE bre LRWA Liquid Roofing and Waterproofing Association

LIQUITEC BALCONY, WALKWAY AND

Example System Configurations

REINFORCED SYSTEM

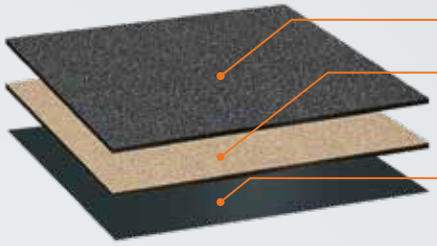
Used wherever there are occupied premises beneath. It is especially suitable for the overlay of failed or worn asphalt, helping to avoid the costs, disruption and risks associated with its removal.



Bauder LiquiFINISH
abrasion resistant system seal coat.
Bauder LiquiPAVE RF
self levelling surface layer with large grain, hard wearing crystal quartz aggregate.
Bauder LiquiBALKON
certified reinforced waterproofing layer, fully reinforced with Bauder 110g reinforcement fleece, a tough polyester fabric. The substrate is sealed with Bauder LiquiPRIME to improve adhesion.

UNREINFORCED SYSTEM

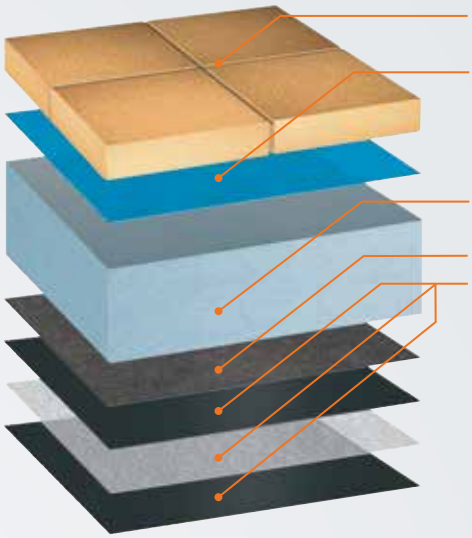
Used over unoccupied premises, such as cantilevered structures. Reinforcement is still used to upstands and details, as structural movement may occur.



Bauder LiquiFINISH
abrasion resistant system seal coat.
Bauder LiquiPAVE RF
self levelling surface layer with large grain, hard wearing crystal quartz aggregate. The substrate is sealed with Bauder LiquiPRIME to improve adhesion.
Bauder LiquiBALKON

BURIED REINFORCED SYSTEM

Paving or timber decking can be used over the reinforced waterproofing layer with the addition of a slip layer and protection layer to prevent the possibility of mechanical damage. This system should also be used when insulation is required as shown in the illustration.



Paving
on supports or screed, or timber decking.
Bauder U-Max or BauderJFRI Vapour Permeable Membrane
designed to increase the thermal performance of the insulation whilst preventing fines from working their way beneath.
Bauder XPS (CO2) or BauderJFRI Inverted Insulation
where it is necessary to provide an insulated solution.
Bauder Filter Fleece
Bauder LiquiBALKON
cold liquid applied waterproofing layer, fully reinforced with Bauder 110g reinforcement fleece, a tough polyester fabric. The substrate is sealed with Bauder LiquiPRIME to improve adhesion.

A finer quartz grade is also available for projects requiring a smoother surface finish.

Finish Colours

The following finish colours are available as standard.

RAL 7030	RAL 7031	RAL 7043
Stone Grey	Blue Grey	Traffic Grey

www.bauder.co.uk/technical-centre

TERRACE SYSTEM

Technical Guide

Cold Liquid Applied Systems

Cold liquid applied >>

DOWNLOADS

- BIM
- NBS
- CAD
- Product Data Sheets
- BBA Certificates
- FM Approval
- EPD Certificates
- ISO
- DoP
- Design Guides

www.bauder.co.uk/technical-centre

INSTALLATION METHODS

Warm Roof Application Sequence

MEMBRANE AND INSULATION LAYERS

No.1: Vapour barrier applied / installed to primed substrate, terminating 100mm past the surface level of the proposed insulation.

No.2: Bauder insulation installed with insulation adhesive.

No.3: Carrier membrane installed over the insulation, lapping with the vapour barrier at details by 50mm.

LIQUID LAYERS

No.4: Reinforced LiquiDETAIL is applied to all upstands and details.

No.5: LiquiDEK is applied over the carrier membrane and the reinforcement fleece is rolled in..

No.6: A further coat of LiquiDEK over the reinforcement fleece 'wet-on-wet' completes the installation.

Balcony, Walkway and Terrace Application Sequence

PRIMING

No.1: Whenever priming is necessary it is applied to the details first, followed by the main area. Masking tape is used to achieve a neat edge.

UPSTANDS AND DETAILS

No.2: A generous layer of LiquiDETAIL resin is applied to the upstand then the fleece is embedded into the wet resin, making sure that it is fully saturated. The masking tape is removed whilst the material is still wet.

MAIN AREA WATERPROOFING

No.3: The LiquiBALKON is applied to the substrate and the fleece embedded, pressing free any trapped air to ensure the fleece is fully saturated.

Another layer of LiquiBALKON is applied, wet-on-wet to ensure full saturation.

SURFACING LAYER

No.4: LiquiPAVE RF is then applied with a trowel.

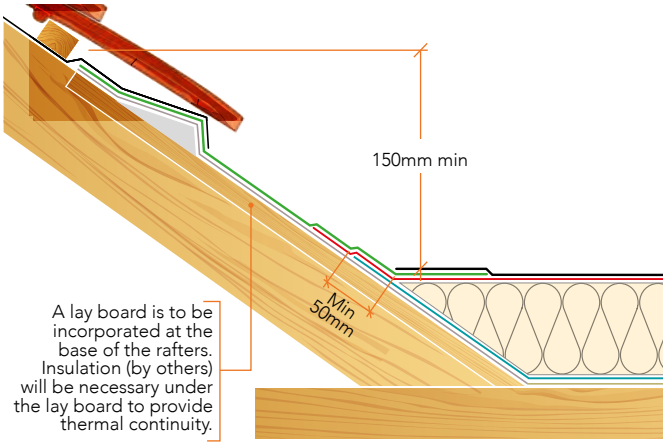
No.5: The quartz aggregate is quickly embedded whilst the resin is still wet, by broadcasting to excess.

No.6: The excess is then swept off once cured.

No.7: Mask the details again and apply a generous layer of LiquiFINISH to the details first, remove the masking tape while the resin is still wet. The deck is then treated by pouring the LiquiFINISH and spreading with a hard rubber squeegee, then back rolling with a dry lambswool roller.

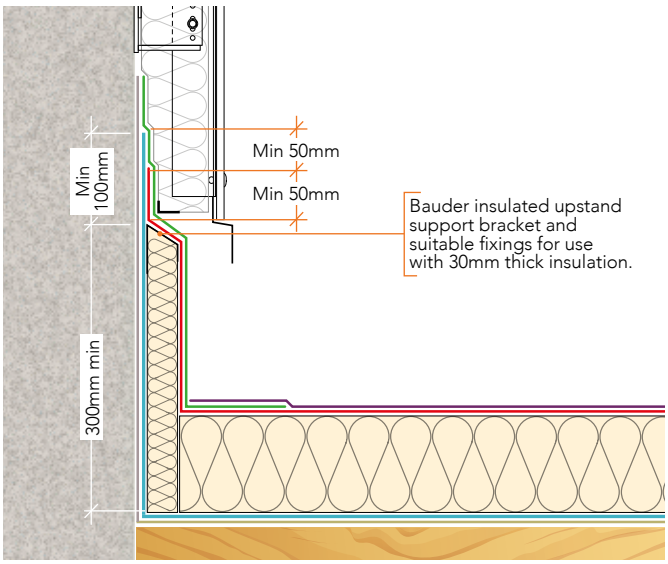
GENERAL DETAILING

LiquiTEC Warm Roof



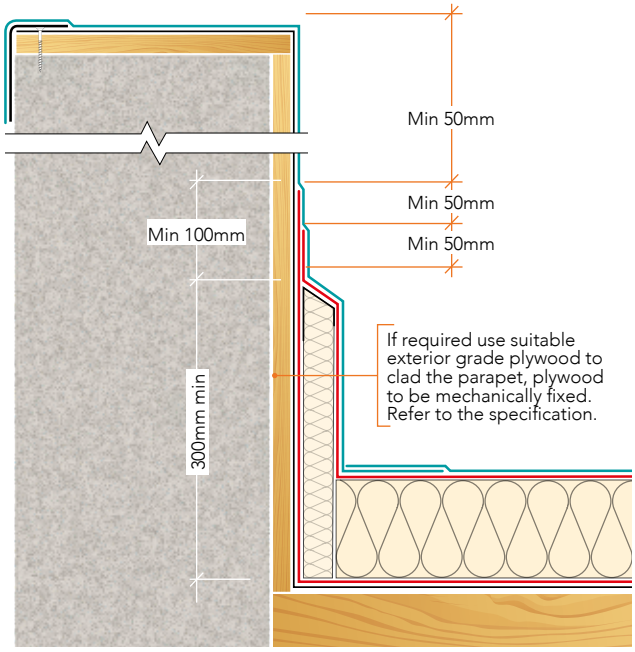
Upstand to Pitched Roof

This is a common detail where it will be necessary to provide a lay board that allows a vertical upstand height of 150mm above the finished waterproofing level in order to prevent water ingress and to comply with Codes of Practice BS 8217.



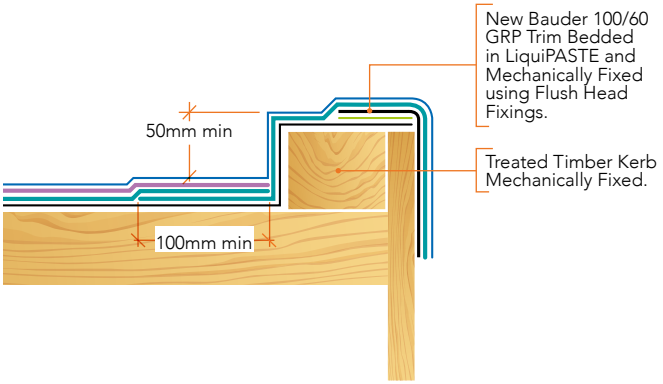
Insulated Upstand to Vertical Cladding

The cladding system should be installed after the roof waterproofing to allow the waterproofing to be detailed correctly. 30mm thick insulation to the upstand prevents thermal bridging from the room beneath, and will be easily held in place by the Bauder insulated upstand support bracket.



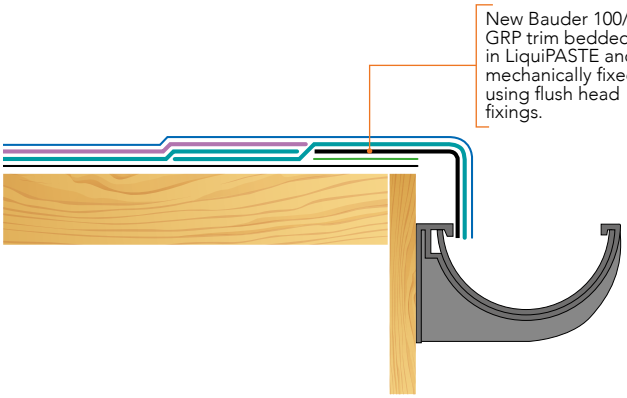
Insulated Parapet Upstand

Taking the waterproofing up and over the parapet and terminating onto a trim, or under a capping or coping stone totally encompasses the detail, ensuring that water cannot find its way through the inside or top of the wall and behind the Bauder system.



Perimeter Kerb

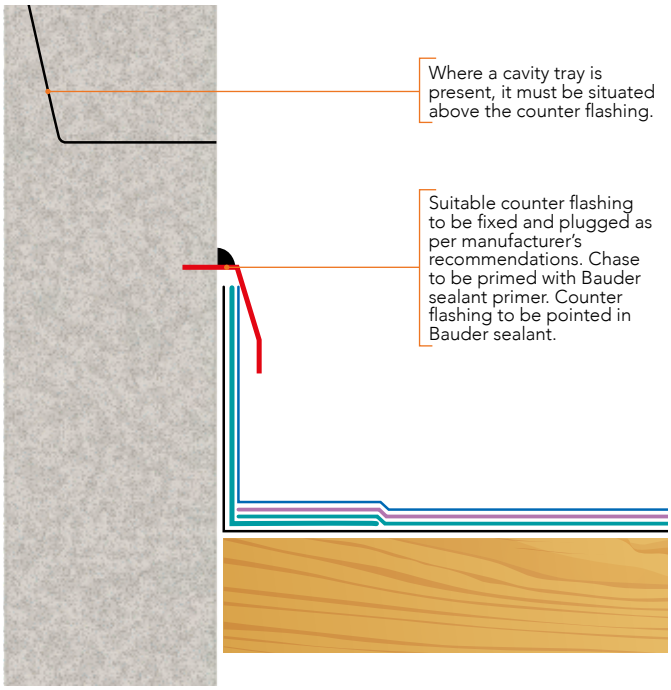
The 50mm high kerb follows the principles of BS 8217, and is designed to prevent rainwater being blown off the roof. The 100/60 trim can be used either way around to suit the aesthetics of the roof being waterproofed.



External Gutter

Trim should be bedded in LiquiPASTE to take out any irregularities in the underlying substrate and facilitate alignment of adjacent sections.

Waterproofing can either be taken to the bottom of the trim as shown or terminated on the horizontal to allow the black surface of the trim to be visible on the vertical.

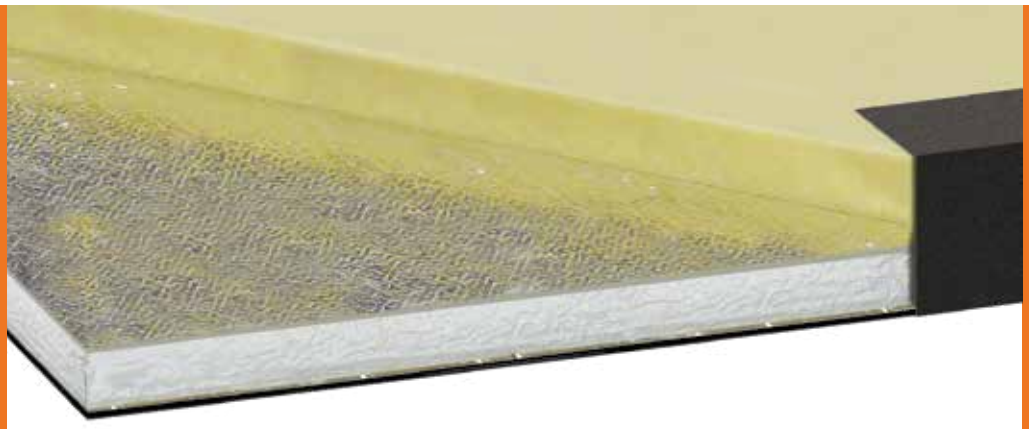


Un-insulated Upstand to Brickwork

Although the LiquiTEC system is self-terminating, it is essential to provide some protection to the top leading edge on vertical upstands, ideally with a counterflashing inserted into a cut chase. Where a chase cannot be cut, a surface mounted termination bar may be used, bedded in Bauder sealant.

7

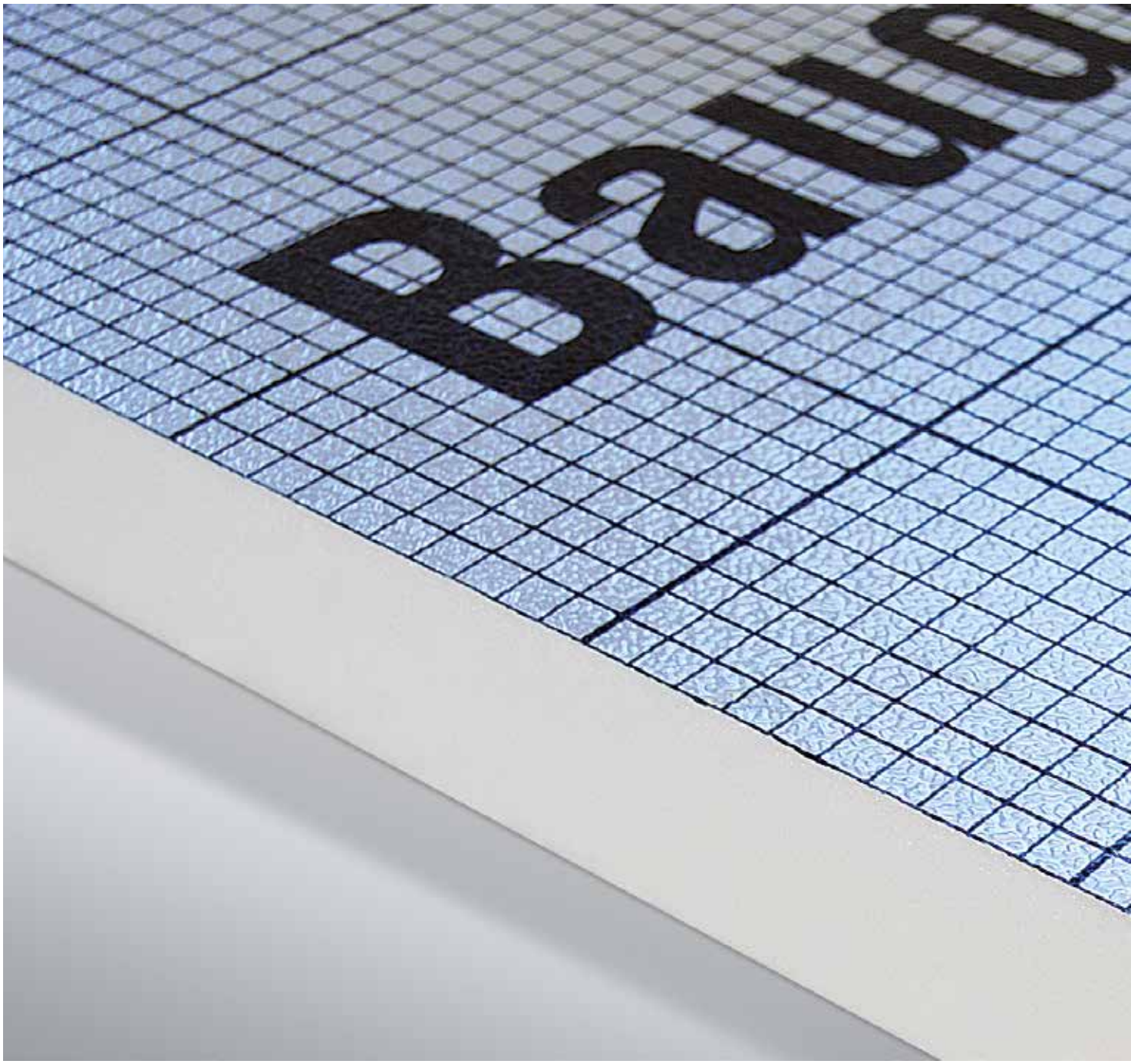
Insulation

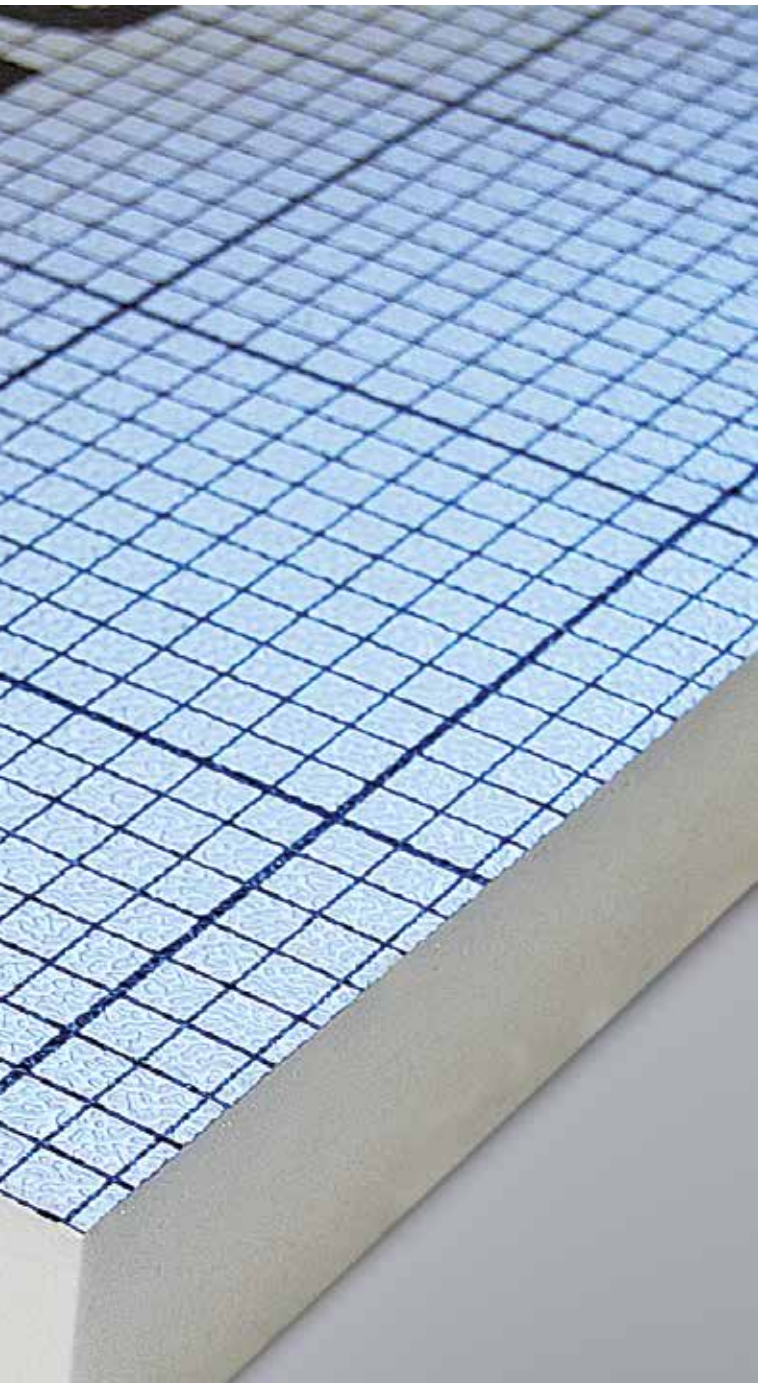


Improved energy efficiency has very positive effects on the environment in terms of reduced greenhouse gas emissions, whilst also providing consumers with lower energy bills.

The range of insulants incorporated within our systems help to meet this objective.

OVERVIEW OF INSULATION





The insulation for flat roofs is commonly produced as rigid boards making them easy to handle and install with the variety of waterproofing types and systems. Ordinarily, polyisocyanurate (PIR) insulation is used within warm roof construction as it has excellent dimensional stability and compressive strength, which enables it to withstand foot traffic without depression. Within an inverted roof construction the insulation needs to be able to endure a 'buried' scenario beneath ballast or a green roof without detriment to its properties or insulating capability; and so forms of polystyrene are utilised.

Bauder Warm Roof Insulation

Our principal manufactured insulation is BauderPIR which is both strong and inert and has a high compressive strength making it suitable for all kinds of load bearing decks.

BauderVIP is a vacuum insulation panel designed to provide high thermal performance in areas with limited installation height and is ideally suited for terrace and balcony applications.

BauderROCK is our mineral fibre insulation with exceptional acoustic and fire resistance properties. The insulant is considerably heavier than PIR and may not be suitable for all warm roof constructions.

Bauder Inverted Roof Insulation

Our Expanded Polystyrene and Extruded Polystyrene inverted roof insulations are designed to sit on top of our waterproofing systems. The insulation is always ballasted to stabilise it against wind uplift and flotation which can comprise items such as pebbles, paving or a green roof.

Specification Support

Specification downloads:
www.bauder.co.uk/technical-centre

NBSPlus BIM DWG

Telephone helpline:
0845 271 8800

ECO PLATFORM EPD EN 15804 VERIFIED bre IMA Insulation Manufacturers Association MEMBER CE BBA APPROVAL INSPECTION TESTING CERTIFICATION CERTIFICATE 16/5365

ENVIRONMENTAL CREDENTIALS

Building Research Establishment (BRE) Green Guide

The BRE Green Guide to Specification gives generic ratings for various product types. These are used within schemes registered under BREEAM UK New Construction 2014.

Product ratings

- 'A' generic rating, element number 1415320205 for Bauder FA-TE & FA.

The only insulation suitable for flat roof applications that rates more highly is Expanded Polystyrene, but this is seldom used in warm roof construction due to its poor fire performance.

- 'A+' generic rating, element number 815320025 for BauderJFRI 200 and JFRI 200 HP.
- 'A' generic rating, element number 1315320001 for BauderJFRI 300.

Environmental Product Declaration (EPD)

The Eco Platform accreditation is recognised by the BRE as valid and transferrable environmental documentation towards obtaining BREEAM credits within their assessment process for BREEAM UK New Construction 2018.

Within our waterproofing systems we have the following EPD certificates for our PIR insulation.

- **PU Insulation - Mineral Fleece Facing**
  EPD-IVP-20140206-IBE1-EN.
- **PU Insulation - Aluminium Facing**
  EPD-IVP-20140207-IBE1-EN.
- **PU Insulation - Unfaced**
  EPD-IVP-20160147-IBE1-DE.

All certificates can be downloaded from our website bauder.co.uk/technical-centre

Our Products in Practice

We are committed to reducing the impact our manufacturing has on the environment as well as how our products can support the environment through a reduction of energy usage, recycling and reusing.

Insulation

Our BauderPIR insulation has extremely high thermal efficiency and is CFC and HCFC free. It has zero ODP and a Global Warming Potential of less than 5Kg CO_2 - Eq/Kg. As part of our PIR insulation manufacturing process, offcuts and waste are readily recycled and used in the production of hand cleansers and decking materials.

The embodied energy of our rigid polyurethane PIR insulation accounts for as little as 4% of the energy the board can save during its serviceable life. With buildings accounting for 50% of the energy consumption in Europe, the inclusion of insulation when installing new or refurbished roofs plays a significant part in reducing CO_2 emissions.

Designing Insulation Schemes

Effective and efficient use of insulation boards on a roof is a consideration so that resource efficiency is maximised and site waste minimised. At Bauder, it is our aim to design out waste arising from a scheme layout, though the success of this can depend more on the way the building is designed rather than the way the product is used. This is particularly important when tapered insulation schemes are required where boards are precisely positioned and less transposable.

Upgrading Insulation on Current Roofs

Utilising moisture mapping and other sophisticated diagnostics and software, we are able to offer a refurbishment service that identifies precisely where on a current roof the insulation is perfectly sound and efficient and therefore does not need replacing, and the areas suffering from water ingress which need to be removed as the insulation is ineffectual. This provision proactively analyses the exact project requirements, rather than working with assumptions, to reduce the materials required for refurbishing the roof and keeping costs to the building owner at a minimum.

TECHNICAL CREDENTIALS

British Standards

Our BauderPIR insulation range complies with BS EN13165 Thermal Insulation Products for Buildings. Factory made rigid polyurethane foam (PU) products.

BBA APPROVAL INSPECTION TESTING CERTIFICATION
CERTIFICATE 16/5365

BBA Certification

Our BauderPIR Insulation boards have been tested by the BBA and carry certificate number 16/5365.

ETA CE
Europ. Techn. Zulassung
European Technical Approval
ETA-13/0493

Our BauderVIP panels are certified under European Technical Approval ETA-13/0493.

IAF INTERNATIONAL ACCREDITATION FORUM

DAkkS Deutsche Akkreditierungsstelle D-ZM-16089-01-00

ISO Accreditation for Manufacturing

Our PIR insulation boards are manufactured in our factories operating an ISO System and are certified to be in accordance with ISO 9001, ISO 14001 and ISO 50001.

IMA Insulation Manufacturers Association MEMBER

Insulation Manufacturer's Association (IMA)

We are an 'Insulation Product Producer' member of IMA which is the representative body for the rigid PIR and PUR foam industry in the UK and offers informed advice and opinion on the use of PUR/PIR insulation products and related issues.

Conservation of Fuel and Power - Building Regulations

Roof insulation thickness for building regulations will vary depending on the country within the United Kingdom where the building is to be sited and the type of insulation used.

Different insulants have different efficiencies and performance levels, which affects the thickness required to meet building regulations. This table shows a comparison of the insulations when looking to achieve a 0.18 W/m²K U-Value on a plywood deck.

TO ACHIEVE A U VALUE OF 0.18 W/M²K ON A PLYWOOD DECK		
Insulation Type	Thickness (mm)	Approx Weight (Kg/m²)
BauderVIP	60	13
BauderPIR FA-TE	120	3.6
BauderPIR FA	120	3.6
BauderPIR Flatboard	140	4.2
BauderPIR Tapered	130	3.9
BauderJFRI 200 HP (with JFRI VPM)	185	5.55
BauderJFRI 200 (with JFRI VPM)	200	6.0
BauderJFRI 300 (with JFRI VPM)	200	8.0
BauderROCK	200	27.2
BauderXPS (CO2) (with Umax)	200	7.0
Cork	210	21.0
Cellular Glass	210	26.3

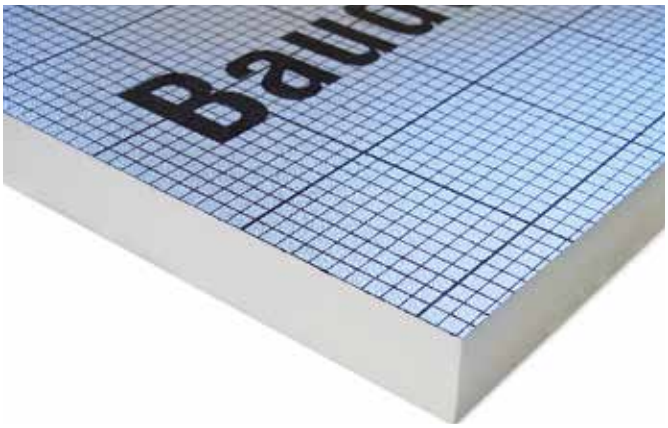
INSULATION FOR WARM ROOFS

Bauder PIR Insulation

Our manufactured insulation, of which there are four variations, is a closed-cell rigid polyisocyanurate (PIR) board. It is both strong and inert and has a compressive strength of minimum 0.12N/mm² making it suitable for all kinds of load bearing decks. The low thermal conductivity allows for the insulation to be of a reduced thickness compared to many other well known insulants.

Key Features

- Superior thermal performance.
- High compressive strength.
- High index PIR.
- Provides superior life cycle performance.
- CFC and HCFC free giving zero ozone depletion potential (ODP) with a GWP (Global Warming Potential) of less than 5Kg CO_2 - Eq/Kg.
- FA & FA-TE generically rated 'A' in 'BRE Green Guide'. (element no. 1415320205)
- Water absorption rate of just 2% vol at the surface as the closed cell structure does not permit capillary action.
- Low thermal conductivity.



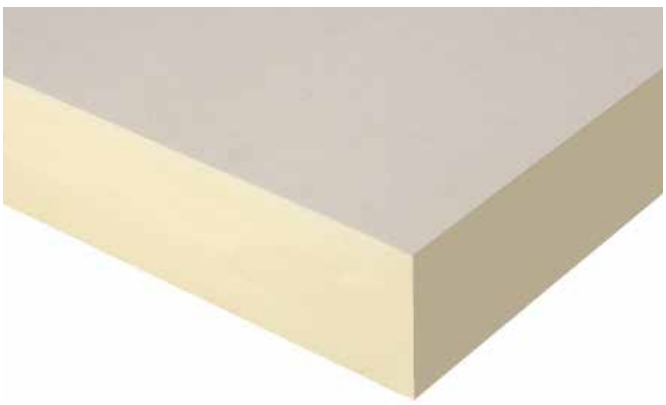
BauderPIR FA-TE Insulation

This insulation is faced on both sides with aluminium foil to increase thermal efficiency and is available in various thicknesses to achieve different thermal requirements.

The FA-TE insulation is utilised in bituminous systems and installed between the vapour control and underlayer membranes.

BauderPIR FA Insulation

This insulation is faced on both sides with black aluminium foil to increase thermal efficiency and is super-sized to enable fast track installation within our single ply systems for both adhered and mechanically fixed orientations. It is available in various thicknesses.



BauderPIR Flatboard Insulation

This insulation is faced with mineralised glass fibre. It can be used in all of our reinforced bitumen membrane systems as well as our synthetic single ply systems.

BauderPIR Tapered Insulation

This is a lightweight, convenient and cost effective alternative method of providing falls to a roof instead of incorporating them into the structure, whilst also providing thermal insulation. A tapered insulation scheme is ideal for improving drainage falls on refurbishment projects.

Our technical team can design bespoke tapered insulation schemes for individual projects and provide advice for flat roof fall design.

Bauder Mineral Fibre Insulation

Mineral fibre insulation provides thermal and acoustic insulation, whilst offering superior fire performance for both new and refurbishment projects. The insulation is produced through spinning molten rock to produce a mass of fine, intertwined fibres and pressed into boards.

The multi-purpose facing allows the insulation to be either mechanically fixed or adhered within the roof system.

Key Features

- Excellent sound absorption and noise reduction.
- Heat resistant.
- Dual density for improved compressive strength.
- Non-combustible, delivering high fire performance.
- CFC and HCFC free, with a Global warming potential less than 5Kg CO_2

BauderROCK Insulation

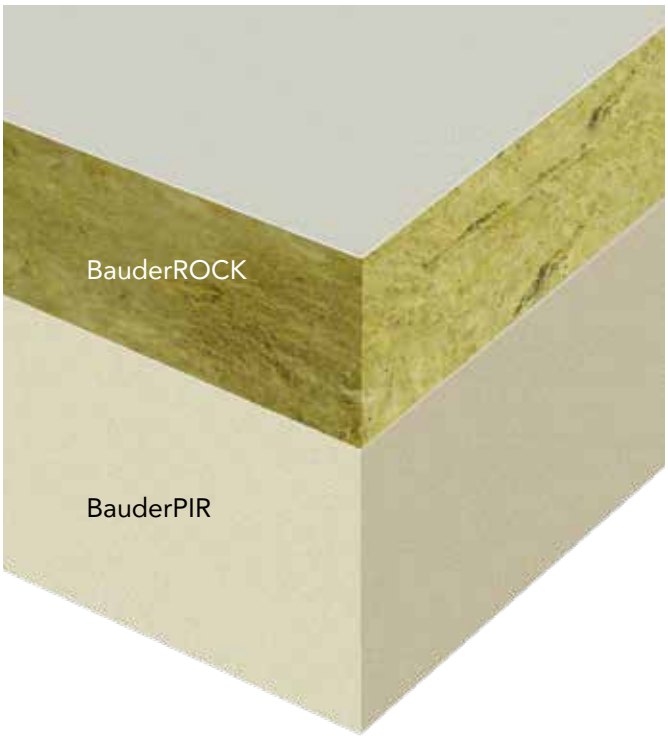
This mineral fibre flat board insulation is ideal for projects that are required to achieve a high level of sound reduction and fire performance within a warm roof construction for bituminous or single ply membrane systems.

BauderROCK Tapered Insulation

This mineral fibre tapered board is ideal for projects that require improved drainage falls and a high level of sound reduction within a warm roof construction for bituminous or single ply membrane systems.

SPECIALIST INSULATION SOLUTIONS

Combined Acoustic System



Combining BauderROCK with BauderPIR can reduce rain noise and airbourne sound transmission whilst keeping weight loadings and system thickness to a sensible level.

- Improved sound reduction compared with solely BauderROCK
- Thinner build-up than solely BauderROCK
- Less weight loading than solely BauderROCK
- Vapour permeability
- Added thermal performance
- Dimensional stability
- A natural fire barrier

The sound properties of the base layer of BauderPIR Insulation are enhanced with an upper layer of BauderROCK.

Installation can be mechanically fastened or adhered and is suitable for both refurbishment and new build.

Zero ODP and GWP of 30g CO_2-Eq./kg

Generic BRE Green Guide Rating A

Bauder Profiled EPS

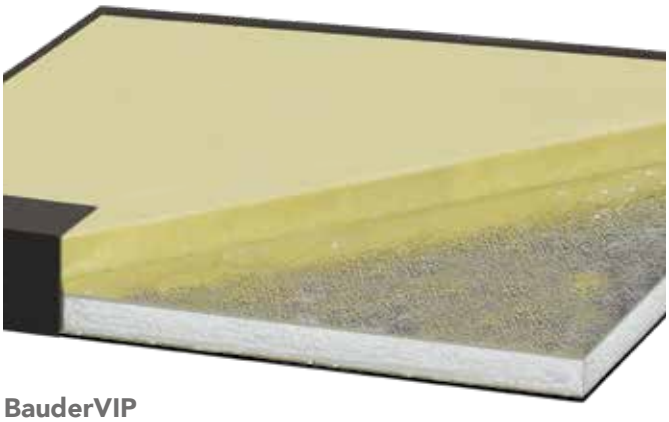
EPS is a lightweight cellular plastic material suitable for a wide range of building insulation applications. It comprises expandable beads of polystyrene pre-foamed and fused together in a steam heated mould under pressure. It is an excellent insulating medium which exhibits consistent thermal performance over the range of temperatures normally encountered in buildings.

The profiled EPS board is used within refurbishment projects to overlay an existing profile sheet metal roof covering to improve thermal performance without re-cladding. The insulation is manufactured to match the profile of the sheet metal roof currently in-situ, typically steel, composite panels or aluminium, and is cut to the thickness required to achieve the desired thermal performance. The insulation is then waterproofed with the Bauder single ply membrane systems.

The insulation has a high compressive strength. It is resistant to the passage of water and will not degrade. It is CFC and HCFC free, with a global warming potential less than 5Kg CO_2.

For full information on the Profiled Overlay System.

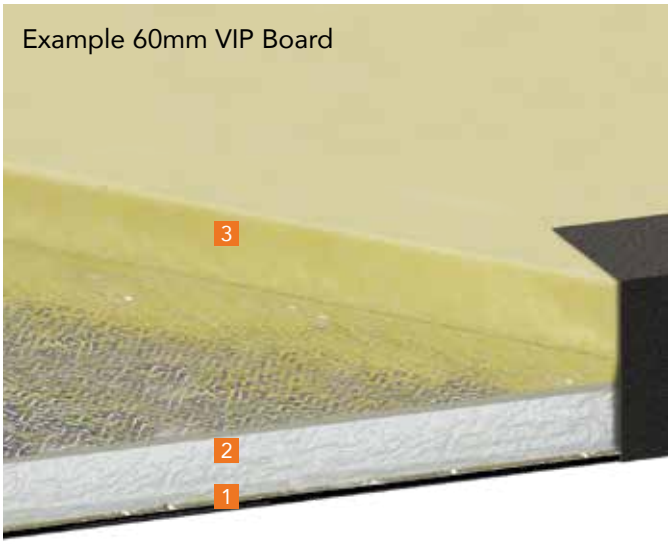
Bauder Vacuum Insulation Panel



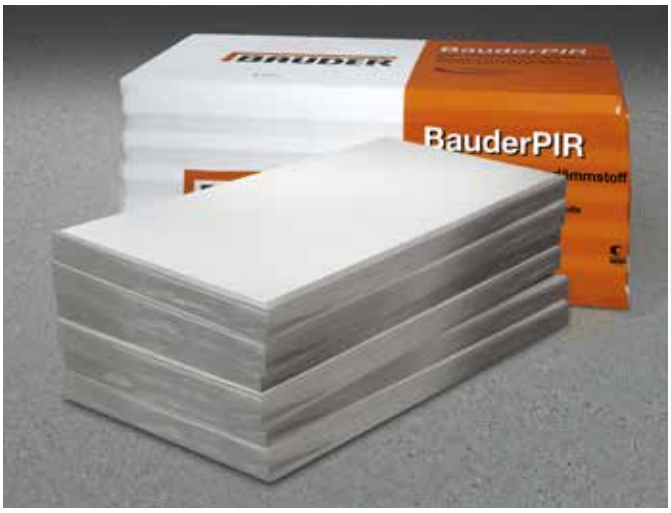
BauderVIP
This vacuum insulation panel is designed to provide high thermal performance in areas where system build-up height is limited and is ideally suited for terrace and balcony applications with a landscaped finish, excluding timber decking.

The exceptional insulating properties (calculated value of thermal conductivity - 0.0063 W/mK) achieved by BauderVIP is due to the high performance vacuum silica core. This silica is encased by a multi-layer composite aluminium foil, and then the air is removed from the silica to create a vacuum.

In order to protect the vacuum during installation and against normal construction processes, BauderVIP is protected on the underside with a 3mm thick rubber granulate mat and on the upper surface with 17mm high density BauderPIR. Both protective layers are bonded to the vacuum core to provide one complete encapsulated panel.



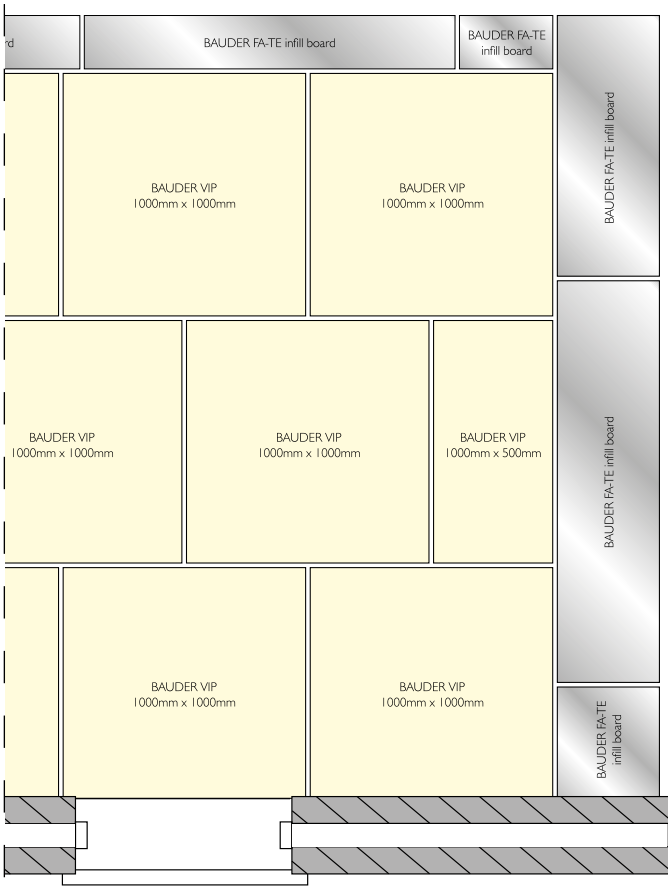
1. **3mm Recycled Rubber Mat**
2. **40mm VIP Core**
3. **17mm High Density PIR**



BauderVIP is available as a 60mm or 80mm thick panel and supplied in the following sizes:

- 1000 x 1000mm
- 1000 x 500mm

The Bauder VIP panels are certified under a European Technical Approval ETA-13/0493.



Example Layout

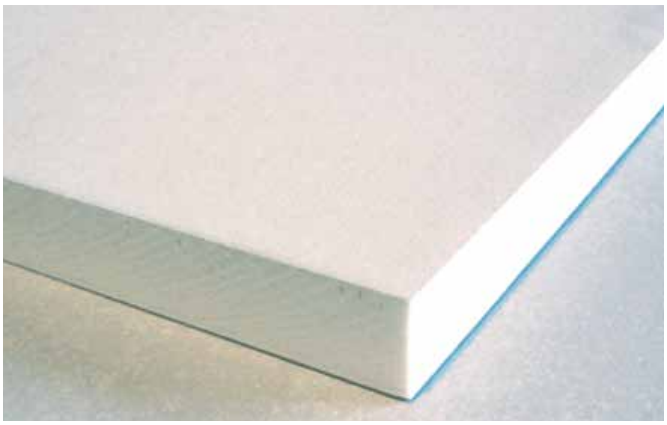
INSULATION FOR INVERTED ROOFS

Insulation for use in inverted roof design needs to possess specific properties, as the environmental demands placed upon it are more severe than those placed upon insulation in a warm roof design. As the insulation does not benefit from the protection of the waterproofing membranes, it needs to be impenetrable to water, resistant to rot and decay, and have a higher compressive strength.

We offer a choice of insulation for use with inverted roof systems depending on the specific requirements of the project along with the preference of the client.

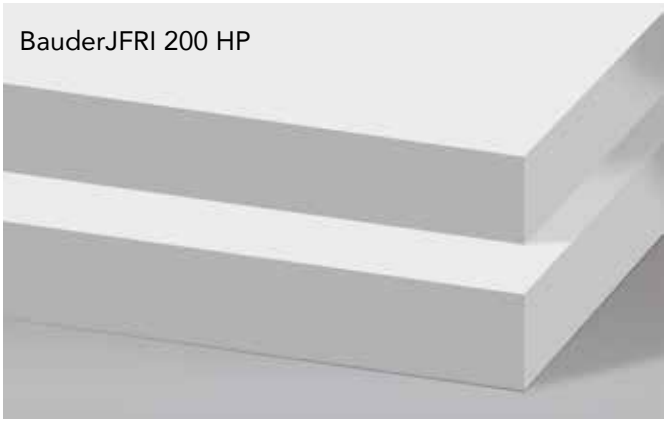
Key Features

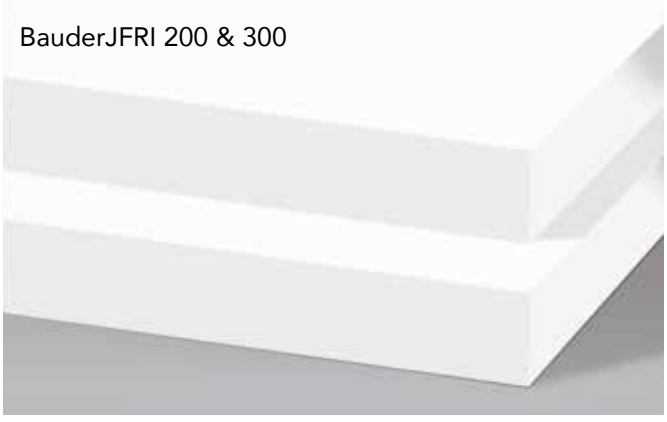
- High compressive strength.
- Low moisture absorption.
- CFC and HCFC free giving zero ozone depletion potential (ODP) with a GWP (Global Warming Potential) of less than 5Kg CO_2 - Eq/Kg.
- Ballast must be provided in the form of paving slabs, pebbles or a green roof.
- Retains its thermal performance and structure in exposed conditions.



BauderXPS(CO2)
This CO_2 blown extruded polystyrene insulation offers a global warming potential (GWP) <5Kg CO_2 - Eq/Kg and is CFC and HCFC free with zero ODP.

This insulation has high compressive strength and low water absorption making it a tried and tested material for inverted flat roofs and ballast must be included in the form of paving slabs, pebbles, landscaping etc. to provide resistance against flotation and wind uplift.





BauderJFRI Flatboard Insulation
An environmentally friendly, high performance rigid expanded polystyrene insulation, which is very lightweight and has a high compressive strength. It is resistant to the passage of water and will not degrade. The product is rebated on all four sides to ensure thermal continuity. It is CFC and HCFC free, with a global warming potential less than 5Kg CO_2.

We have three grades of JFRI insulation;

BauderJFRI 200 HP - can withstand permanent loads of up to 60KPa. Due to an improved declared thermal conductivity (W/mk) this version can be reduced in thickness compared to the standard BauderJFRI 200.

BauderJFRI 200 - can withstand permanent loads of up to 60KPa.

BauderJFRI 300 - for permanent loads of up to 90KPa.

JFRI 200 HP, 200 and 300 used in the inverted roof concepts have a Class E reaction to fire classification BS EN13501-1:2007.

When ballasted with either aggregate (minimum depth of 50mm), or fully supported cast stone or mineral slabs of at least 40mm thickness, the roof may be considered to be of designation Ext.F.AA (low vulnerability in Scotland) and so are unrestricted by the National Building Regulations.

BauderJFRI Tapered Insulation

Cost-effective alternative method of providing falls to a roof instead of incorporating them into the structure, whilst also providing thermal insulation.

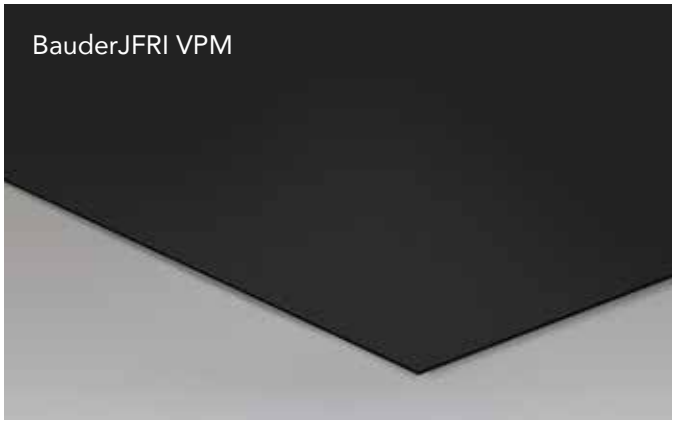
An environmentally friendly, high performance rigid expanded polystyrene insulation, which is very lightweight and has a high compressive strength. The product is resistant to the passage of water and will not degrade. The product is rebated on all four sides to ensure thermal continuity. It is CFC and HCFC free, with a global warming potential less than 5Kg CO_2.

BauderJFRI HP Upstand Insulation

Upstand Insulation

Upstands are insulated to reduce the risk of cold bridging. The top of the upstand board must be at least 150mm above the level of the landscaping finish. We offer two upstand boards depending on the insulation type used for the flat area. Bauder XPSU (CO_2) with cementitious facing is used in conjunction with BauderXPS (CO_2). BauderJFRI HP Upstand Insulation with GRP facing is used in conjunction with BauderJFRI I nsulation.

JFRI HP Upstand Board utilise edge cover strips fixed to all exposed vertical joints to prevent weathering.



BauderJFRI VPM

Vapour Permeable Membranes

When carrying out thermal calculations for inverted roof design, allowance is made for the cooling effect of rainwater, which seeps between the joints in the insulation causing thermal bridging.

The use of a vapour permeable membrane above the insulation not only prevents debris from tracking beneath the insulation but also reduces the level of cooling as most of the rainwater is discharged before it reaches the insulation. This means that by using a vapour permeable membrane, better U values can be achieved with the same thickness of insulation.

We offer two vapour permeable membranes, BauderJFRI VPM for use with BauderJFRI, and Bauder U Max for use with Bauder XPS (CO_2).

8

Green and Blue Roofs

We lead the way in the development of all types of green roofs having supplied and installed solutions for over 40 years.

We provide the complete package of waterproofing systems and associated landscaping components to ensure that every green or blue roof is fully compatible.

OVERVIEW OF GREEN AND BLUE

We were the first company to introduce lightweight landscaping technology into the UK and Ireland, partnering on many prestigious projects since 1982. Our unrivalled expertise ensures we deliver any green or blue roof scenario, from recreational gardens and parks to simple low maintenance environmental greening and biodiverse ecological solutions.

ROOFS

James Terry Court, Croydon provides residential, nursing and specialist dementia care for up to 76 residents. The beautiful rooftop garden and sheltered terraces help residents make the most of the outside space whatever the weather.

Blue Roofs

The BauderBLUE Roof System is a sustainable drainage method designed to attenuate and manage stormwater on a flat roof over a 24-hour period via a restrictive flow outlet. A BauderBLUE roof is a solution for urban areas where options for ground-based attenuation systems are limited, and in particular, where construction is being carried out within flood sensitive areas.

Sedum System
Non-Accessed Extensive Green Roof

All in one system comprising mature sedum species pre-grown on an integrated multifunctional water retention and filter layer with 20mm of extensive substrate. The system has been developed for use directly over the waterproofing without the need for a secondary layer of substrate.

Substrate Roofs
Extensive Non-Accessed Green Roofs

Substrate green roofs are designed to be comparatively lightweight, work towards providing some storm water attenuation and support a wide variety of low maintenance plant species which are generally self-sustaining, and wind, frost and drought tolerant.

Biodiverse Habitats

Created to encourage a wider spread of birds, insects and plant species into the area and generally replicate the ecological environment of the site. This is particularly important if there are planning conditions or a local Biodiversity Action Plan (BAP) must be followed.

Pre-grown Vegetation Blankets

Designed to give instant greening to a roof. Two options are available; Bauder WB native wildflower blanket or a sedum mix in the Bauder SB substrate blanket.

Plug Planted Systems

The selection and location of each plant species can be controlled according to requirements which is ideal when the roof has a number of different aspects. We can supply over 100 different plugs: British Native Wildflowers, herbs, grasses to sedums and other succulents.

Seeded Roofs

Our unique range of British native seed mixes provides the specifier with a selection of seed blends to suit particular locations and are designed to meet BREEAM and BAP requirements.

BioSOLAR Roofs

Combining a green roof with a solar PV array where the substrate and vegetation provide ballast for the PV mounting. The mounting system raises the modules above the substrate to allow liberal growing room for the plants.

Recreational Gardens, Terraces and Spaces
Accessed Intensive Green Roofs

Rooftops and podiums where the design may include flowerbeds, lawns, shrubs and trees intermixed with paths, driveways and patios. The combinations of finishes will impact on the design, construction, drainage and components used to deliver to each element's requirements.

ENVIRONMENTAL CREDENTIALS

Aiding Biodiversity and Meeting a Biodiversity Action Plan (BAP)

A green roof can provide a range of natural habitats specifically designed to support particular species of plant, insect or wildlife. Designed for the local ecology, in which vegetation will establish and provide an environment for wildlife as well as insects and invertebrates. The provision of a healthy habitat in a place that could otherwise be empty encourages wildlife to remain in the area, providing wildlife corridors to support the natural colonisation of locally arising plants, birds and insects, boosting the resilience of species in the area.

Our wildflower blanket and Flora Seed Mixes are all specifically devised to meet BAP criteria through their inclusion of species within the RHS 'Perfect for Pollinators' and Flora Locale 'native origins criteria'.

Bauder Works with Buglife, the invertebrate charity, to produce a range of habitat features that favour some of the UK's most vulnerable species.

Storm Water Management and SuDS

The specifically engineered outlet within a blue roof restricts the discharge of storm water to a calculated and predesigned 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 which helps to avoid downstream or localised flooding.

Green roofs can retain rainwater in the substrate, drainage/reservoir board and plants. This water is then used by the vegetation or evaporates back into the atmosphere. The FLL reports that, over the course of a calendar year, a green roof can frequently retain 40% of average rainfall on an extensive green roof with 20-40mm of substrate and sedum vegetation and 90% of average rainfall on an intensive green roof with over 500mm of substrate.

Improving Air Quality of Local Surroundings

Localised air quality is improved as the vegetation assists in filtering out both gaseous pollutants and dust particles, effectively purifying the air. Additionally, the natural evaporation of water from the plants and soil helps to cool and humidify the air, so lowering the ambient temperature and reducing the heat island effect.

Prof. Dr. H. J. Liesecke, the former chairman of the German FLL regulatory body, carried out tests at the University of Hanover to provide evidence of the natural air purifying effects of Xero Flor XF301 sedum system with its patented substrate.

The test container housing the sedums and mosses was filled with the waste gas from petrol and diesel engines and after 48 hours the pollution levels were measured showing a reduction by 95% within the period. A second chamber was also set up without vegetation as a comparative control.

In conclusion, extensive green roof systems effectively mitigate car emmissions.

Urban Heat Island Effect

The urban heat island effect is the difference in temperature between urban areas and the surrounding countryside and is a result of large building surfaces reflecting and radiating solar, which will not dissipate fully overnight. The substrate of a green roof will absorb some of this heat and the natural evaporation of water from both the plants and soil helps to cool and humidify the air, thus lowering the ambient air temperature.

Recycled Content of Green Roof Components

Many recycled or waste materials are used within our green roof build ups to enable us to provide environmental solutions to the industry.

Water Retention and Drainage Layers

Our DSE 20, 40 and 60 boards all utilise recycled high density polyethylene which is easily moulded to create the cupped profile boards that provides water retention and multi-directional drainage.

Protection Layers

Our protection layers FSM600 and FSM1100 are made from a mixture of two recycled materials, reground polyester and polypropylene fibre, that are combined before being mechanically and thermally solidified to deliver a layer which prevents mechanical damage to the waterproofing beneath the green roof build up.

Our ProMat is made of granulate from recycled shredded tyres reformed and bound by Polyurethane to give a high protection layer against mechanical damage.

Our Ecomat product is a protective layer created from mechanically bonded recycled Polyester clothing and fabric.

Substrates and Growing Mediums

Our FLL compliant substrates are based around recycled crushed brick and composted recycled organic material to give growing mediums which correctly balance water storage, structural stability, water permeability and grain size distribution according to the requirements of the planting scheme.

Separation and Slip Layer

Our PE Foil allows the green roof to operate independently of the waterproofing system and is manufactured from recycled polyethylene granulate.

Recycling and Reusing Green Roof Components

The level of recycled content within our components clearly demonstrates that these products are then easily returned to the convention.

Schemes Registered for BREEAM 2014 Accreditation

The BREEAM assessment method evaluates the sustainability of built environments through the different stages of their life cycle. The schemes include:

Our green roofs have the potential to count towards these sections of BREEAM:

Land Use and Ecology

LE 03 Mitigating Ecological Impact.
Criteria 1&2
Potential credit 1

LE 04 Enhancing Site Ecology
Criteria 1&2
Potential credit 1

LE 05 Long Term Impact on Biodiversity
Criteria 8
Potential credit 1

With the verification of a suitable qualified ecologist, a Bauder green roof can be specified with our WB native species wildflower blanket or Bauder Flora seed mixes 3,5,7,9,11 which are accredited by the RHS as 'Perfect for Pollinators' and certified by Flora Locale to create a new valuable ecological habitat, mitigate the impact of the building on the construction's footprint and create a long-term habitat for local flora and fauna.

Health and Wellbeing

Hea 05 Acoustic performance
Criteria 2
Potential credit 1

Our Xero Flor sedum blanket green roof system on a metal deck has been tested in accordance with BS EN ISO 140-18: 2006 to determine the sound intensity level within the building during heavy rainfall. The sedum plants intercept the impact of rainfall and mitigate the noise so that a figure of 33.5 dB was achieved.

Management

Man 04 Stakeholder Participation
Criteria 12
Potential credits 1

Green roofs for fully accessible recreational use provide facilities that can be shared by the relevant parties. They can be podium based, at ground level with further facilities situated below such as car parks, or elevated at rooftop level with the relevant and important safety features.

Energy

Ene 04 Low and Zero Carbon Technologies
Compliance CN10
Potential credits 2

A BauderSOLAR and Bauder BioSOLAR Green Roof PV array create local renewable energy generation from sources which can supply a compliant percentage of energy to the building.

Materials

Mat 01 and MAt 03Responsible Sourcing
Criteria 2b
Potential credits 3

Our XF301 sedum system holds ISO 14001as our green roof components are manufactured from recycled granulate.

Mat 04 Insulation
Criteria 1c
Potential credits 2

A green roof assists insulation of the building by regulating rooftop temperatures and reducing the need for additional climate control within the building. Appropriate thermographic survey results would identify performance and are particularly useful when a current building is being refurbished with a retrofit green roof.

Within a warm roof construction, our PIR is listed as achieving a generic A rating.

Waste

Wst 02 Recycled Aggregates
Criteria 3c
Potential credits 1

Our ProMat protection layer is manufactured from tyre rubber crumb from non-construction post-consumer sources which is listed in CN1 Secondary aggregates.

Crushed aggregate obtained from site is not recommended within a green roof because it can introduce even small levels of contaminated content to the living roof.

TECHNICAL CREDENTIALS

Adopting Standards

Throughout Europe, the standards most widely recognised as comprehensively covering green roofs are those of the Forschungsgesllschaft Landschaftsentwicklung Landschafttsbau (FLL). This independent foundation was set up by the German Government over 20 years ago and has developed specific guidelines for green roof systems.

We have adopted these well respected standards, which cover all aspects of waterproofing, root protection, landscaping, installation and maintenance and we will continue to do so whilst also working in conjunction with the GRO Code of Best Practice for the UK.

Protection of the Waterproofing

A green roof protects the waterproofing from UV damage and thermal movement. Research has shown that the life expectancy of the waterproofing is significantly extended and in many cases may last the estimated design life of the building, which can eliminate future replacement costs.

Fire Testing

Bauder XF301 was the first sedum blanket in the UK to be awarded an EXT. F.AA fire rating by the Building Research Establishment. The full system, including the waterproofing and insulation was tested, and so the EXT. F.AA rating applies to the complete system and not just the sedum blanket covering.

The same system was tested in a sloped orientation in 2009 to ensure that the fire behaviour is not affected by roof slope. The test was a success and the system is now also classified EXT.S.AA, giving peace of mind when specifying the system on a sloped roof.

Increased Efficiency and Output of a BioSOLAR PV Array

A green roof helps to maximise solar energy generation as the vegetation preserves ambient rooftop temperatures, keeping the modules at optimal output. The cooling effect increases panel output by up to 5-7%.

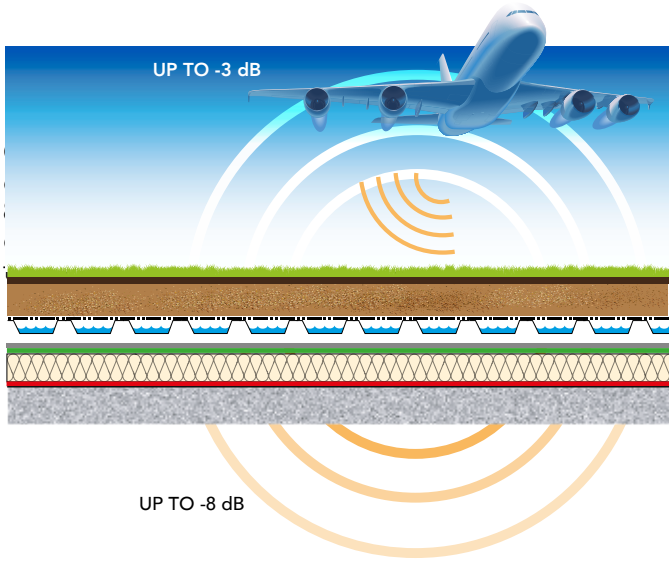
Aid to Planning Consent

Many local authorities favour planning proposals that incorporate green roofs within the application as this helps meet their targets on sustainable environment and support of priority species

Sustainable Urban Drainage is now part of legislation and is a critical part of planning. Blue roofs form part of the options available for SuDS.

The Flood and Water Management Act 2010 was introduced in England and Wales and implemented to better manage flood risk. The Act creates safeguards against rises in surface water drainage charges and protects water supplies for consumers. The Act gives levels of responsibility to local authorities to co-ordinate flood risk management in their area.

Many local planning authorities (LPAs) are adopting early perspectives that encompass Schedule 3 of the Act to bring in measures that prevent flooding. Within construction and development, planners are restricting the amount of rainwater leaving a site via the drainage system, limiting water egress to 5-10 litres per second per hectare, the same flow rates for regional greenfield sites.



Reduced Building Running Costs

The enhanced thermal performance provided by a green roof provides a more balanced temperature within the building. This reduces heating costs in the winter and air conditioning expenses during the summer.

Reduced Lifecycle Costs

The main reduction in lifecycle costs comes from the green roof providing protection from the damaging effects of the weather, which effectively 'ages' the waterproofing, thus the time span between replacement is extended significantly, and in many cases replacement will become unnecessary.

Offset Construction Costs

In large construction projects a green or blue roof can mean that storm water holding tanks are reduced in size or no longer required, as the roof itself will attenuate required rainfall.

Creates an Amenity Space

The roof is often an under utilised asset of a building, as it offers the unique potential to replace the land lost to the construction as reusable space. Large roof areas covering underground car parks can provide parkland or sports facilities.

Increases Property Value

A green roof is an additional asset, once created will maximise the properties potential value.

Productivity in the Workplace

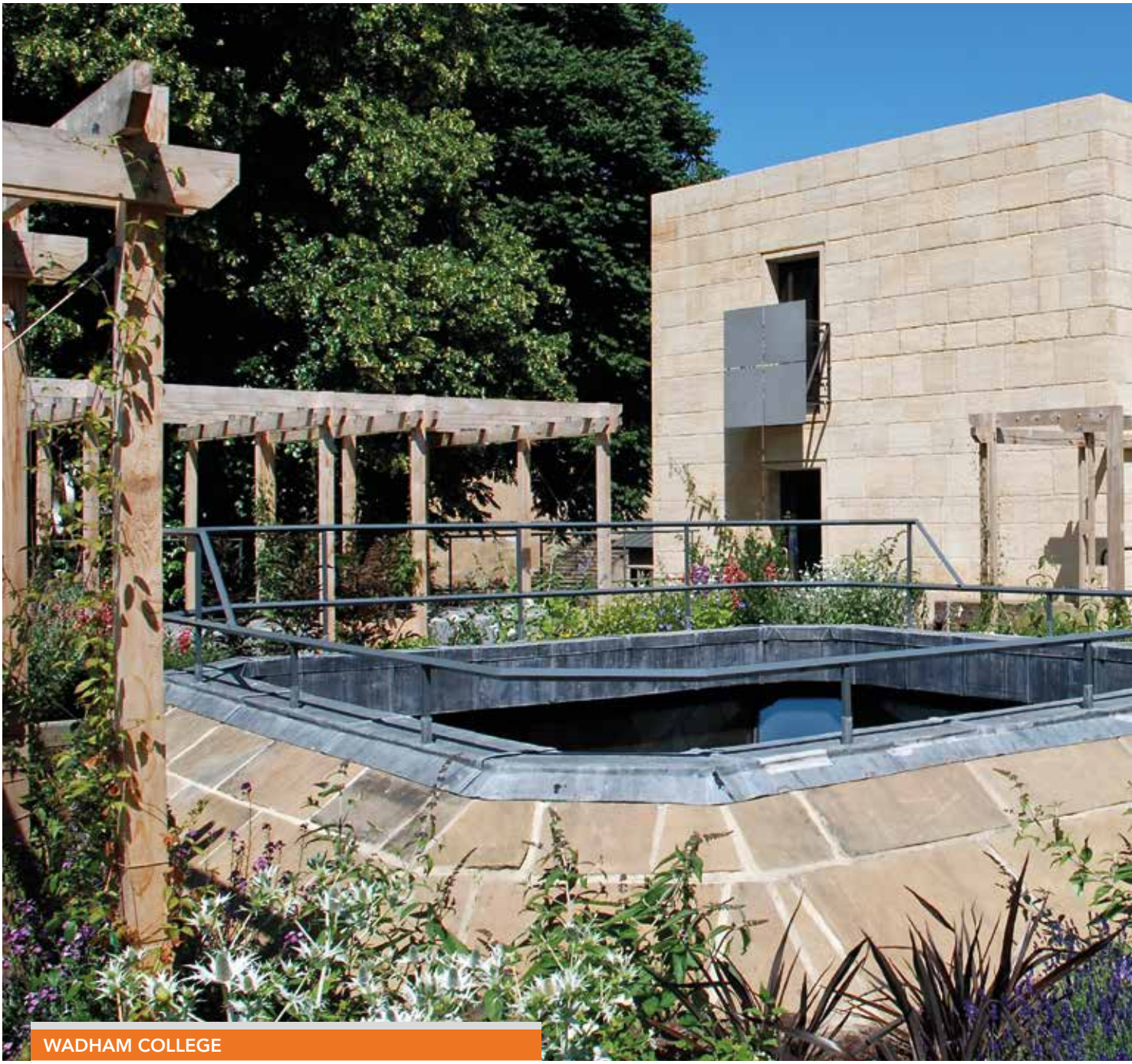
Research has shown that people working in offices that overlook green spaces have a higher productivity than those with a poorer outlook on to hard, impervious buildings. The evidence shows that there is a reduction in stress levels if people have visual and personal contact with natural greenery and that physically they benefit from the cleaner air.

Health

Hospitals are greening overlooked roofs or incorporating rooftop garden areas for the benefit of patients as they find that this speeds recovery. Some patients are also encouraged to access the gardens and to actively maintain them as part of therapeutic exercise.

RECREATIONAL SPACES, GARDENS

Accessed Intensive Green Roof Systems



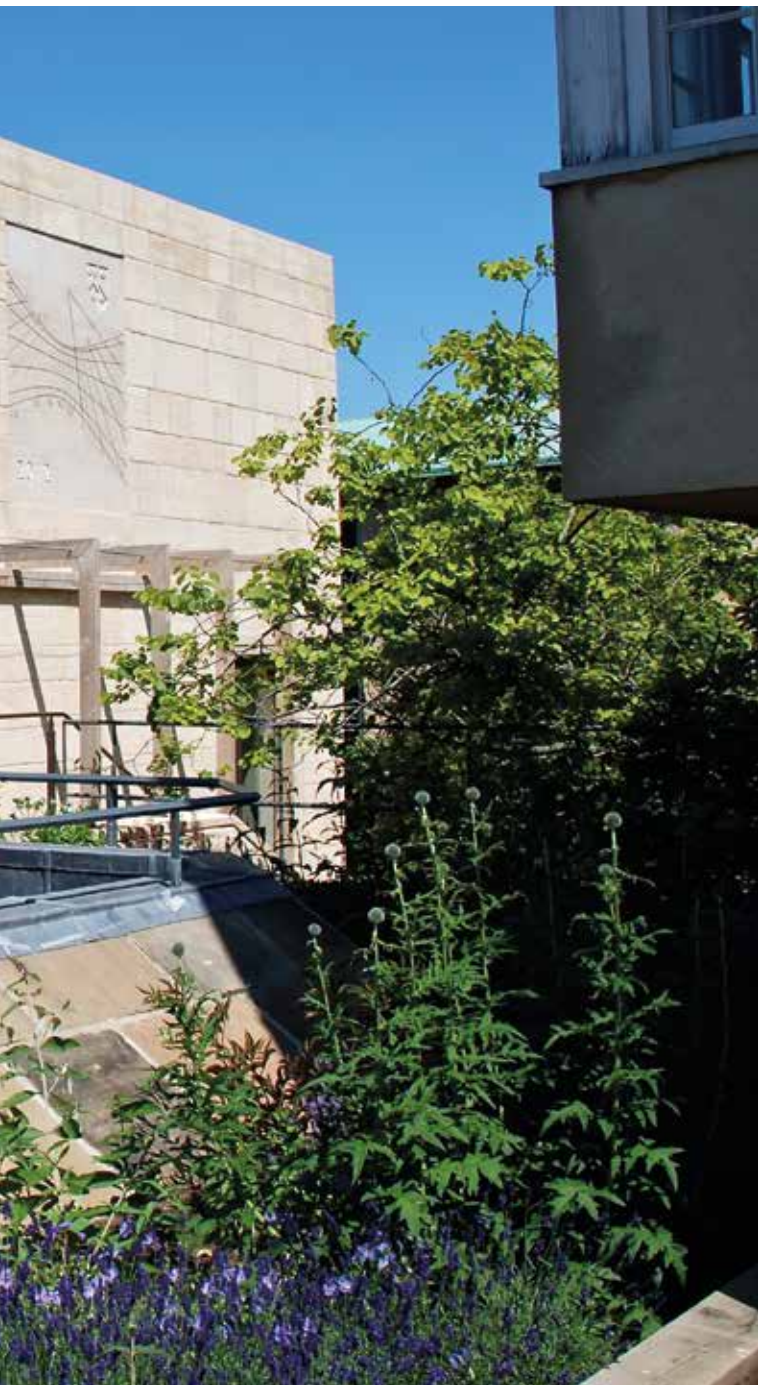
WADHAM COLLEGE

Location: **Oxford**

"The Bauder Hot Melt System with Intensive Green Roof Landscaping offers incredible durability, versatility and cost effectiveness. The roof garden has transformed the graduate centre at Wadham and undeniably assisted in maximising the building's potential. Bauder provided the highest standards of technical support throughout the works and delivered a single point of contact roofing solution that met our exact specifications under one allencompassing guarantee."

Tim Lee of Lee Fitzgerald Architects

AND TERRACES



Intensive green roofs provide recreational gardens and amenity spaces on podiums and at roof level, with all the benefits usually associated with ground level landscaping. Increasingly, buildings in city areas are constructed with a green roof on the underground car park to provide additional facilities, thereby maximising the full potential of the building by utilising all available space within the structure's footprint. Typically they will feature landscapes combining shrubs, perennial and herbaceous plants as well as grassed areas and even trees.

Semi-Intensive Green Roofs

This term is generally used to describe a planting scheme where the vegetation has been selected to benefit the building occupants. This may be for its aesthetic qualities or as a public space. The planting is normally in planters with adjacent hard landscaping.

Key Features

- Assists in maximising the building's potential.
- Provides valuable recreational space.
- Offers storm water management benefits due to the depths of substrate used, particularly when specified in conjunction with permeable paving.
- Increases the overall value of the property.

The plants used make a heavy demand on the green roof and will require maintenance, irrigation and management throughout the year to ensure the upkeep of the landscape and allow the vegetation to flourish.

It is important to first establish the landscape finish you are looking to achieve. There is little to restrict the scope for design, other than the overall weight of the system dictating the construction of the supporting structure and the height and level of exposure of the roof.

All our green roof systems meet with GRO and FLL Guidelines.

Specification Support

Specification downloads:
www.bauder.co.uk/technical-centre

NBSPlus BIM DWG

Telephone helpline:
0845 271 8800

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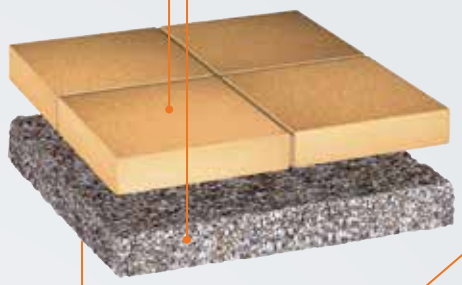
RECREATIONAL SPACES, GARDENS AND TERRACES

Example System Configurations

Our lightweight substrates combined with specially developed water storage and drainage components all ensure that the modern green roof can replicate a traditional landscape at roof level at only a fraction of the weight and with a substantially shallower build up.

It is crucial that an integrated approach is taken to the design and specification of both the waterproofing and landscaping components, so that the desired outcomes are achieved. We can work with you from the earliest design stage to ensure that your green roof project is successful.



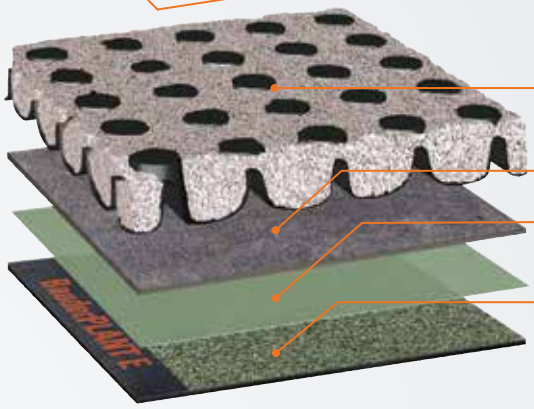
Paving/Pebble Ballast

Granite Chipping Base

Vegetation
specifically selected for each individual roof, from turf to trees.

Bauder Intensive Substrate
lightweight growing medium manufactured to meet FLL guidelines.

Bauder Filter Fleece
filtration layer that prevents substrate fines from washing into the drainage layer.



Bauder DSE40 or DSE60
60mm thick, water storage and drainage layer, infilled with Bauder Mineral Drain for structural stability.

Bauder FSM 1100 Protection Mat
recycled polyester and polythene fibre mix.

Bauder PE Foil
polythene foil separation and slip layer manufactured from recycled granules.

Bauder Plant E or AP2
root resistant, SBS modified bitumen membrane reinforced with 250g/m^2 recycled spunbond polyester.

www.bauder.co.uk/technical-centre

PROJECTS

Glasgow Harbour
Glasgow

02 Office
Leeds

James Terry Court
South Croydon

SUBSTRATE GREEN ROOF SYSTEMS

Non-Accessed Extensive Green Roof Systems

A substrate-based green roof will often incorporate a mixed vegetation scheme of low maintenance plants chosen to suit the project and location.

These extensive green roof systems are primarily used for their ecological benefits or aesthetic appearance rather than for general access or for leisure purposes.

A traditional extensive substrate green roof system provides a depth of growing medium usually around 80-200mm to allow for the specification of a broader range of species and planting schemes. The plants are generally low maintenance, wind, frost and drought resistant and can be installed by different methods, including plug planting, vegetation mat and seeding.

Key Features

- Comparatively lightweight.
- Plants chosen to suit the project and location.
- Deep drainage and substrate layers enable excellent water retention to aid SuDS requirements.
- Creating natural habitats to encourage native plants, insect life and small wildlife to remain, so aiding biodiversity.
- Can be designed specifically to support particular flora and fauna.
- Aid to planning consent as biodiversity roofs help to meet local authority policies towards a sustainable environment.
- Aid to meeting BREEAM requirements of a development through points secured by the use of accredited native species plants.
- Cost effective on large roof areas.

An extensive substrate system allows a wider choice of suitable plants for the client. There are two types of substrate used within these systems designed to support the different forms of vegetation. Our extensive substrate is specifically for sedum planting schemes and our biodiverse substrate supports British native species.

Manually planting individual plants in plug format gives the client a much greater choice of species and the opportunity to plan the layout. This can be of particular benefit when the roof is to be overlooked and where the roof areas to be greened are either partially or wholly in shade.

All our green roof systems comply with GRO and FLL Guidelines.

Specification Support

Specification downloads:
www.bauder.co.uk/technical-centre

NBSPlus BIM DWG

Telephone helpline:
0845 271 8800

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SUBSTRATE GREEN ROOF SYSTEMS

Example System Configurations

Substrate-based extensive green roofs can incorporate a variety of vegetation and hard landscaping finishes.

Vegetation Mats

The installation of a pre-grown vegetation mat allows instant coverage of the roof. Native wildflower blanket, Bauder WB, meets the growing demand to satisfy the requirements of BREEAM and should meet the biodiversity action plan for the site.

Bauder SB vegetation is a mature sedum blanket with a broad mix of sedums, 12-14 species, and is typically grown for a year prior to installation for excellent coverage.

Plug Planting

This method gives the client both a much greater choice of plant species and the opportunity to plan the layout. The individual immature plants or 'plugs' are planted into the substrate, which can then grow on to give good cover over the next few years.

Seeding

An economical and practical method for vegetating larger roof areas. Our seed mixes are designed for the harsh conditions on a roof. Plant establishment and coverage will take 18-24 months, depending upon the time of year sowing takes place and the weather conditions during the period of establishment.

Biodiverse Options

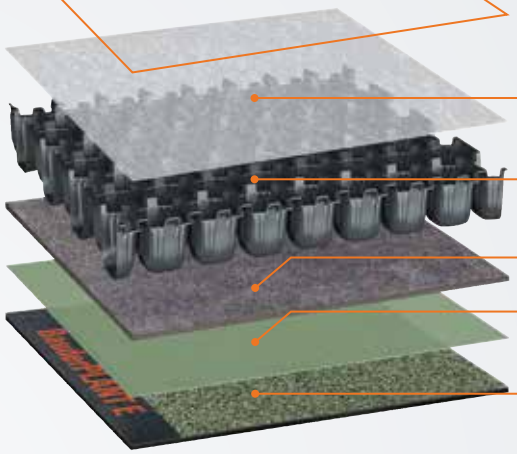
Bauder's range of seed, plug and blanket can be used in combination to create the matrix of habitat and surface finishes required. Bauder has allied with Buglife (the invertebrate charity, buglife.org.uk) to produce roofs designed with dead wood, sand/stone piles as well as dew ponds etc to give a truly sustainable insect friend environment.

Vegetation Mat

Seeded Roof

Plug Plants

Biodiverse Habitat



Bauder Filter Fleece
filtration layer that prevents substrate fines from washing into the drainage layer.

Bauder DSE40
40mm water storage layer that provides multi directional drainage.

Bauder FSM600 Protection Mat
recycled polyester and polypropylene fibre mix.

Bauder PE Foil (specified in some projects)
polyethylene foil separation and slip layer manufactured from recycled granules.

Bauder Plant E or AP2
root resistant, SBS modified bitumen membrane reinforced with 250g/m^2 recycled spunbond polyester.

www.bauder.co.uk/technical-centre

PROJECTS

Barclays Bank Tower
London


Biodiverse roof using Bauder
Wildflower Seed


Bord Gáis Networks
Dublin


Mature Plug Planted Roof

SUBSTRATE PITCH ROOF SYSTEMS

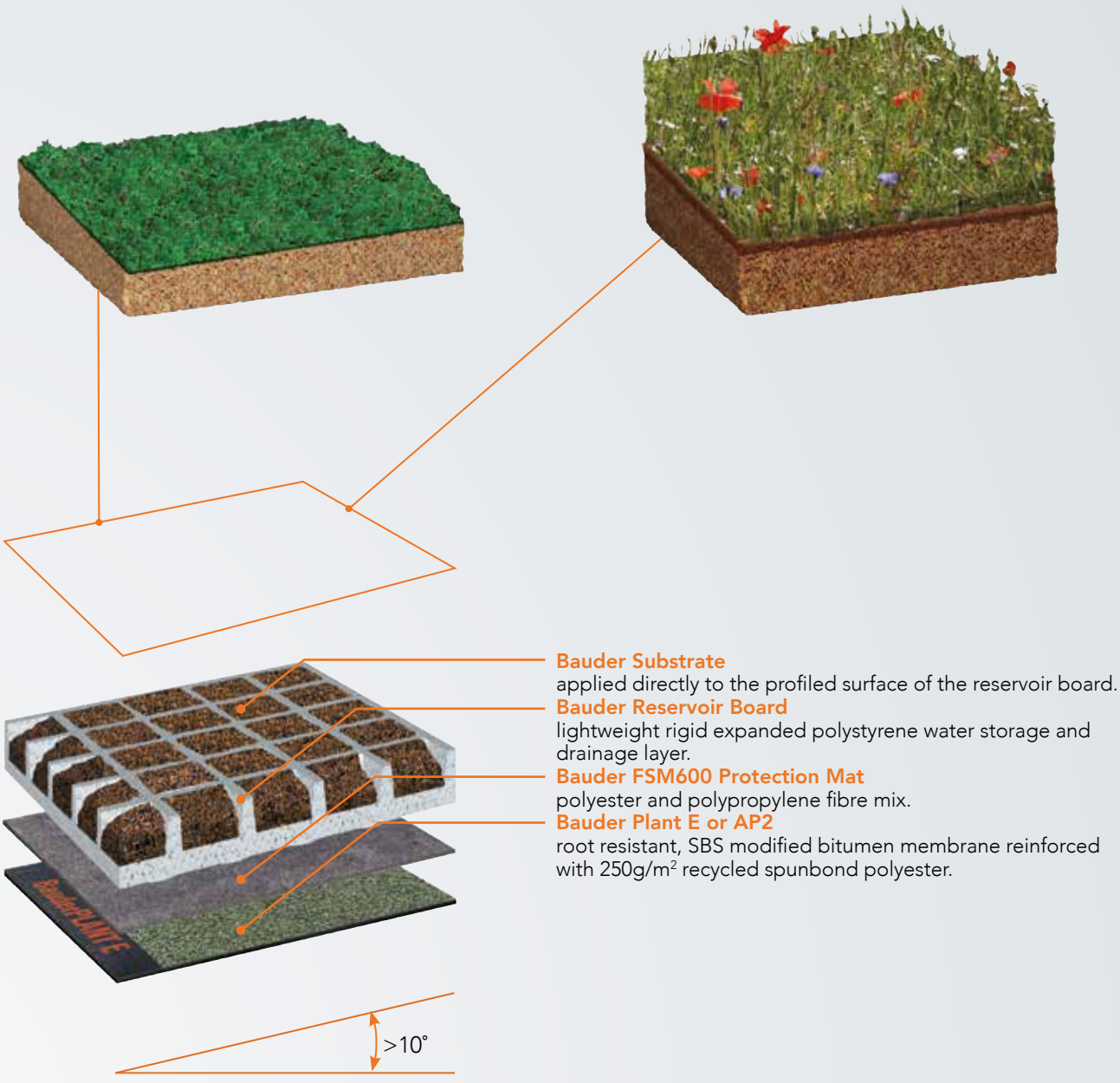
Example System Configurations Over 10°

An extensive substrate system on a pitch greater than 10° requires a water retention and storage board that will hold the substrate firmly in place and be sufficiently rigid to prevent board flexure and manage the imposed sheer load.

The extensive or biodiverse substrate is applied directly to the profiled surface of the board so that the green roof is stabilised whilst retaining sufficient levels of water to support the vegetation.

Sedum Vegetation on Bauder Extensive Substrate
variety of sedum species with some grasses and moss.

Vegetation on Bauder Biodiverse Substrate
generally provided through plug planting, vegetation mat or seeding. Selected species can be chosen to suit the project and location.



Bauder Substrate
applied directly to the profiled surface of the reservoir board.

Bauder Reservoir Board
lightweight rigid expanded polystyrene water storage and drainage layer.

Bauder FSM600 Protection Mat
polyester and polypropylene fibre mix.

Bauder Plant E or AP2
root resistant, SBS modified bitumen membrane reinforced with 250g/m^2 recycled spunbond polyester.

www.bauder.co.uk/technical-centre

PROJECTS

Plug planted vegetation on
East Anglian Children's Hospice

Fulham Jetty

BIOSOLAR GREEN ROOF SYSTEM

Example System Configurations

Bauder BioSOLAR is a revolutionary solar PV mounting system for biodiverse or extensive green roofs. Well suited to new build applications where environmentally friendly solutions are required to meet planning and BREEAM requirements. Our BioSOLAR system can also be retrofitted on many existing roofs without the need for any structural modification to the building.

A key element is that the front edge of the PV panel is set 300mm above the level of the substrate, which allows liberal growing room for the vegetation without blocking light to the array that would otherwise reduce the efficiency of the panels. This height setting also enables light and moisture to reach beneath the panel to support the plants below.

Vegetation Mats

Bauder's SB substrate sedum blanket or WB native wildflower blanket can be used to stablise the substrate quickly in exposed locations and gives instant greening between panels. These are typically placed between rows only (not under the panels) with Bauder Flora 3 seed mix being used in these shadier areas.

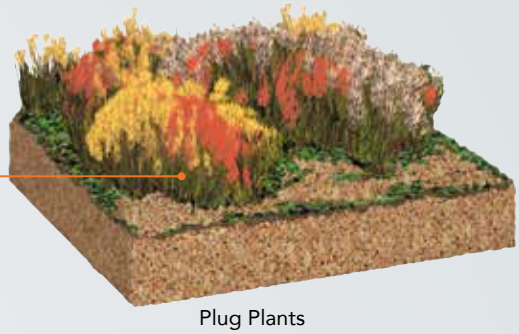
Plug Planting

Plug plants are used in areas where particular species are required. Care is required to only specify species that do not grow higher than the panels.

Bauder Flora 3 Seed Mix

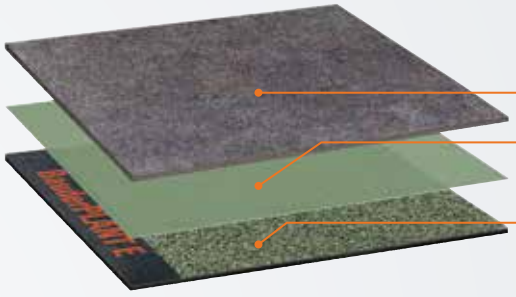
The Flora 3 seed mix has been specially designed to work with the Bauder BioSOLAR system and is a mix of low growing and shade tolerant species. The whole roof area can be of benefit to wildlife, taking advantage of the mixture of shade sun and shelter the BioSOLAR roof offers.

Seed Mix



Plug Plants

Vegetation Mat



Bauder FSM600 Protection Mat
recycled polyester and polypropylene fibre mix.

Bauder PE Foil
polyethylene foil separation and slip layer manufactured from recycled granules.

Bauder Plant E or AP2
root resistant, SBS modified bitumen membrane reinforced with 250g/m^2 recycled spunbond polyester.

www.bauder.co.uk/technical-centre

PROJECT INSTALLATION

LIGHTWEIGHT SEDUM SYSTEM

Extensive Green Roof XF301

WAITROSE

Location: **Bagshot**

"Bauder delivered high quality, professional support throughout the project, and Span Roofing demonstrated exception levels of workmanship in the installation of the green roof. This eco-friendly building is undeniably a benchmark for sustainable construction and its roof has played an integral part in achieving this."

Jeffrey Thornton of Midas Group

Our extensive XF301 Sedum System is constructed using low maintenance drought resistance planting (sedum species) that provide excellent cover and increased protection to the waterproofing system.

The plants are grown on a 'blanket' that is harvested like turf and installed by rolling out on top of the waterproofing. The blankets are very lightweight, easy to maintain and provide instant greening to the roof.

The XF301 sedum system is a very versatile green roof system and is suitable for both new build and refurbishment projects.

Key Features

- The most lightweight green roof system available, making it ideal for retrofitting or refurbishment projects.
- Delivers instant greening of a roof with mature sedum species.
- Ideal solution where a green roof needs to be specified to meet planning requirements.
- Ideal for projects where there are weight, height or cost constraints.
- Sedum blankets are grown on our farm in the UK and delivered to site within 24 hours of harvesting.
- Fire classification B roof (t4) and verified by the BBA as 'unrestricted' and suitable for use on any part of a roof in conjunction with Bauder Total Green Roof System.

The system features up to 14 species of sedum together with some mosses and grasses which ensures plant diversity regardless of location; species are selected to suit our climate and keep weight and maintenance to a minimum.

All our green roof systems comply with GRO and FLL guidelines.

Specification Support

Specification downloads:
www.bauder.co.uk/technical-centre

NBSPlus BIM DWG

Telephone helpline:
0845 271 8800

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LIGHTWEIGHT SEDUM SYSTEM

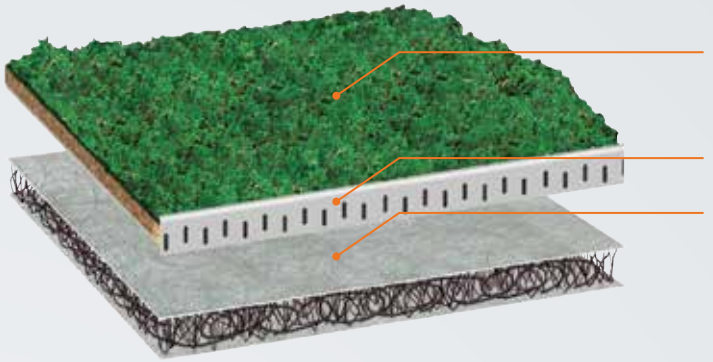
System Configuration

The multi-functional XF301 combines the vegetation support layer with a moisture retention fleece to provide the perfect base for all roofing scenarios with a labour efficient installation.

Our patented geo-textile carrier fleece with its ultraviolet resistant nylon loops provides a support base for the specially developed substrate growing medium and gives stability to the established vegetation whether on a flat roof or up to 25° degrees.

The integral fleece is a unique feature of our XF301 sedum system, retaining moisture after rainfall and thus allowing the plants to take up the water for future use. The sedums are grown to maturity before being harvested, thus ensuring that they acclimatise quickly to their new rooftop location.

We currently cultivate 60,000m^2 of XF301 and are able to harvest the sedum and deliver to site within 24 hours.



Bauder XF301 Sedum System
pre-cultivated vegetation blanket on a patented nylon loop and geo-textile base carrier with special substrate and a pre-attached integral 8mm moisture retention fleece.

AL40 Sedum Blanket Edge Trim
perforated edge/drainage trim.

Bauder SDF Mat
multifunctional drainage, filtration and protection layer manufactured from ultraviolet resistant nylon woven loops which are thermally bonded to geo-textile filter fleece facings.

System Installation

Long length rolls are used to speed up installation process.

Short 2m rolls of XF301 Sedum System installed by hand.

PROJECTS

Chelsea FC Training Ground
Cobham, Surrey

PROJECT STUDIES
Intensive System

Small Animal Hospital

Set within the Garscbue Estate, Archial Group, the Architect, wanted a new build project with as minimal visual impact as possible, so the building was constructed within the side of a hill with a green roof. Towards the end of the roof's construction a seeded grass finish was opted for.

Past experience proves that the open texture of traditional substrates can allow the seed to be blown off the roof and to migrate down into the growing medium to a point where it cannot germinate properly, creating a patchy finish. To prevent this, Bauder developed a specialist seed bed substrate mix to be used as a topdressing over their traditional intensive substrate, allowing the use of a grass seed mix that could easily blend with the surrounding grassland. The seeds were dressed onto this top-dressing using traditional sowing techniques and equipment, which delivered both optimum germination and the swift establishment of a healthy, even greensward.

The building seamlessly blends into its surroundings, inviting visitors to explore the roof top vantage.

BUILDING BOARD	
Client:	**University of Glasgow**
Location:	**Glasgow**
Roof Area:	**2,800m²**
Architect:	**Davis Duncan Architects**
Contractor:	**Advanced Roofing Systems**

APPLIED PRODUCTS

- Bauder Seeded Green Roof uses a specifically developed seed bed substrate mix to encourage the roofs integration with the surrounding environment.

Biodiverse System

Sharrow Primary School

The Bauder green roof on Sharrow Primary School in Sheffield was the first in the country to be declared a nature reserve. A fitting accolade for a school that defies traditional ideas of what a school should be.

Restricted ground space opened up the opportunity to create green roofs at three levels for play space, and outdoor classrooms and a 2000m² biodiversity roof designed to replicate a meadow, complete with cornflowers and other urban plants. It is also a haven for birds and other kinds of wildlife, with rotting tree stumps provided for many kinds of insects. All of roofs are used as a learning resource with curriculum-friendly uses for all the children.

Sharrow Primary is also Sheffield's greenest school, with a heating system powered by warmth coming up from deep in the earth and toilets flushed by rainwater, further proving that Sharrow School is a real testament to what can be achieved and is a landmark construction that raises the benchmark. This sustainable building was delivered on time and within budget with ongoing whole life cost savings.

BUILDING BOARD	
Project:	**Sharrow Primary School**
Investor:	**Sheffield City Council**
Place:	**Sheffield**
Area Size:	**2000m²**
Architect:	**Sheffield City Council**
Contractor:	**Malden Roofing Contractors**

Sedum System

Royal Opera House Workshop

This £8.3m building is used by London's Royal Opera House to build scenery for its elaborate ballet and operatic performances. Located at the £60m High House Production Park, in Purfleet, which opened at the end of 2010, the workshop boasts outstanding green credentials.

Stretching over 400 sq metres, the workshop is faced in cedar wood and features a state-of-the-art green roof from Bauder. The vast 3,200sq metre roof is covered in sedum plants to soften the impact of the structure into the surrounding parkland and attract insects and native wildlife.

Overlooking the Queen Elizabeth II Bridge and the Thames, the workshop features a vaulted ceiling, which is 19 metres at its highest point to accommodate the full-scale scenery which is built by the 30 full-time craftspeople employed there.

BUILDING BOARD	
Project:	**Royal Opera House Workshop**
Investors:	**Arts Council England** **Royal Opera House** **Thurrock Council** **Local & Regional Development Agencies**
Place:	**Purfleet, UK**
Roof Area:	**2,800m²**
Architect:	**Nicholas Hare Architects LLP**
Contractor:	**F K Construction**

BAUDER BLUE ROOF SYSTEM

Sustainable Urban Drainage

Development and expansion of towns and cities has seen exponential use of impervious surfaces causing artificially high rates of rainwater runoff. In measures to prevent flooding, planners are restricting the amount of rainwater leaving a site via the drainage system which can be limited to 5-10 litres per second per hectare, the same flow rates for regional greenfield sites.

A Bauder blue roof is a solution for urban areas where options for ground-based attenuation systems are limited, and in particular, where construction is being carried out within flood sensitive areas. This rooftop sustainable urban drainage system (SuDS) has weight load implications and the project's structural engineer will need to be engaged with the design process from an early stage.

Blue Roof for SuDS

The specifically engineered outlet restricts the discharge of stormwater to a calculated and predesigned 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 which helps to avoid downstream or localised flooding.

The Bauder Blue Roof system can be constructed at either rooftop or podium level. The designed void space between the flat roof waterproofing membrane and hard or soft landscaping finish allows the stormwater to attenuate.

Key Features

- Simple low maintenance design
- Bespoke, project specific discharge rates to match the requirement of the SuDS report for the site.
- Can be created on zero falls or up to 1:40 pitch
- Correct volume and weight of water storage with built in overflow to ensure the maximum water level (HMax) is never exceeded and a tell-tail parapet overflow is utilised to visibly identify if water levels rise close to the HMax.
- Variants designed to work in conjunction with the Bauder Total Green Roof System and Bauder Hot Melt System.

Specification Support

Specification downloads:
www.bauder.co.uk/technical-centre

NBSPlus BIM DWG

Telephone helpline:
0845 271 8800

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BLUE ROOF DESIGN

System Configuration

The Bauder Blue Roof is designed for use with either the Bauder Total Green Roof System as a warm roof construction or the Bauder Hot Melt cold roof construction.

The design of the void space requires free-flowing water movement to the specifically engineered outlets.

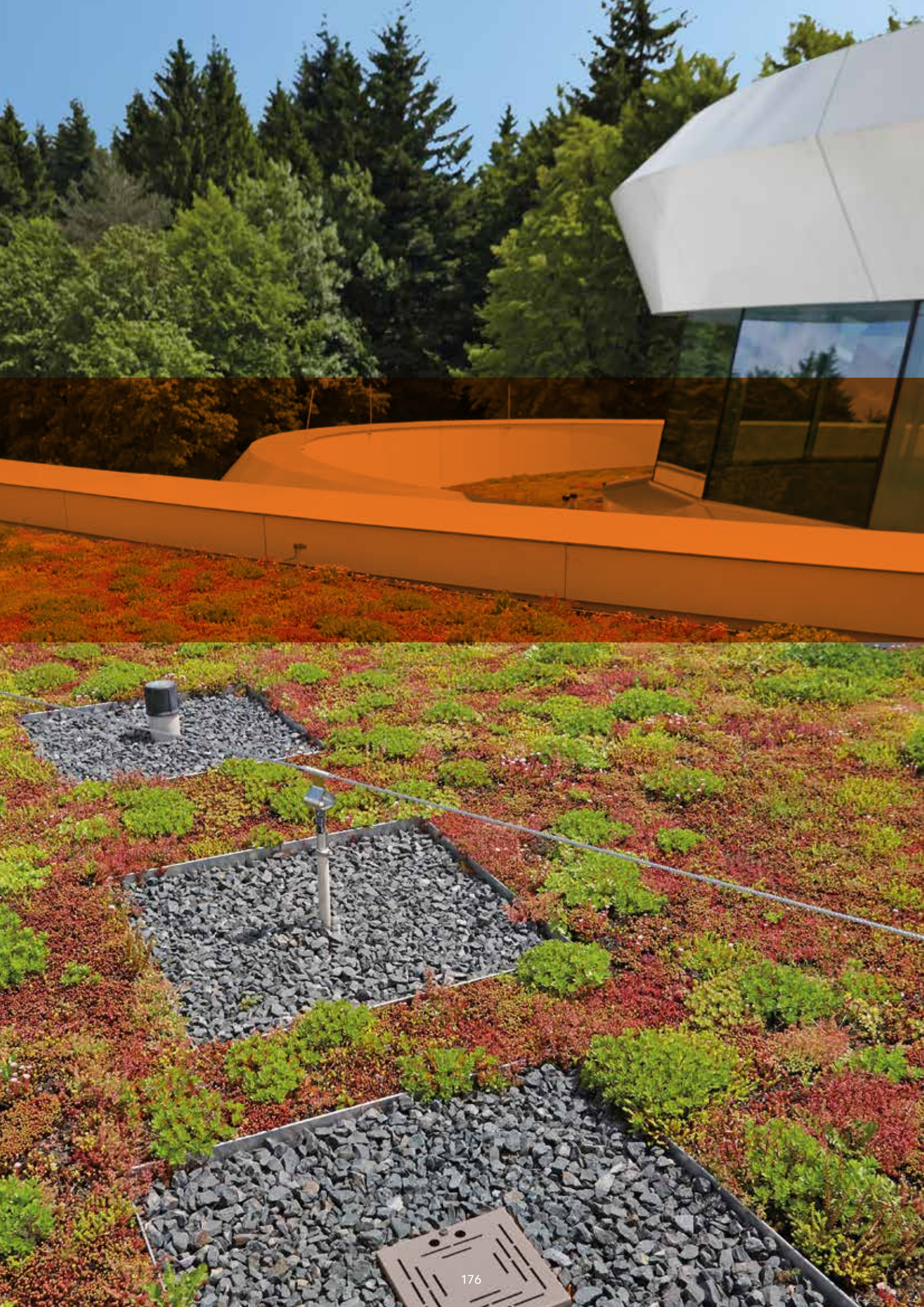
The baseplate of the blue roof system sits within a standard Bauder outlet and slows water from leaving the roof via a calculated number of restrictive flow holes. The number of flow holes, up to a maximum of 12, is calculated to reflect the SuDS calculation for permitted discharge rate for the site.

If, in the event of a storm of greater magnitude than 1:100 plus 40% for climate change, then water will evacuate the roof through the central overflow.

The design of every Bauder blue roof is individual to the project and geographical location. The roof should have minimal penetrations in the construction. We use details of the roof area and the drainage requirements for the site to produce a roof specific discharge report as part of our service.

Bauder Infograph Video

To view the entire animation: https://www.bauder.co.uk/blue-roofs



Technical Guide

Green and Blue Roofs

Green roofs

DOWNLOADS

- BIM
- NBS
- CAD
- Product Data Sheets
- BBA Certificates
- FM Approval
- EPD Certificates
- ISO
- DoP
- Design Guides

www.bauder.co.uk/technical-centre

GREEN ROOF DESIGN CONSIDERATIONS

Green roofs have now become big business and it is important that any supplier is able to prove their credibility and to offer valuable guarantees.

This section briefly explains items that need to be considered when designing a green roof.

We have a comprehensive Green Roof Design Considerations guide available to download from www.bauder.co.uk/technical-centre/design-guides

Why is a green roof required and what performance is expected?

There could be many reasons why a green roof is required. It may be to satisfy a planning constraint, in which case economic options will be considered; mitigate against storm water where the design will maximise rainwater attenuation; support specific wildlife for a biodiversity solution; provide recreational space with public access; offer additional energy savings or generation as photovoltaic units are up to 5% more efficient when used on a green roof; or for aesthetic reasons where the building needs to be masked into its surrounding environment.

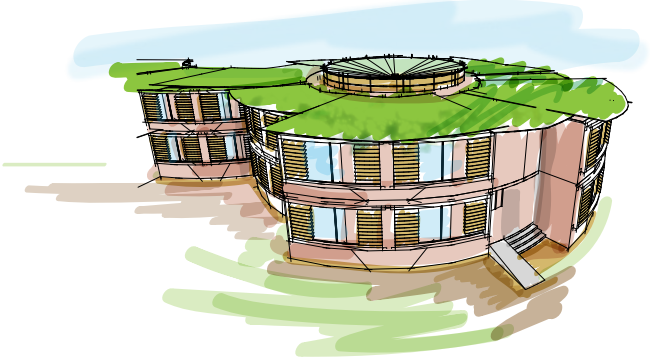
Essential factors to be considered

The most important factor when considering a green roof is the strength and durability of the underlying waterproofing which must:

- Meet all waterproofing standards.
- Have an FLL Compliant Root Barrier.
- Be leak tested prior to installation of the green roof elements.
- Have drainage calculated to cope with severe storm events.
- Incorporate safe access to the roof for maintenance.

The green roof should be designed to:

- Balance with the environment and growing conditions on the roof.
- Meet any planning requirements.
- Work within the constraints of the building design (height, weight etc).
- Be maintained safely.
- Provide a mixture of different habitats for plants and insects.



The Landscape Finish

The primary decision is the type of landscape required that best suits the rationale behind the development, whether it is an intensive, extensive or biodiversity roof. Whatever the landscape chosen, the plants will have some basic requirements to sustain them; nutrients, a balance between moisture and drainage to suit the vegetation, and aeration to the root system.

Structural Loading

Most roof deck constructions are suitable provided that they can support the imposed load. The saturated weight of the system should be determined at an early stage. Our technical team can provide information so relevant data can be passed to the client's structural engineer.

Indicative weight loadings:

- Intensive systems - 300-400kg/m^2.
- Extensive substrate systems - 120-200 Kg/m^2.
- Lightweight sedum system 44 Kg/m^2 .

Root Resistant Waterproofing System and Insulation

Bituminous and single ply membranes have passed the stringent 4 year FLL root resistance test widely regarded as the toughest green roof performance trial currently available.

Our systems can incorporate both flat board and tapered insulation. We can calculate the thickness to meet your required U-value and produce condensation risk assessments upon request. The landscaping element of the green roof is excluded.

Falls

Intensive green roofs can be safely installed on horizontal decks whereas with extensive green roofs minimum falls of 1:60 and above are preferred. The criteria is to have a depth of drainage layer deep enough to hold the landscape above any residual standing water that occurs on the surface of the deck.

Drainage
The soft landscaping on a green roof will retain a large percentage of the average annual rainfall, as for example an intensive green roof can retain up to 90%, which will result in a significant reduction in the number of outlets required and will thus reduce costs.

All outlets should be protected by an inspection chamber with removable covers to allow access for maintenance, and be surrounded by a pebble vegetation barrier to prevent encroachment.

Growing Mediums
Usually referred to as substrates, they provide the necessary nutrients, aeration and anchorage for the plants. We blend a number of different substrates tailored to the vegetation being grown, they are FLL compliant and weigh significantly less than top soil.

Vegetation Barriers
These provide important functions on a green roof:

- As required by FLL and GRO as a fire break.
- Provide rapid surface drainage during heavy rainfall.
- Reduce and ease routine maintenance.
- Protection of the waterproofing from mechanical damage during maintenance.
- Wind uplift resistance by increasing the imposed load at roof perimeters.

Pebble barriers should be provided at perimeters, abutments, rooflights, inspection chambers and all other protrusions. They are not suitable on roofs with a pitch greater than 9° where alternative materials are used.

Wind Uplift
The stability of the system is increased because the negative pressure forces that can develop during high wind conditions are counteracted by the weight of the green roof system.

Wind can also lead to erosion problems on exposed sites, especially if plant establishment is in the early stages.

Irrigation
Requirement for irrigation will depend upon the location of the building, the local climate and the type of plants used to vegetate the roof.

On our XF301 Sedum System green roofs, we recommend installing a leaky pipe irrigation system where the following conditions apply:

- South facing roof slopes exceeding 5° pitch.
- All roof slopes exceeding 10° pitch.
- Windy or exposed site locations.
- Inland sites where rainfall is less frequent

On intensive green roofs an automated system is generally the best option and the frequency at which it is applied will depend on the plant species.

Safe Roof Access
Provision should always be made for safe access to the roof for routine maintenance, which may include man-safe systems with harness and attachment points, internal access hatches or an externally mounted bracket to secure a ladder.

Maintenance
All roofs require a minimum of two inspections a year to ensure that the outlets etc. are maintained. An extensive green roof will need only minimal maintenance to feed the vegetation and ensure that any unwanted species do not become established.

Intensive schemes will require more regular maintenance. download more information from the Technical Centre on our website, bauder.co.uk/technical-centre

Bauder Green Roof Maintenance Service
Our green roof maintenance service focuses primarily on extensive systems and is set up to be tailor made to suit the client's budget and type of extensive roof installed.

BLUE ROOF DESIGN CONSIDERATIONS

Many local planning authorities (LPAs) are adopting early perspectives that encompass Schedule 3 of the Flood and Water Act 2010 to bring in measures that prevent flooding. Within construction and development, planners are restricting the amount of rainwater leaving a site via the drainage system, limiting water egress to 5-10 litres per second per hectare, the same flow rates for regional greenfield sites.

We have a comprehensive Blue Roof Design Considerations Guide available to download from, www.bauder.co.uk/technical-center/designguides.

Design of a Blue Roof

A blue roof can be at rooftop or podium level and is designed to attenuate storm water within a void which sits directly above the waterproofing layer and beneath a surface finish such as a vegetated green roof or hard landscaping.

A blue roof should not be designed as a water storage facility but should allow all the water to evacuate the roof over a 24-hour period from the end of the projected maximum rainfall event.

Key aspects

1. **Single Point Source and Guarantee.** Consider the waterproofing, blue roof and surface design finish as one element, to ensure compatibility and guarantee clarity.

2. **Void Space.**

3. **British Standards.** Standards and Systems Codes of Practice for waterproofing and roof detailing.

4. **Roof Penetrations.** must be minimal or eliminated in the area where water is to be attenuated, other than the rainwater outlets or emergency overflows that are required for drainage functionality.

5. **Emergency Overflow.** Unconnected to the blue roof outlet flow restrictor, to discharge the rainwater.

Drainage

The discharge rate for the site is set by the local planning authority. The blue roof may be included to supplement other methods, or designed as the sole solution. The blue roof may be designed to accept a higher or lower percentage of the controlled discharge depending on other attenuation or storage options available in other areas of the site or because the building will have loading restrictions or limited available height for the rooftop solution

Deck Construction

The implementation of a blue roof will have considerable loading implication on the roof and its waterproofing. The roof deck construction will need to be designed not only to accept the dead and imposed loads*, but also the weight loading associated with the water to be attenuated on the roof.

A blue roof can be designed on zero falls providing the waterproofing system holds relevant certification and the roof is designed in accordance with British Standards.

Waterproofing

Consideration must be given to the appropriate form of waterproofing so that it can meet the demands placed on it by the blue roof.

If the blue roof construction has a finish where germination of any plant seedlings is possible the membrane should be tested and approved to the current FLL and GRO guidelines.

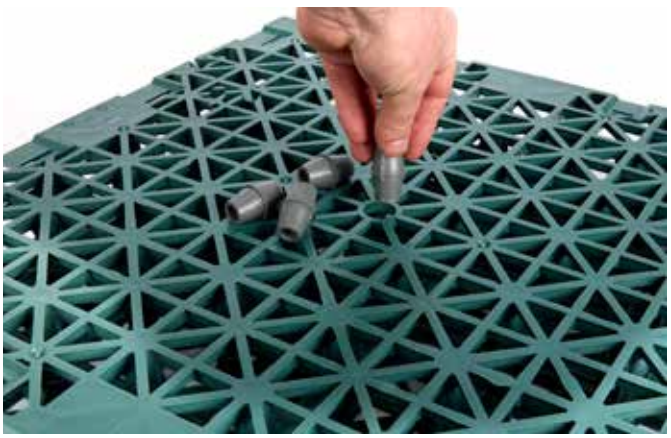
Our blue roof solutions utilise two robust waterproofing constructions; a bituminous warm or cold roof build-up with the Bauder Total Roof System (Green for soft landscaping) or a Bauder Hot Melt cold roof construction. Both systems carry BBA certification and are suitable to maintain the integrity required for blue and green roof applications.

Void-Farming Component

The void forming component must have the correct structural capacity to resist the permanent load of the required finish and any imposing loading.

The void-forming components must:

- Have the capacity to fully accommodate the predicted storm water for a 24-hour period.
- Be resistant to chemicals such as fertilisers, petro-based compounds and water bound pollutants carried in by rainfall typically from 4-9pH.
- Allow free-flowing movement of water to the flow restrictor outlets
- Be designed beneath the surface finish and be able to prevent any ponding or flooding occurring on the surface finish.



Blue Roof Outlets

Restrictor Outlets

The design, manufacture and installation of a flow restrictor and outlet is critical to the success of a blue roof as the outlet will be subjected to greater water pressures than standard gravity-fed drainage and it could be immersed for long periods

Emergency Overflows

Emergency drainage will be provided with the primary outlet and a secondary method of drainage to facilitate the removal of excess rainfall if the designed capacity is exceeded. The emergency overflow outlet will be specified and the base of the overflow pipe should be placed level with the top of the void height or H-Max.

Maintenance access is important to allow for clearing of any silt, debris, or leaf and plant matter which could block or restrict the flow of water through the emergency outlet. This is particularly important if trees are located nearby, as they can be a frequent source of material.

Surface Finishes

The surface finish will be able to freely drain in to the attenuating void space without submitting to ponding water or flooding.

Suitable permeable surface finishes are:

- Paving or decking on a pedestal support system.
- Extensive green roofs, such as sedum or wildflower systems.
- Intensive green roofs, such as lawns, planters and more substantial planting.
- BioSOLAR

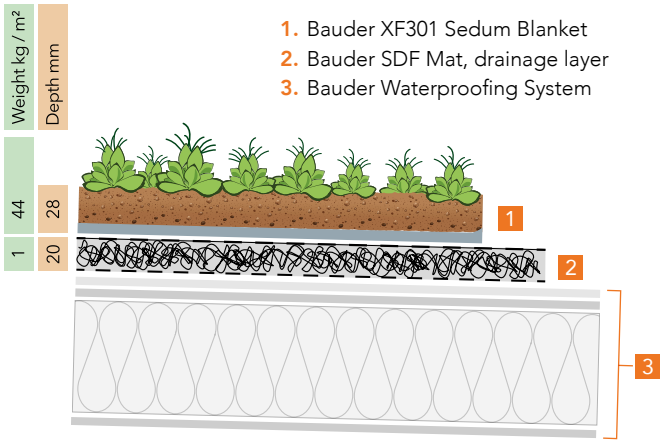
Impermeable surface finishes require approaches to ensure the water can drain or filter in to the blue roof void space so that attenuation of rainwater can occur.

Ensuring Success

Designing a blue roof requires specialist knowledge and a cohesive approach with full compatibility of the waterproofing void components, outlets and finish. We provide the complete design package and guarantees for every project to ensure success.

DESIGN & WEIGHT LOADINGS

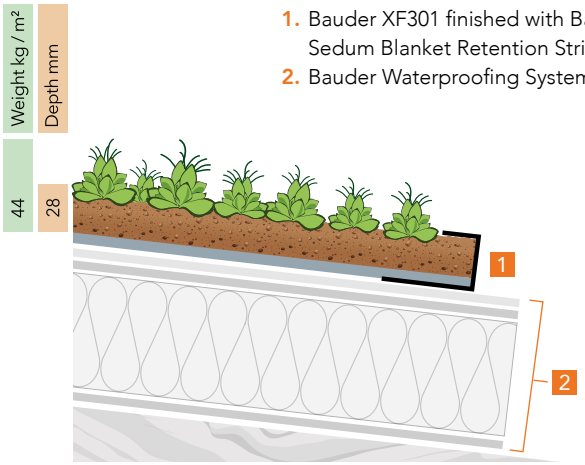
XF301 Lightweight Sedum System



Flat Roofs

Extensive green roofs should be designed with a minimum fall of 1:60, and even then, small areas of standing water may still occur. This water will rot and kill the vegetation.

Bauder SDF Mat drainage layer is specified within the system to lift the blanket clear of any standing water, allowing it to disperse during periods of prolonged heavy rain. It is lightweight, weighing only 0.6Kg/m^2.



Roof slopes 2° and up to 9°

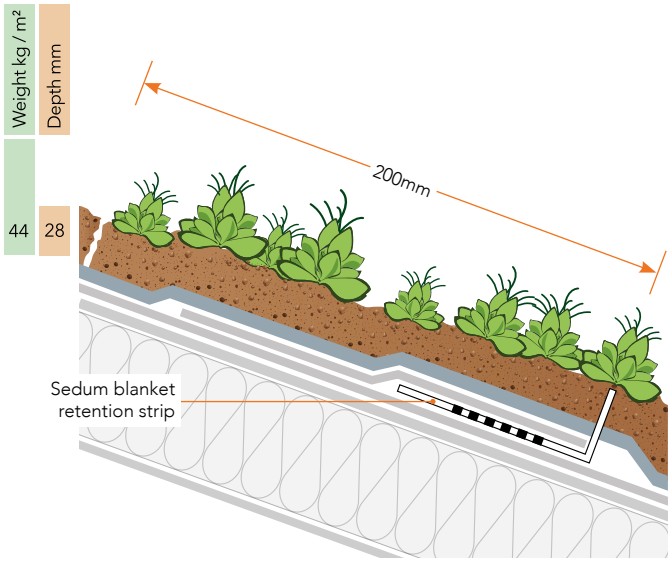
For roof slopes exceeding 2° standing water should not be an issue, allowing the SDF Mat drainage layer to be eliminated and the Bauder XF301 combination blanket to be installed directly over the waterproofing.

Standard 2 x 1m rolls can be used up to 5° but on larger roofs above this pitch, long rolls in lengths up to 10m reduce the number of joints and are more wind resistant. A crane that is capable of reaching all areas of the roof is imperative when using long rolls.

When installed over either a 'barrel vault or 'dual-pitched' roof, the long length blanket may be applied over the ridge as the forces imposed are counterbalanced. For all other situations, Bauder sedum blanket retention strip should be used.

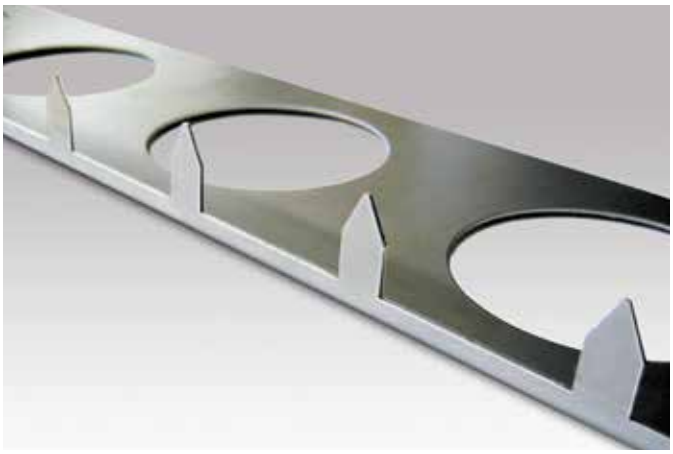
In some instances it is not possible to use the long length roll, i.e. if there are numerous rooflights or interruptions or if crane access is impossible. In these situations the standard 2x1m lengths may be used in conjunction with the sedum blanket retention strips to mechanically prevent slippage of the blanket.


AL40 Sedum Blanket Edge Trim



Roof slopes 10° and up to 25°

Where the XF301 blanket is to be installed on a pitch between 10° and 25°, it is essential to mechanically restrain the blanket against the sheer forces created by the slope. This is achieved by using the Bauder retention strip.



Sedum blanket retention strip

Each retention strip is set in a staggered pattern 200mm below the leading edge of the blanket, the strip being secured by a 200mm wide strip of cap sheet which is bonded through the holes of the base plate of the strip to the waterproofing underneath. The teeth of the retention strip penetrate the underside of the blanket and ensure that no post-installation slippage can occur.

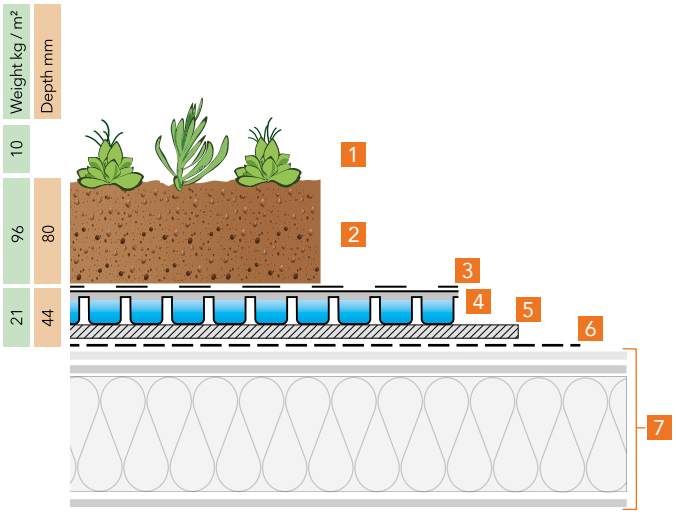
Roof Slopes > 25°

Sedum plants can thrive on slopes exceeding 25°, however, increasing the steepness of the roof slope above this will introduce issues in relation to building maintenance that must be taken into account within the design. It is very difficult to stand on a roof above this pitch without damaging the plants and fertiliser can be washed out of the blankets during heavy rainfall, necessitating additional applications.

Not all roof designs are suitable, should you be considering a green roof installation on an extreme slope we would suggest that you contact our green roof technical department in the first instance for guidance.

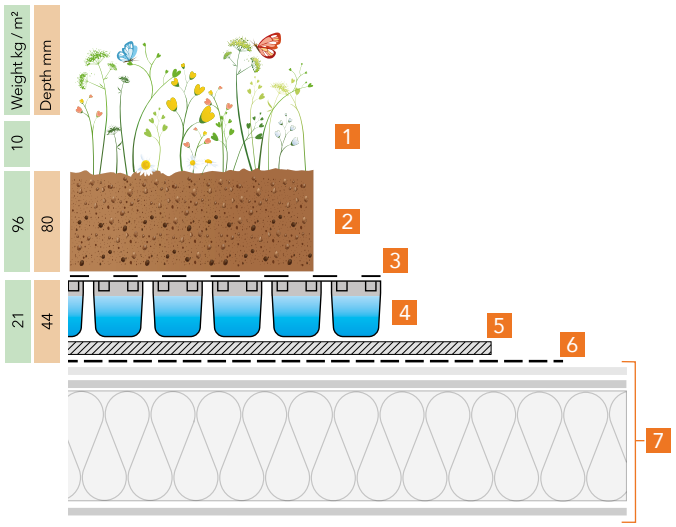
DESIGN & WEIGHT LOADINGS

Substrate Green Roof Systems



Sedum plug plants on extensive substrate with DSE20

A broad range of individual sedum plug plants can be used to produce a particular design or planting layout suited to the roof conditions. Plugs are typically planted 15-25 per m² and normally in groups of 5-7s of similar species. Sedum plants are very drought tolerant and DSE20 with 80mm of FLL compliant Bauder Extensive Substrate gives adequate water storage to support the vegetation.



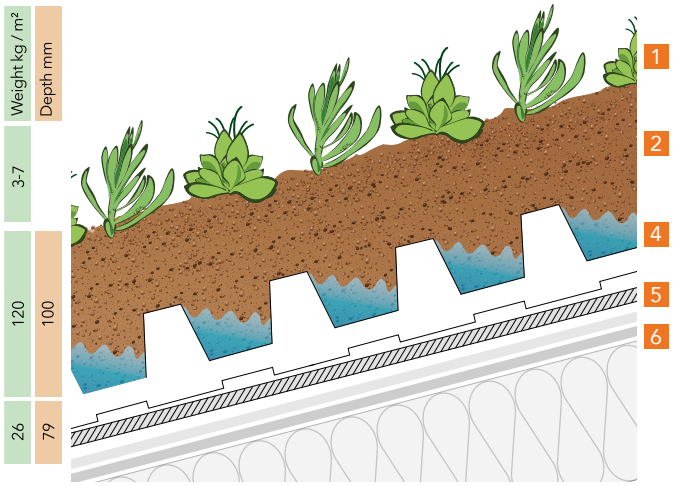
British native species vegetation on biodiverse substrate with DSE40

Often to ensure particular key species establish on a roof individual native species plug plants are used. The vegetation can be established either with a mix of plugs or seed or a combination of the two. When wildflower plugs are used substrate depth needs to be adequate to support the plants and water storage sufficient to maintain plant life. This is achieved with DSE40 water storage board and at least 100mm of substrate which conforms to FLL / GRO guidelines.

LEGEND

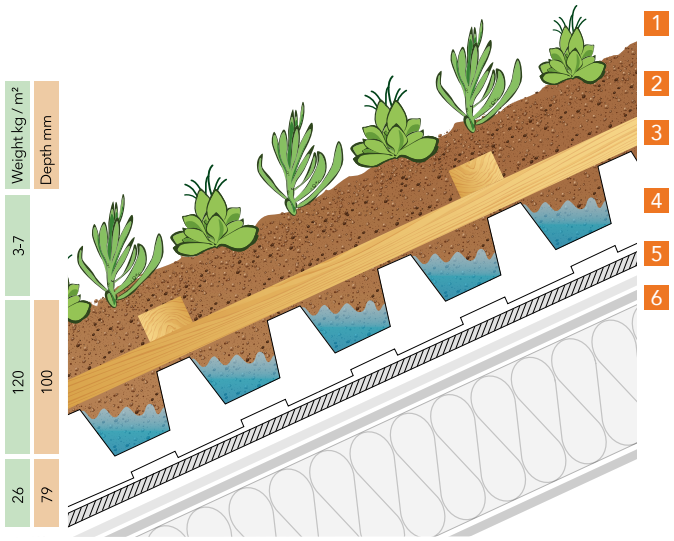
1. **Vegetation** to suit the project and site locality.
2. **Bauder Extensive or Biodiverse Substrate** Light weight growing medium. Manufactured and used in accordance with FLL / GRO guidelines.
3. **Bauder Filter Fleece** filtration layer prevents substrate fines from washing into the drainage layer.
4. **Bauder water storage and drainage DSE20 OR DSE40,** capacity to suit the vegetation and project.
5. **Bauder FSM600** 4mm thick protection layer.
6. **Bauder PE Foil** A polyethylene foil separation and slip layer manufactured from recycled granules required on some project specifications.
7. **Bauder Waterproofing System** High performance waterproofing membranes suitable for green roof systems.

Substrate Pitched Roof Systems



Slopes of 5 - 15°

On slopes above 5 degrees, a mechanical stop at the base of the green roof is required to prevent the system moving. Bauder 75mm Reservoir Board interlocks for greater stability and gives improved water storage on pitched roofs.



Slopes of 15° - 25°

On roof slopes above 15° in addition to the mechanical stop, a trellis is added to the substrate to prevent it slipping whilst the plants become established. It is important that the root systems bed-in quickly to prevent erosion.

Early consideration of the design, construction method and ongoing maintenance of the green roof is vital if the roof is to be successful.

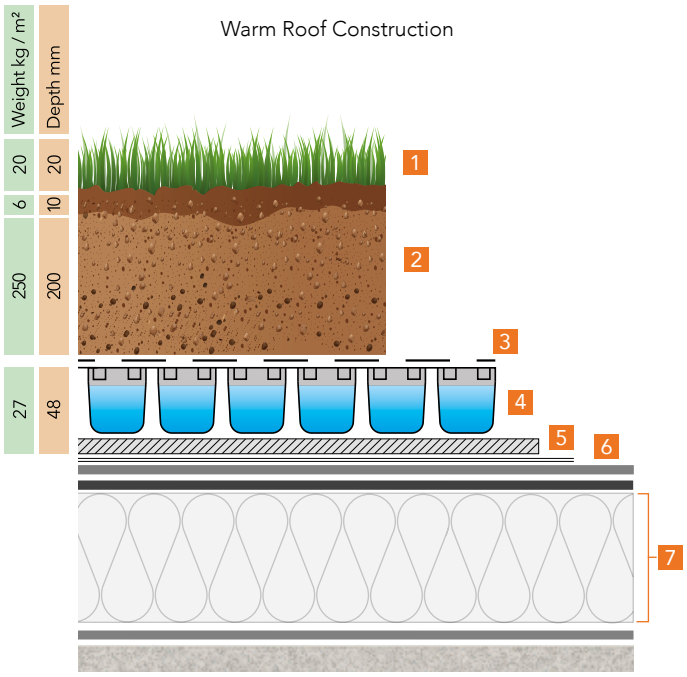
All pitched roof systems will require dripline irrigation to maintain the vegetation during dry weather.

LEGEND

1. **Vegetation** selected species to suit the project, site locality or BAP.
2. **Bauder Extensive or Biodiverse Substrate** lightweight growing medium, manufactured and used in accordance with FLL guidelines.
3. **Timber Trellis** fabricated from untreated timber for substrate retention.
4. **Bauder Reservoir Board** water storage and drainage, 75mm thick.
5. **Bauder FSM 600 Protection Mat** a 4mm thick protection layer.
6. **Bauder Waterproofing System** high performance waterproofing membranes suitable for green roof systems.

DESIGN & WEIGHT LOADINGS

Recreational Spaces, Gardens and Terraces using DSE40 and DSE60



Turf finish

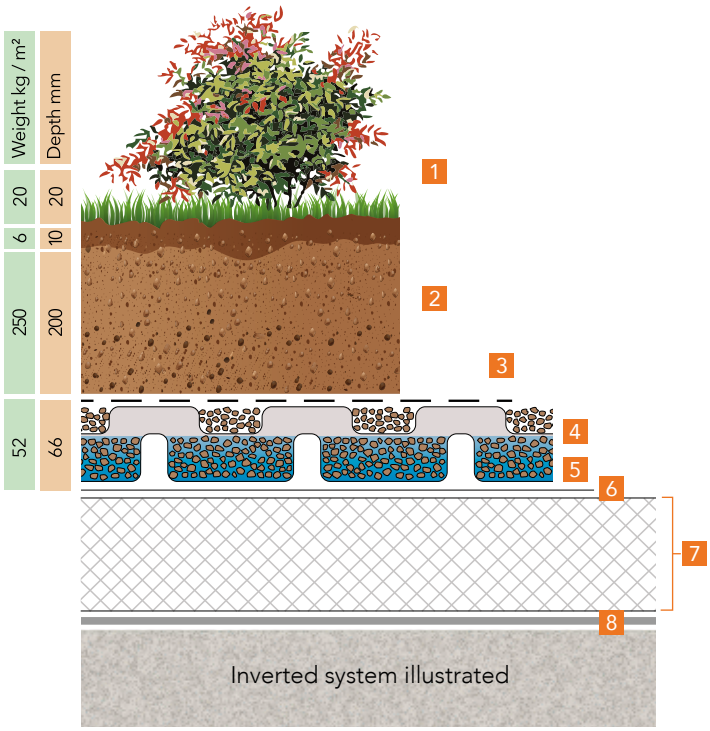
For a lawn finish, either real or artificial, it is important to correctly construct the base. The Bauder DSE40 board delivers stability whilst also ensuring adequate drainage and if required this product can be filled with Bauder Mineral drain, Type 1 or concrete to allow the constructions of paths or planter walls.

1. **Turf**
2. **Bauder Intensive Substrate**
   Lightweight growing medium, 200mm.
3. **Bauder Filter Fleece**
   Filtration layer prevents substrate fines from washing into the drainage layer.
4. **Bauder DSE40**
   Water storage and drainage 40mm thick.
5. **Bauder FSM1100 Protection Mat**
   Polyester and polypropylene fibre.
6. **Bauder PE Foil**
   Polyethylene foil separation layer (required on some project specifiactions).
7. **Bauder Waterproofing System**
   (Warm roof, Bauder Total Green Roof System shown)

Roadways and footpaths

In applications where roadways and footpaths are required, the board area immediately underneath can be infilled, to provide a stable base for construction capable of supporting heavy vehicular loads, to allow for uninterrupted drainage underneath the hard landscaping.

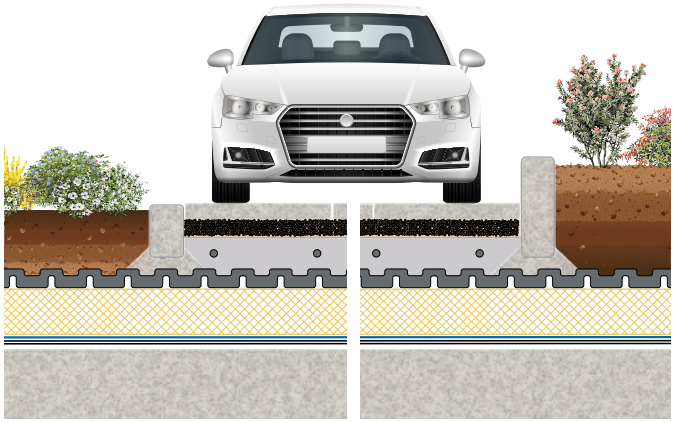
Recreational Spaces, Gardens and Terraces with DSE 40 and DSE60



Soft and/or hard landscaping for heavy trafficking

Protection of the waterproof layers is vital where there is heavy traffic. The Bauder FSM1100 protection mat and DSE60 ensure there is no danger of mechanical damage to the waterproofing. DSE60 can then be filled with Bauder Mineral drain or concrete to strengthen and spread the implied load.

1. **Turf or vegetation**
2. **Bauder Intensive Substrate**
   Lightweight growing medium to support the planting scheme.
3. **Bauder Filter Fleece**
   Filtration layer prevents substrate fines from washing into the drainage layer.
4. **Bauder DSE60**
   Water storage and drainage 60mm thick.
5. **Bauder FSM 1100 Protection Matt**
6. **Vapour Permeable Membrane**
7. **Bauder EPS or XPS Inverted Insulation**
8. **Bauder** (inverted hot melt shown) **Waterproofing System**



Access roads and support slabs

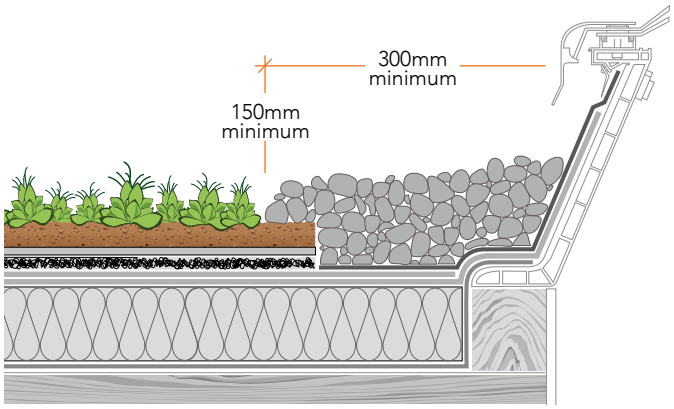
Many large modern developments incorporate planted central courtyards to utilise these valuable areas.

It is essential that a structural engineer assists you with specific information on loadings for your project. Bauder DSE40 and DSE60 is suitable for all walkways, driveways and road surfacing. Concrete covers over the upper board profile should be a minimum of 100mm. If you require an insulated system we will advise you on the depth of insulation necessary for your particular project. Bauder DSE40 and DSE60 will also provide a suitable base for constructing kerbs or foundations to support lightly loaded walls etc.

Bauder drainage boards are designed to support both hard and soft landscaping, laid in a continuous layer over the area to ensure there is free drainage.

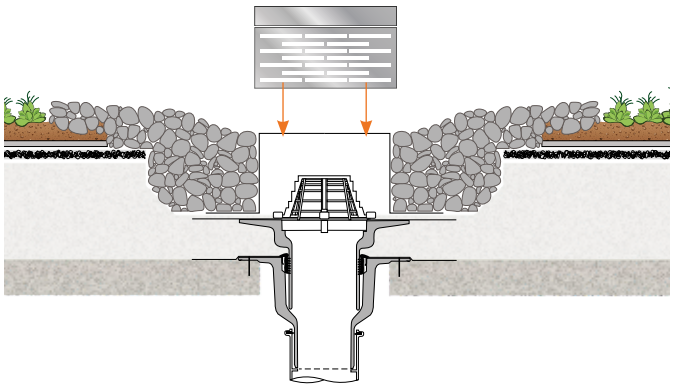
GENERAL DETAILING

XF301 Lightweight Sedum System



Construction to Rooflight Upstands

Detailing around upstands and rooflights is important and, to follow best practice, all Bauder green roof specifications follow FLL and GRO guidelines which include a pebble margin to act as a fire break. Where there are opening doors, windows or rooflights the pebble margin should be 500mm.

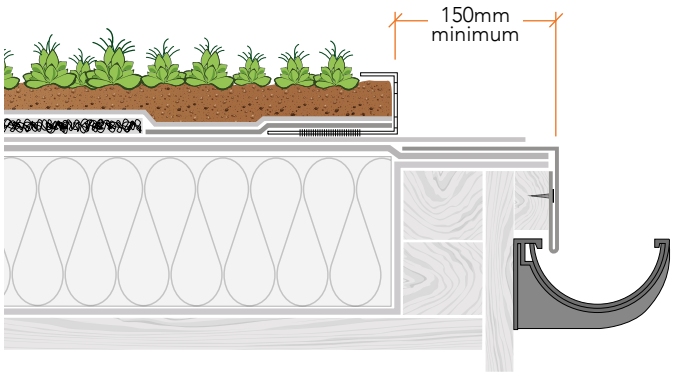


Bauder Inspection Chambers

These should be installed above all internal rainwater outlets to provide access for inspection and cleaning. The chamber lid is secured with a single quarter turn slot screw fixing and has finger holes for easy removal.

The base of the unit is slotted on all four sides to ensure effective drainage, has feet on three sides to provide a stable base onto the waterproofing and has a cut-away feature on the fourth side to allow for its installation at abutments to kerbs and upstands where either chutes or two way outlets are installed.

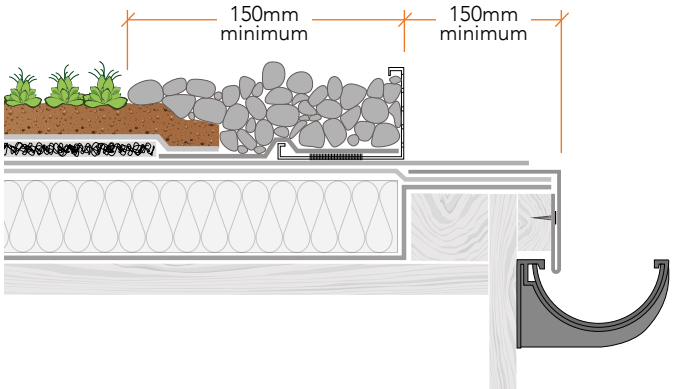
If required, the height of the chambers can be raised in 50mm increments by the use of extenders.



Bauder AL40 Sedum Blanket Edge Trim

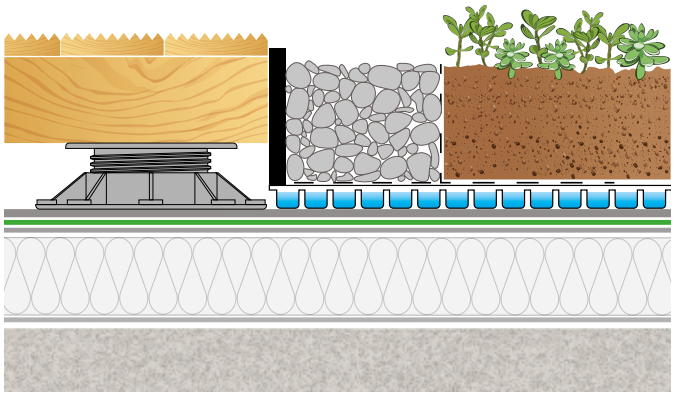
This is a perforated marine grade aluminium alloy trim used to retain the sedum blanket at open perimeters with external gutters and is suitable for bitumen, single ply and cold liquid system installations. It is automatically used on specifications where the roof slope exceeds 5°.

This trim prevents substrate erosion at the exposed edges of the blanket and, due to the excellent wind uplift and fire characteristics of the Bauder XF301 Sedum System, may be used where a pebble vegetation barrier is impractical. The trim should be set back from the drip edge by approx 150mm to prevent vegetation overhanging the gutter and impeding drainage.



Bauder AL80/100 Drainage Trim

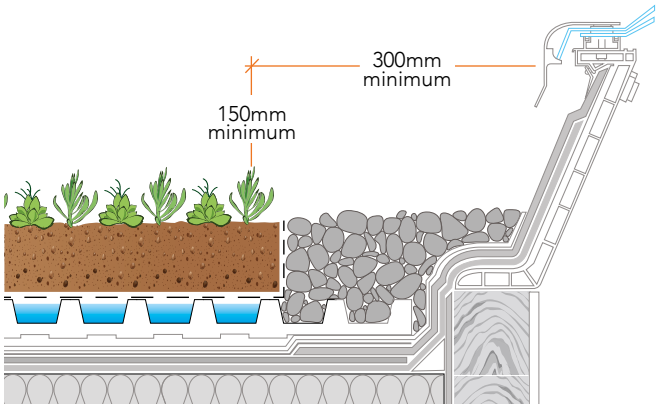
This perforated aluminium trim retains pebble vegetation barriers at open perimeters. The product is suitable for use with both bitumen and single ply waterproofing systems.



Timber Decking

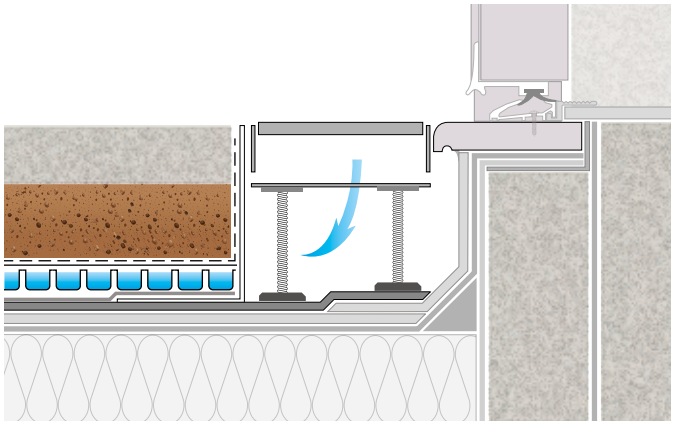
Timber decking should be constructed with a slight fall to disperse rainwater. The timber framework should be raised off the roof surface so that water can flow freely to rainwater outlets and prevent the bearers from eventually rotting.

The suggested method is to place the decking framework on Bauder pedestal support units.



Rooflight Upstand

Due to the combined depth of the waterproofing system and soft landscaping, the proprietary kerbs supplied with most standard rooflights may be insufficient in height.

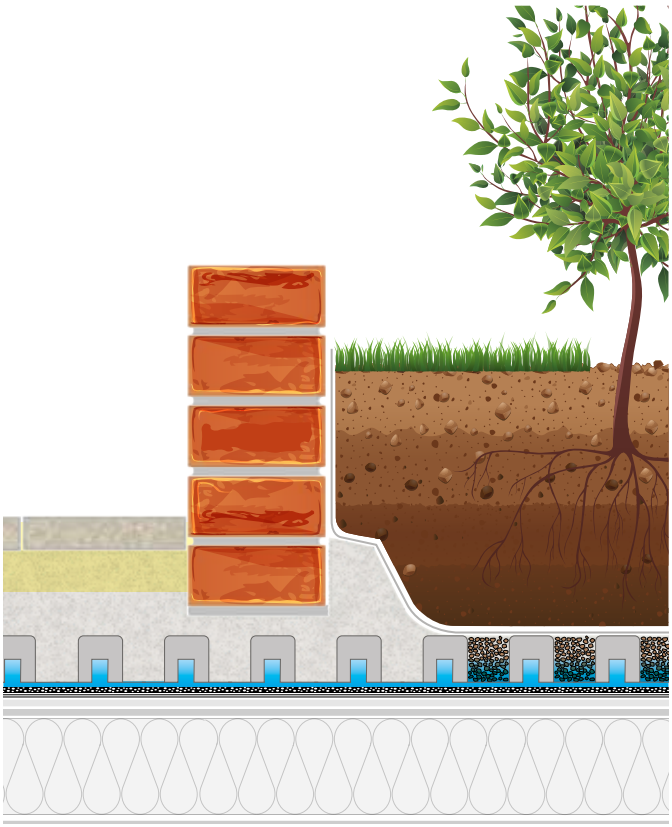


Bauder Linear Drainage System

For drainage close to walls or beneath door thresholds, linear drains can be used to collect surface water and discharge it directly into the drainage layer. The channel sections are perforated to allow water to seep through, and in the event of heavy rain, can direct water to outlets or drainage channels. The channel can be supplied separately for bedding on Bauder Mineral Drain (landscape depths exceeding 90 mm) or with adjustable support legs for depths of between 60 - 140mm. Stainless steel channel connectors and stop ends are also available for this unit.

GENERAL DETAILING

Recreational Spaces, Gardens and Terraces

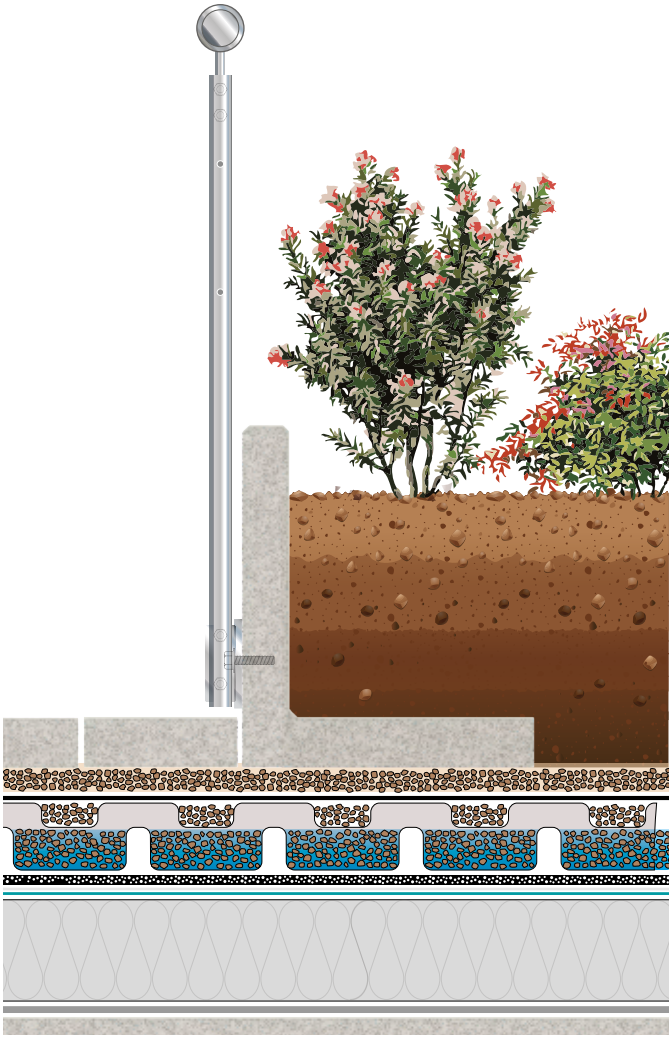


Raised Planter Beds

There are many different methods for constructing raised planter beds that are independent of the waterproofing system. However, they are all similar in that excess water must be free to drain away from the base to the nearest rainwater outlet.

To prevent staining, the inside of the planter should be waterproofed.

Wherever possible, we recommend that the waterproofing is applied to the whole roof surface to eliminate the need for complex detailing around structures built off the deck.

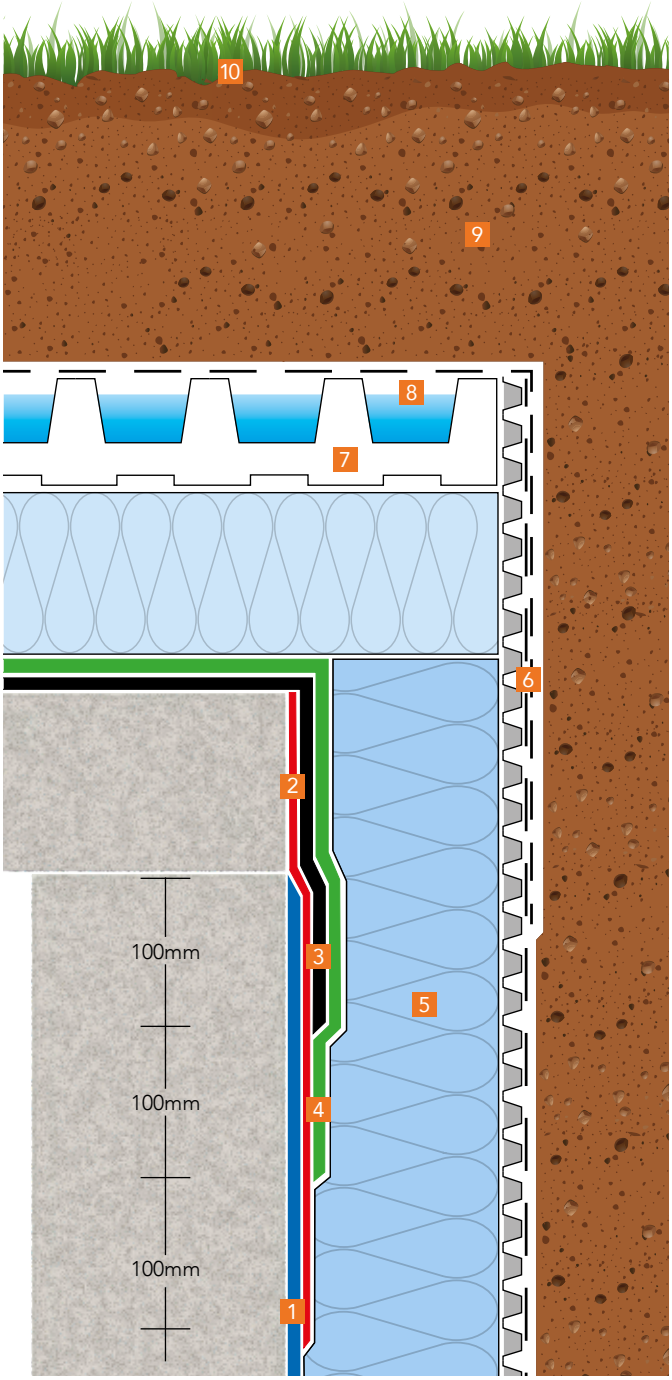


Perimeter Handrail

Intensive green roofs are predominantly used as recreational areas and therefore it is necessary to incorporate suitable perimeter protection within the design to meet current Health and Safety requirements.

Handrail systems should wherever possible be designed so that they do not penetrate the waterproofing system.

Where there is no practical alternative to a deck fixed handrail, it is important to ensure that the balustrade is circular to allow the waterproofing to be dressed and has an 'umbrella' cover welded to the stanchion positioned a minimum of 150mm above the finished height of the landscaping.



Join-On to Tanking

In situations where the Bauder waterproofing has to join to a structural tanking system, it is important to first establish that the proposed systems are fully compatible.

There are various proprietary tanking systems available on the market and our system is generally compatible with those that are bituminous based.

The illustration shows a typical example of the join-on detail to a Bauder Hot Melt System, in this instance the building is insulated using extruded polystyrene insulation and incorporating Bauder PLT10 to provide vertical drainage to a land drain at the base of the slab (not shown).

1. **Bituminous Tanking** (by others).
2. **Min 500mm wide strip of Bauder KSA DUO Self Adhesive Membrane.**
3. **Bauder Bakor 790-11.**
4. **Bauder Hot Melt Waterproofing.**
5. **Extruded Polystyrene Insulation.**
6. **Bauder PLT10 (providing vertical drainage).**
7. **Bauder 75mm Reservoir Board.**
8. **Bauder Filter Fleece.**
9. **Top Soil.**
10. **Turf.**

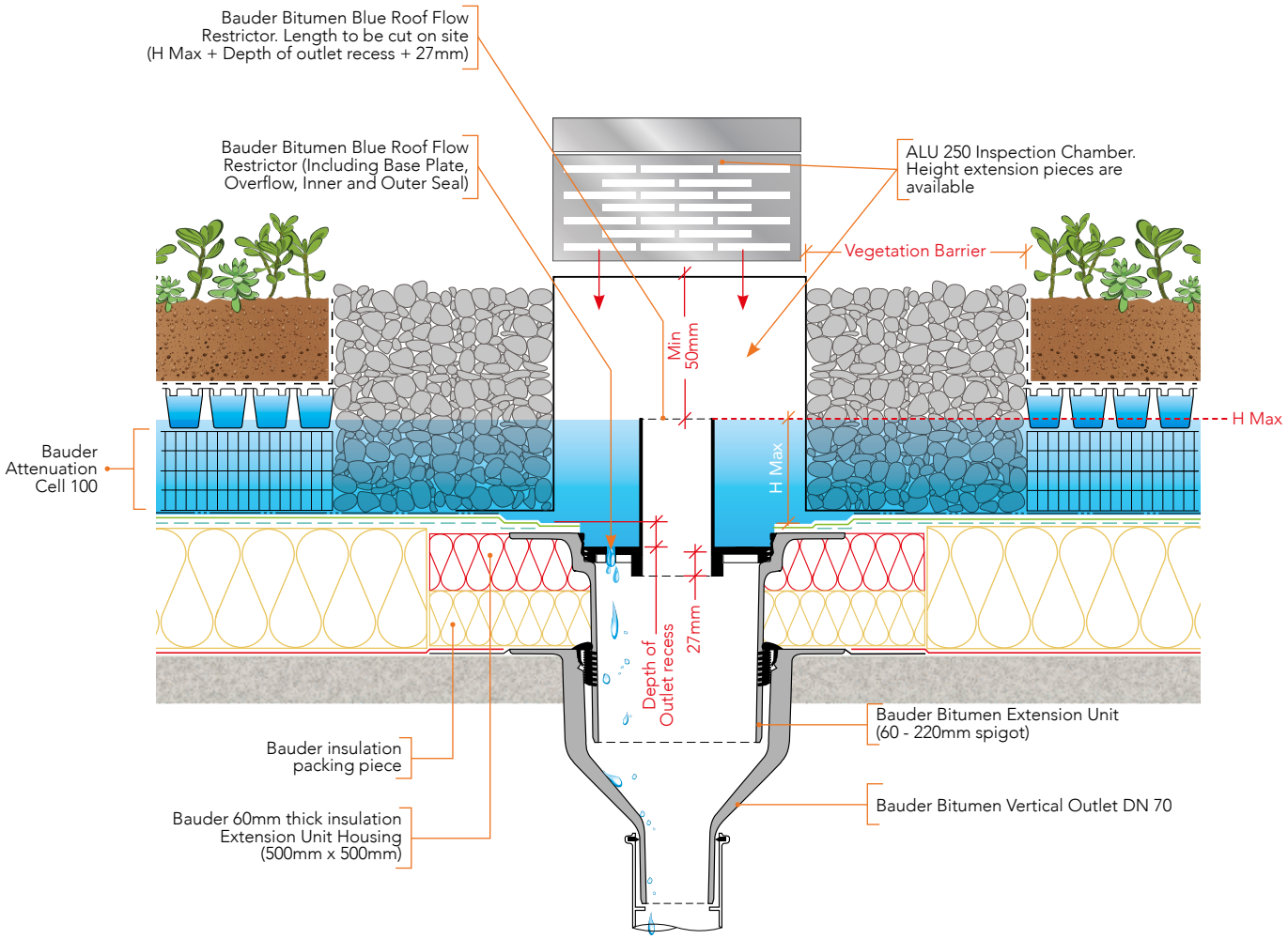
Specification Support

Specification downloads:
www.bauder.co.uk/technical-centre

Telephone helpline:
0845 271 8800

GENERAL DETAILING

Blue Roofs

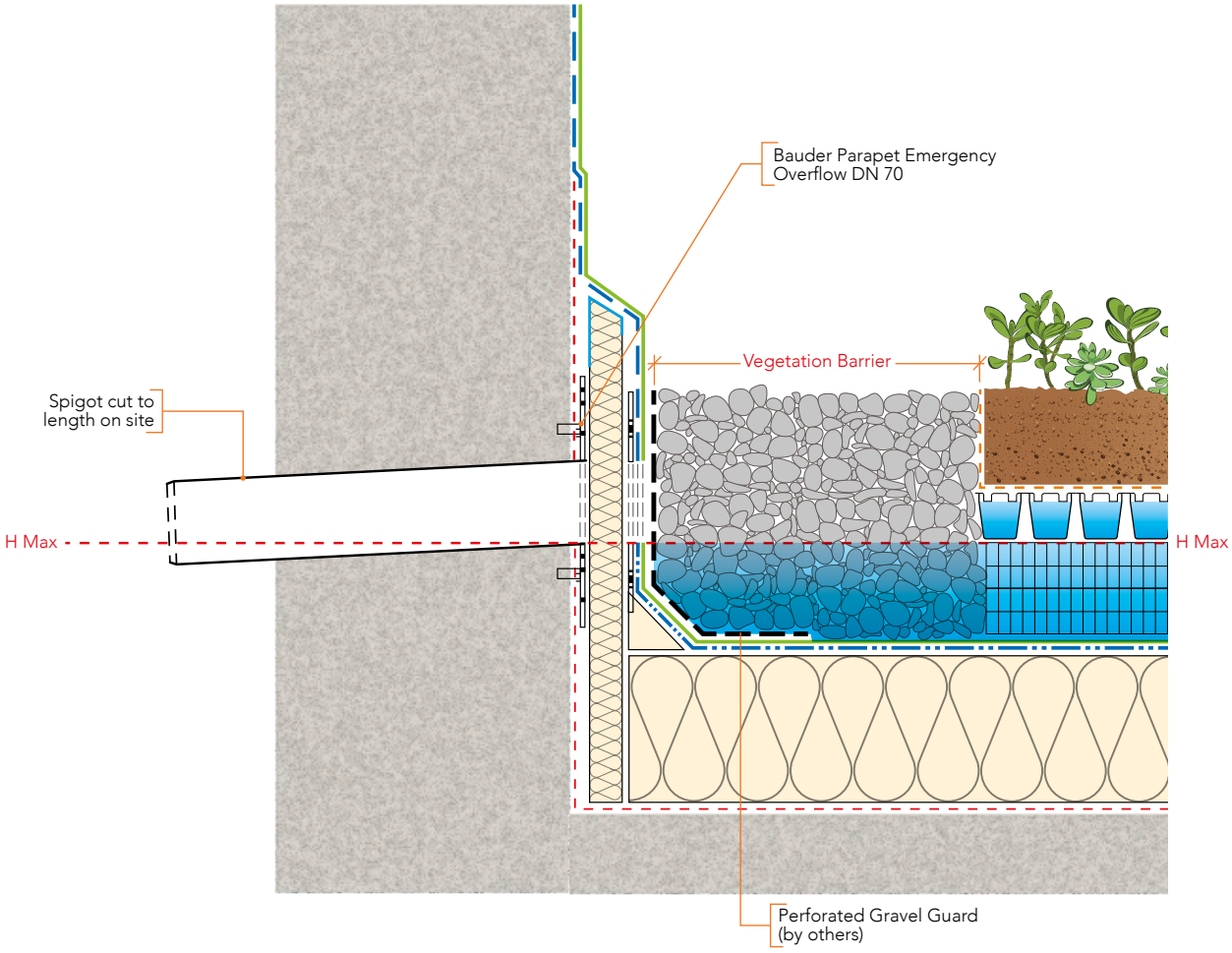


The cross section above shows the Bauder BLUE system. The Flow Restrictor sits securely within the outlet and precisely controls the flow rate of rainwater off the roof (each restrictor is bespoke to the roof requirements).

The Attenuation Cell 100 provides an open void for holding back rainwater in the short term. This will only start to fill in heavy storm conditions when the restricted flow is exceeded. During a heavy storm, the water builds up to a maximum (normally set at a 1:100 Yr storm event (+40% for global warming). In the event of this being exceeded the water is safely discharged through the overflow in the centre of the flow restrictor.

Prior to finalising the roof design Bauder carries out detailed calculations to establish the configuration of the restrictors and their individual flow rate plus the maximum depth of water allowed to build up on the roof (H-Max).

The layers above the Attenuation Cell 100 (DSE drainage board, substrate and vegetation) are the green roof elements, and whilst they greatly help with the attenuation of water on the roof they are separate to the blue roof elements.



NFRC guildelines for blue roofs recommend that a parapet overflow is always installed to enable excess water to drain off the roof.

The Bauder Emergency Overflow is designed to act as a highly visible 'tell tale' of the level of water on the roof. It provide a useful indicator should water build up to the H-Max point. Bauder's Flow Restrictors have additional vertical overflows to prevent the H-Max ever being exceeded.

BAUDER PLANTING & VEGETATION

Bauder WB Native Wildflower Blanket
The vegetation blanket meets GRO recommendations and is specifically designed to flourish in the difficult conditions found on roofs.

The blend of 38 British native wildflowers, herbs and grasses, that are included on most BAP lists, are sown on a 100% natural biodegradable blanket.

Bauder SB Sedum Blanket and XF301 Sedum System
Both of these vegetation blankets provide dense sedum foliage cover featuring up to 14 species of sedum.

The plants provide colour and are selected to suit our climate. The blankets are grown for 12 months. The Bauder SB Sedum Blanket is grown on a 100% biodegradable jute carrier and provide 90% ground coverage at installation.

Plug Planting
The use of small seedling plants have a number of advantages, each individual species can be chosen and the location and density of the planting can be controlled.

We can supply a wide range of British provenance plug plant species for a project.

Seeding
Seeding is a proven way to establish vegetation, however at roof level, the environment makes this a challenge without the correct provisions. We supply a range of British and Scottish provenance seed mixes which have a unique blend of seed species, adhesive to bind the seed to the substrate, organic fertiliser for nutrients and mycorrhizal fungi to increase the root surface area and establish the plants as they grow.

BIODIVERSE LANDSCAPES

These have been referred to, in the past as 'brown' or 'naturalised' roofs, and now come under the Biodiverse heading. Over the last few years there has been a dramatic growth in the requirement for biodiversity at roof level.

The issues are complex with each Local Authority producing their own Biodiversity Action Plan (BAP) and target species ensuring it complies with the ecological requirements to achieve maximum BREEAM credits and fulfils all the planning requirements.

Our technical team can produce comprehensive specifications for the roof and, if required, detailed roof plans and management plans.

Biodiverse Roof Plans

In discussions with architects we can interpret the ecological requirements to show detail 'layout' drawings for the mounding of substrate and location of planting and surface finishes, ensuring the loading of the roof is compatible with the roof structure.

Biodiverse Green Roof Management Plans

Increasingly, local authorities require 3-5 year site specific management plans to ensure the roof establishes correctly and produces the habitat it was designed to deliver.

A further service offered by us is the Project Specific Management Plan. This enables the planning requirements to be discharged with our maintenance and monitoring team carrying out the work.

Vegetation

All BAP's are focused on the enhancement of the local ecosystems, to this end the provenance and suitability of the plant stock is key.

Our vegetation blankets are grown in the UK and all wildflower plugs are of British provenance.

Our Flora Seed Mix range uses seed from sources who are signatures to the Flora Locale code of practice. The seed mixes have been developed to offer suitable solutions for the variety of roof environments. They balance the requirement to have grasses and low ground cover to bind the substrate to prevent erosion with wildflowers to offer a nectar source to the many insects that inhabit Biodiverse roofs.

Bauder Flora Seed Mix Range

Bauder Flora 3: General Purpose Mix

Broad range of species, generally low growing, including shade tolerant plants. Particularly suited for the BioSOLAR green roof system.

Bauder Flora 5: Urban Seed Mix

Specifically designed for city rooftops, there is a high percentage of annuals to give good colour in the first year.

Bauder Flora 7: Chalk Grassland

This mix has species particularly found on chalk soils, annuals are not included as they are not generally found on chalk grassland.

Bauder Flora 9: Coastal Mix

Designed for the harsh and saline conditions typically found around the coast of Britain.

Bauder Flora 11: Scottish Mix

The mix contains wildflower and grass species particularly suited to the Scottish environment. All the seed is of Scottish provenance.

SUBSTRATES
For Intensive Green Roofs

Mineral Drain
This single size limestone aggregate provides drainage for an intensive green roof system. It is typically specified alongside our DSE40 and DSE60 board as an infill to provide additional support, particularly when hard landscaping and further construction such as roadways and raised planter beds is to take place above the drainage layer. The mineral drain increases the compressive strength of DSE60 to withstand ≥1000kN/m².

Intensive Substrate
Lightweight growing medium for intensive green roof planting schemes manufactured to FLL and GRO guidelines and comprises recycled crushed brick and expanded clay shale as well as organic content of composted pine bark. This formulation prevents compaction of soil which is common in topsoil applications. Intensive substrate weighs 1.25 tonnes per cubic metre compared to the average of 1.7 tonnes/m³ for top soil. A considerable weight load saving over an entire roof area.

For Extensive Green Roofs

Extensive Substrate
Lightweight growing medium for extensive green roofs with sedum based planting schemes. Manufactured to FLL and GRO guidelines and comprises recycled crushed brick, expanded clay shale and composted organic material. Extensive substrate weighs 1.2 tonnes per cubic metre.

Biodiverse Substrate
Lightweight growing medium for biodiverse, wildflower and native species green roofs manufactured to FLL and GRO guidelines and comprises recycled crushed brick, expanded clay shale and composted organic material made from over 90% recycled content. Extensive substrate provides aeration qualities with some inherent water retention and weighs 1.2 tonnes per cubic metre.

Seed Bed Substrate
This substrate is a top dressing growing medium which is installed at a minimum depth of 25mm over either Bauder Intensive or Extensive Substrates, when the roof is to be either seeded or to receive vegetation cuttings. This substrate is made from recycled crushed brick and composted pine bark.

BLUE ROOF FLOW RESTRICTORS

Bauder Bitumen Blue Roof Flow Restrictor

The Bauder Bitumen Blue Roof Flow Restrictor is designed to be used in conjunction with a standard Bauder Bitumen Blue Roof Vertical Outlet DN70. The Bauder Blue Roof Bitumen Flow Restrictor is comprised of four parts; Baseplate, overflow pipe, Baseplate inner and Baseplate outer seal. The polyamide Baseplate fits within the 70mm vertical outlet, with the EPDM outer seal creating a watertight fit. The HDPE Overflow slots into the central hole of the Baseplate with an inner EPDM seal preventing any leaks.

Baseplate has a number (1-12) of 10mm restrictive flow holes bespoke to the project.

Bauder Hot Melt Blue Roof Flow Restrictor

The Bauder Hot Melt Blue Roof Flow Restrictor is designed to be used in conjunction with a Bauder Hot Melt Compact Vertical Outlet DN70. The Bauder Hot Melt Blue Roof Flow Restrictor is comprised of four parts; Baseplate, Overflow pipe, inner and outer seal. The polyamide Baseplate fits within the 70mm vertical outlet, with the EPDM outer seal creating a watertight fit. The HDPE Overflow slots into the central hole of the Baseplate with an inner EPDM seal preventing any leaks.

The Baseplate has a number (1-12) of 10mm restrictive flow holes bespoke to the project.

DRAINAGE VOID FORMER

Attenuation Cell 100

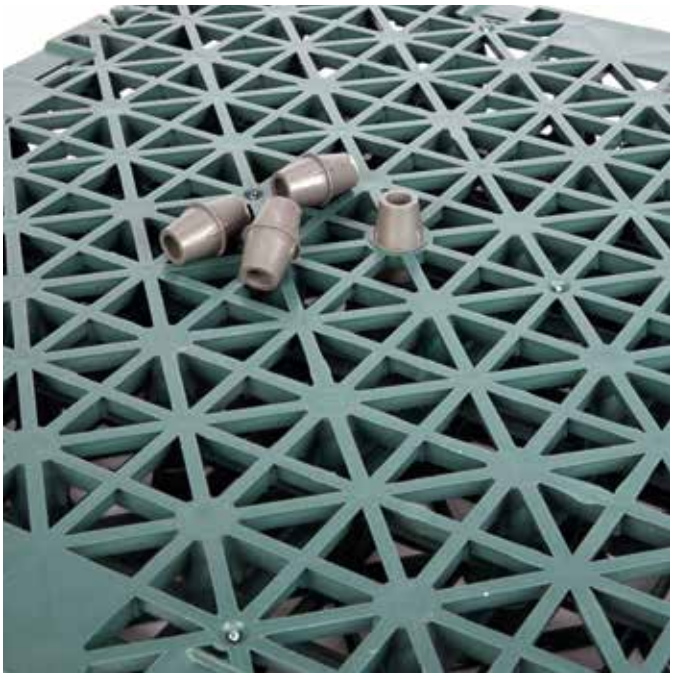
The Bauder Attenuation Cell 100 is a multi-directional drainage layer used primarily as a void former in our blue roof systems.

The boards are designed to create the void space required between the flat roof waterproofing and the hard or soft landscaping finish to allow the stormwater to attenuate. The product is over 95% void and has excellent compressive strength for use under green roofs and hard landscaping surfaces. Attenuation Cell 100 is laid on a protection layer above the completed waterproofing to provide continuous drainage.

Material	Recycled HDPE
Board size	0.6 x 0.6m
Thickness	100mm
Weight	2.9Kg/m^2
Water holding capacity	95 litres/m^2 (95% void space)
Compressive strength	≥400kN/m^2 vertically 100kN/m^2 laterally

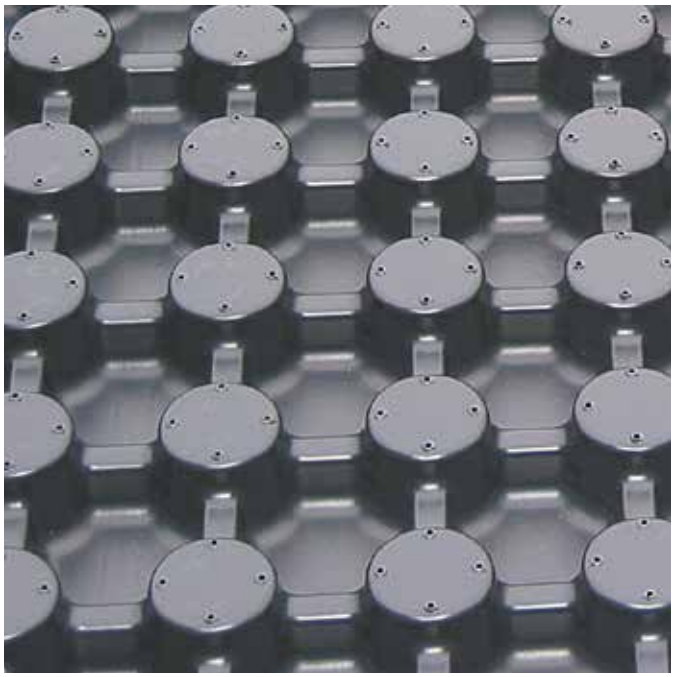
Attenuation Cell Connectors

The Cross Connectors link the boards together horizontally, the Shear Connectors connect two layers of Attenuation Cell 100 should they be required.



WATER STORAGE AND DRAINAGE

DSE60 for Intensive Green Roof Finishes



DSE60 is a multi functional product. Manufactured from recycled high density polyethylene (HDPE).

A deeply recessed surface profile provides water storage above and multi-directional drainage beneath. The large contact areas to the underside provide resistance to high loads and protect the waterproofing from point loading damage. The channels created beneath the board profile deliver high capacity drainage, whilst the upper profile, even when filled with our Mineral Drain, can store between 10 – 12 litres/m^2 of water.

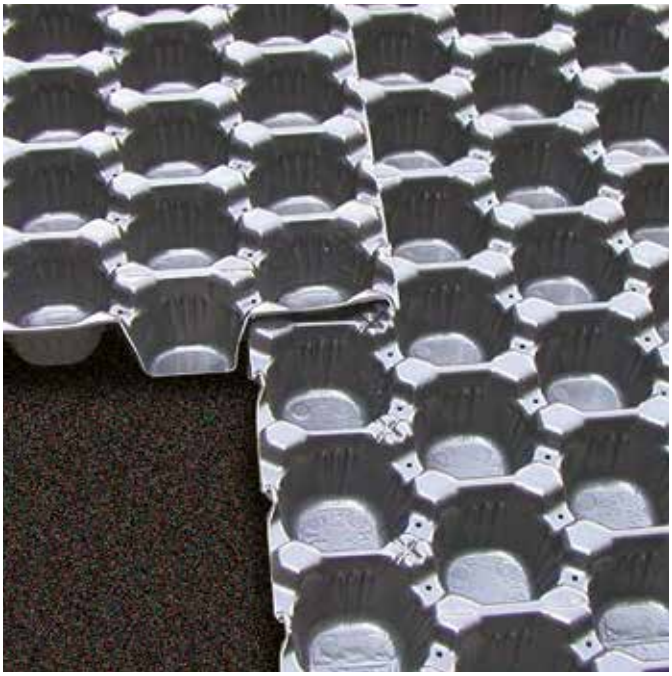
Application

Our deepest and most robust drainage layer used under intensive landscaping and beneath paths or roadways.

Complex landscaping needs this more resilient drainage layer and is the choice for challenging locations.

Material	Recycled HDPE	
Board size	1m x 2m	
Thickness	60mm	
Weight	ca. 40 kg/m^2	When filled with Bauder Mineral Drain
Volume of board profile	ca. 33 litres/m^2	
Water storage	ca. 10 - 12 litres/m^2	
Compressive strength (unfilled)	ca. 100 kN/m^2	

DSE40 for Intensive and Extensive Green Roof Finishes



DSE40 is a medium depth board which can provide multidirectional drainage beneath hard or soft landscaping. Manufactured from recycled high density polyethylene (HDPE), the board has been specifically developed to provide a high water retention capacity. It can be used continuously under a multitude of different landscape finishes.

Application

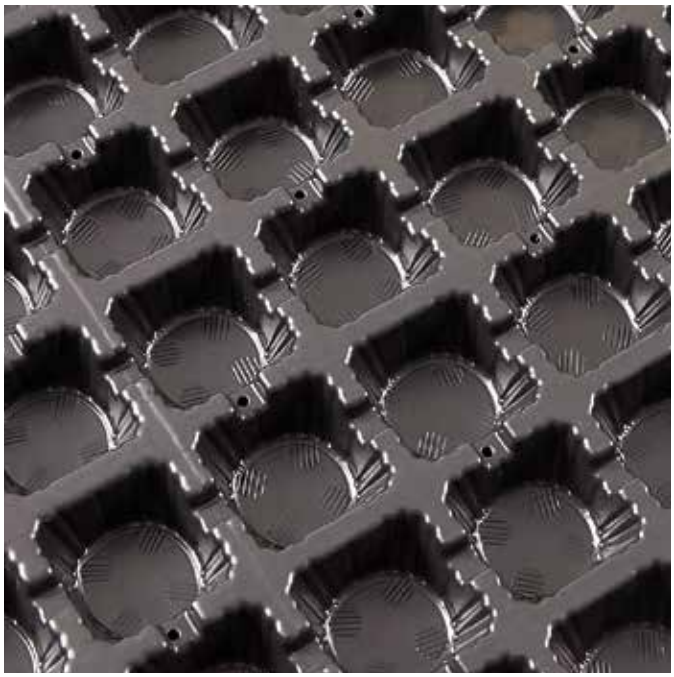
Designed for wildflower and biodiverse applications, as well as deeper, intensive landscapes. Its impressive water storage capacity of 13.5ltr/m^2 makes it possible to use shallower substrate depths.

DSE40 has the option to fill the cells with type1 or concrete to increase its strength for pathways, dwarf walls etc.

Material	Recycled HDPE
Board size	1.04m x 2.03m
Thickness	40mm
Weight	ca. 1.8 kg/m^2
Water storage capacity	ca. 13.5 litres/m^2
Compressive strength	100 kN/m^2

WATER STORAGE AND DRAINAGE

DSE20 for Intensive and Extensive Green Roof Finishes



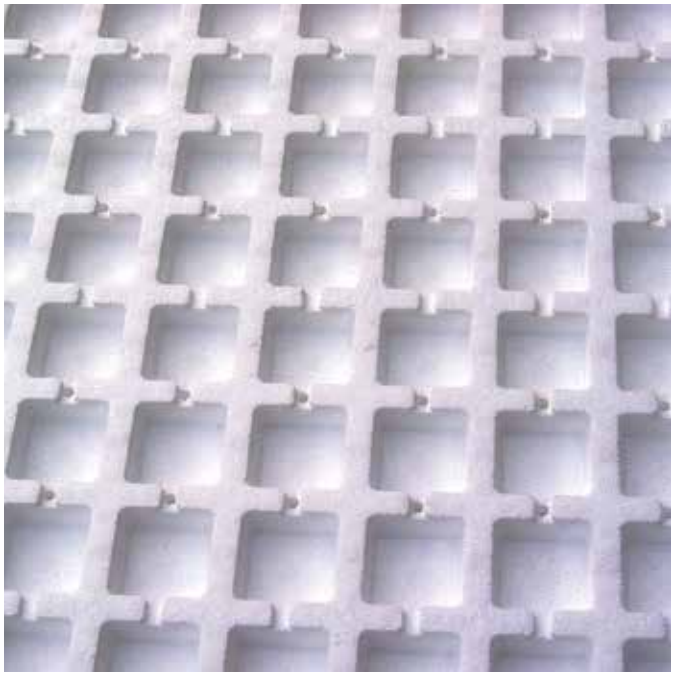
DSE20 is manufactured from recycled high density polyethylene (HDPE) where the cupped profile provides water storage whilst allowing the water to drain through the channels to the underside. It is primarily used to provide continuous drainage within landscaping situations where the loading is moderate.

Application

DSE20 is a lightweight, low profile drainage layer giving excellent drainage and some water storage capacity for sedum green roof systems. Its lightweight, thin profile makes it highly effective on roofs with minimal ponding.

Material	Recycled HDPE
Board size	1.06m x 2.3m
Thickness	20mm
Weight	ca. 1.2kg/m²
Water storage capacity	ca. 7.4 litres/m²
Compressive strength	ca. 110kN/m²

Reservior Board for Sloped Extensive Green Roofs



Our Reservoir Board offers the maximum water retention under flat, soft landscaping and is now most commonly utilised where roof slopes are in excess of 10°. The unique surface profile retains the Bauder substrate when the board is used on roof slopes.

Constructed from rigid expanded polystyrene foam with a profile that is lightweight, the board provides good water retention and allows multi directional drainage. It allows the substrate to be packed into the profile, thus reducing the sheer load on the slopes.

Application

Used for all green roof build ups on slopes over 10°. The interlocking polystyrene board give a ridged surface to hold substrate in place on pitches up to 25°. Reservoir boards can be used with sedum, biodiverse, wildflower and intensive green roof build ups.

Material	Expanded polystyrene
Board size	0.780m x 1.283m (rebated)
Thickness	75mm
Weight	ca. 0.95 kg/m²
Water storage capacity	21.5 litres/m² (when laid flat)
Compressive strength	35 kN/m²

WATER DRAINAGE

SDF Mat for Extensive Green Roof Finishes

SDF Mat is a multifunctional drainage/filtration layer which also provides protection to the waterproofing system. The product is manufactured from ultraviolet resistant nylon woven loops which are thermally bonded to geo-textile filter fleece facings.

On larger projects with modest falls and where maintenance only foot traffic is anticipated, the SDF Mat offers a very cost-effective solution for lightweight extensive green roof construction.

Application

Our lightest drainage layer, SDF mat has no water storage capacity and therefore has a saturated weight of only 0.6 Kg/m^2. It is primarily designed to lift Bauder's XF301 sedum system out of any standing water.

Material	Geo-textile facings with UV resistant woven nylon loops
Roll size	1m x 50m
Coverage	50m^2
Thickness	20mm
Weight	ca. 600 g/m^2
Pressure resistance	ca. 20 kN/m^2

AL40 Sedum Blanket Edge Trim

PROTECTION LAYERS

For Intensive and Extensive Green Roofs

Pro-Mat
6mm heavy duty protection mat used within an intensive green roof to prevent mechanical damage to the waterproofing system. The product is manufactured from recycled shredded tyres.

FSM 1100
8mm substantial protection mat used within an intensive green roof to prevent mechanical damage to the waterproofing system. The product is manufactured from recycled polyester and polypropylene fibre mix.

FSM 600
4mm protection mat used within an extensive green roof to prevent mechanical damage to the waterproofing system. The product is manufactured from recycled polyester and polypropylene fibre mix.

Eco Mat
6mm lightweight protection fleece used within an extensive green roof to prevent mechanical damage to the waterproofing system. The product is manufactured from recycled polyester and polypropylene fibre mix.

PEDESTAL SUPPORT SYSTEM

Adjustable Pedestals for all Types of Terraces and Decking Areas

Our pedestal support system is a range of lightweight, durable paving and decking support units, designed to meet the most exacting standards of both finish and level demanded by architects and clients when specifying open-jointed paving and decking finishes. The range of units, which are adjustable in height from 17-850mm and incorporate slope corrector heads that are variable to a maximum of 5%, are manufactured from black, UV-resistant high density polypropylene. A range of head attachments allow the gaps between pavers to vary between 2-10mm and there is also a joist batten holder available to secure the bearers for timber decking systems.

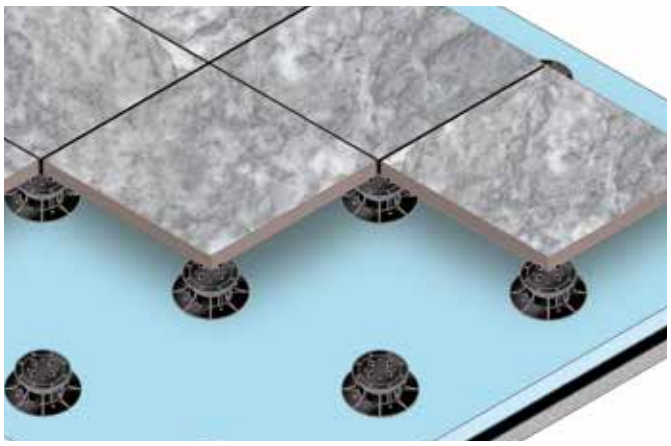
Advantages

- Eliminates algae and efflorescence.
- No bedding sand required.
- Quick to install.
- Cost-effective.
- Lightweight.
- Reduces sound transmission .
- Improves heat insulation.

Key Features

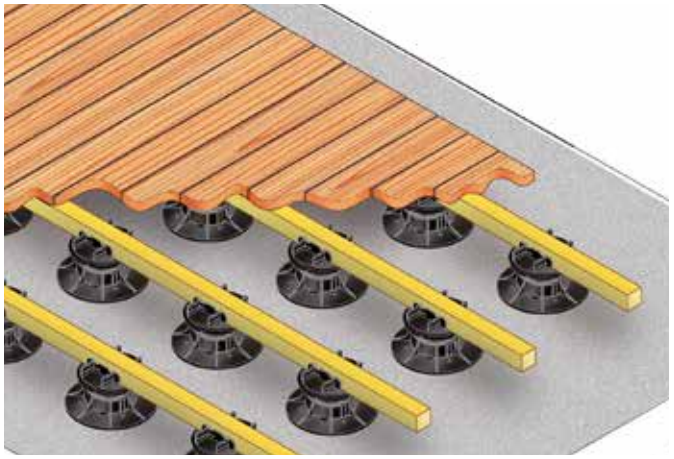
- A lightweight, heavy duty telescopic pedestal.
- Integrated slope corrector head.
- Suitable for a wide range of landscaping applications.
- Works with paving, decking and grillage.
- Allows easy access to concealed services and waterproofing.
- Supports loads of up to 1,000Kg per pedestal.

Slabs



The most common use for the units is to support concrete and stone paving slabs. Where the longest edge of a slab is greater the 450mm, an additional pedestal is usually required under the centre of each slab.

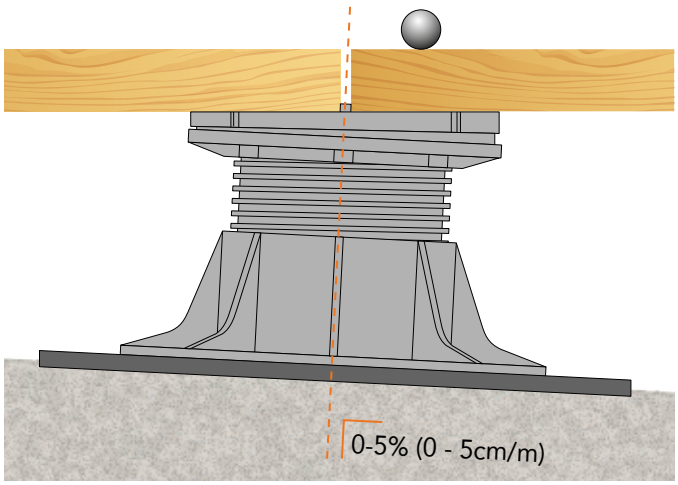
Timber Deck Boards



The number of pedestals required is determined by the span of the joists used, and can only be calculated once the live load requirements are established. Please call us if you wish to discuss this further.

PH5 Slope Corrector

Compensates for a slope from 0 to 5% (slope from 0 to 5cm per linear metre). For good water run-off on roofs the slope should be around 2%.



Specification Support

Specification downloads:
www.bauder.co.uk/technical-centre

Telephone helpline:
0845 271 8800

Standard Pedestal from 17mm x 170mm

DPH-0
17mm

DPH-1
28mm

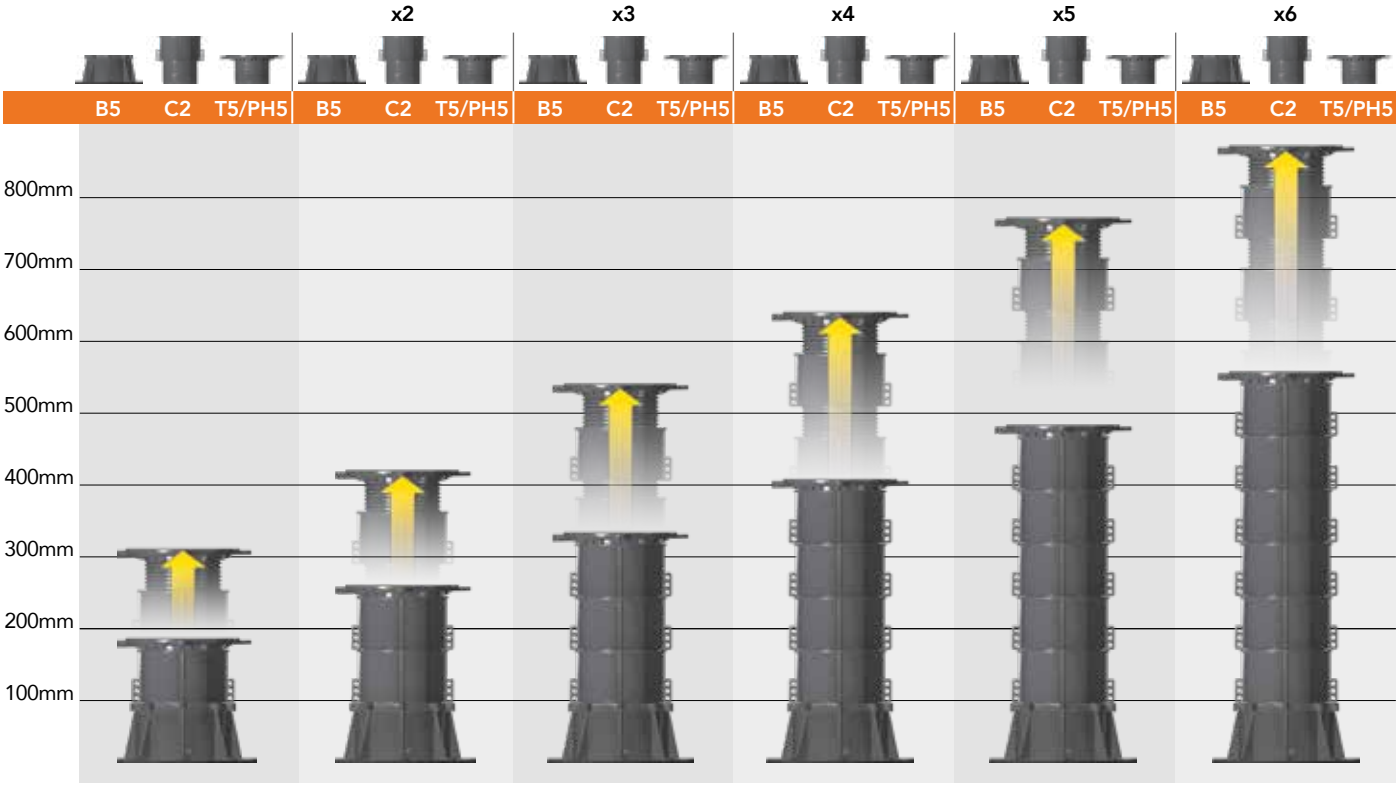
DPH-2
35 to 53mm

DPH-3
50 to 78mm

DPH-4
74 to 110mm

DPH-4
100 to 170mm

Standard Pedestal from 170mm x 850mm (with coupler C3)



DPH-6
170 to 290mm

DPH-7
240 to 400mm

DPH-8
320 to 520mm

DPH-9
390 to 620mm

DPH-10
460 to 750mm

DPH-11
530 to 850mm

TECHNICAL GUIDE

IRRIGATION

▲ Perforated pipe irrigation installed within a raised brick built planter

Green roofs are an expensive finish for a roof so it makes sense to always design in a way to prevent the landscape from dying out in periods of drought. Irrigation should never be disregarded or excluded, because without it, the plants will find it very difficult to survive for the long-term in a healthy condition.

Although water is retained in the growing medium and water storage products this only serves to reduce the frequency of irrigation, particularly if the growing medium is shallow.

Automated irrigation is generally the best option in the long-term. There are many different types of irrigation available, ranging from fully automated with pop-up sprinklers to simple leaky pipe systems.

On the whole, the type of irrigation and frequency of application will depend on the plant species requirements and the prevailing weather conditions. Therefore, the system selected should follow the recommendations of the appointed landscape architect or nominated horticultural specialist and be installed strictly in accordance with the manufacturers recommendations.

▲ An example of a wall mounted control box used in conjunction with an automated irrigation system

SERVICES AND INSTALLATION

Specifying a Bauder Green Roof System

Specifying Bauder materials for your project could not be easier. Simply contact your local technical manager or our technical department with details of your project and leave the rest to us.

- Design advice on waterproofing, planting and landscaping.
- Information on saturated loadings.
- Advice on drainage related issues.
- Thermal calculations.
- Condensation risk analysis.
- Detailed CAD drawings.
- Comprehensive project specifications.

Important

If you do specify our materials without seeking our advice, it is important that we are advised in order for your project to be eligible for guarantee.

Technical Services

At Bauder we pride ourselves on our service package. Through our national team of technical managers and highly trained technicians, we can provide for all your likely requirements, from initial design advice on waterproofing or landscaping related issues through to a detailed and comprehensive specification package supplied in National Building Specification (NBS) or BIM format.

We are increasingly being asked by our clients to assist their consultants with the development of ecological roof systems to meet a Biodiversity Action Plan required for planning consent or where BREEAM points are required.

Whatever your requirement may be for a green or biodiverse roof landscape we will be able to assist you from the conceptual stage in developing a practical solution which will be cost-effective whilst also delivering long-term performance.

Approved Contractors

The quality and experience of the installation operative is essential to ensuring a successful project. We have has always operated a policy where we train and approve the individual installer and not just the company they work for. By taking installers with proven experience and demonstrating the techniques particular to our system we can ensure a quality of workmanship that meets our client's expectations.

With our green roof systems, each installer is required to have a good level of knowledge and understanding of the products and systems that we supply and will regularly deal with our drainage and moisture retention layers, growing mediums and hard and soft landscaping.

On-site Support

Inspections are carried out at key stages of the contract by our own site technicians to satisfy the requirements of our insurance backed company guarantee on our waterproofing systems and ensure adherence to the specification for the landscaping.

ANNUAL MAINTENANCE

A green roof is a real asset to a building and for it to continue to deliver the environmental and aesthetic benefits for which it was originally designed, it is important to carry out maintenance on a regular basis.

A well maintained green roof will:

- Look at its best and ensure the optimum range of species for maximum coverage and longer flowering periods.
- Sustain healthy plant growth to provide a habitat for wildlife.
- Improve air quality by reducing airborne dust and help local air cooling.
- Offer protection to the waterproofing beneath.
- Help conserve and control rainwater runoff.
- Maximise the building's asset value.

Common Problems

Lack of Nutrients can lead to unhealthy plants and loss of vegetation coverage, resulting in bare patches and a reduction in the variety of species present.

Invasive Weeds, Fallen Leaves and Debris can spoil the aesthetic appearance and function of your green roof, and in some circumstances can even damage the waterproofing. The removal of leaf litter from overhanging trees and other accumulated debris is essential to prevent plants from being suffocated.

Impeded Drainage can be detrimental to plant health and roof performance. For example, when the growing medium is not free-draining it can become wet and lead to root rot or invasive grasses and weeds. Regular maintenance and inspection checks ensure that the outlets and areas surrounding outlet inspection chambers remain clear and perform as intended.

Health & Safety Considerations

Following health and safety best practice is essential to all successful green roof maintenance and should be carried out by fully trained personnel who should be:

- Familiar with working at rooftop levels.
- Able to carry out risk assessments.
- Inspecting mansafe equipment prior to use.
- Competent users of all apparatus.
- Wear all necessary personal protective equipment.

OUR MAINTENANCE SERVICE

With over 35 years' experience in the design and supply of green roofs throughout the UK and Ireland, we offer unparalleled knowledge and horticultural expertise for rooftop vegetation and green roof maintenance.

Our national coverage assures you of a prompt reliable service to fully meet your requirements and comprises a full inspection and evaluation of your green roof.

Our experienced maintenance team will fully comply with relevant health and safety legislation throughout the duration of the work to access the roof with suitable edge protection or fall protection systems; carry out pre-use inspections of all maintenance equipment, wear personal protective equipment where necessary; and risk assess all works prior to commencement.

Following each visit you will be provided with a bespoke report that highlights the work carried out, the condition of the roof and any necessary future works to be considered.

Call our team for a no obligation quote.

Sedum Roof Maintenance

It is a common misconception that extensive green roofs are maintenance free, but this is not the case and annual maintenance is required. Our sedum maintenance service typically concentrates on:

- Ensuring adequate fertilisation of the sedum blanket.
- Evaluating colour and growth rate of vegetation.
- Removal of leaves, debris and any unwanted invasive weeds.
- Repairing of any bare patches.
- Clearance of outlets and testing of irrigation.

Biodiverse & Wildflower Maintenance

The level of maintenance of the horticultural element of this type of green roof varies significantly depending on the species of vegetation incorporated, and our biodiverse and wildflower maintenance service typically focuses on:

- Ensuring a suitable balance of species on the roof.
- Removal of leaves, debris and any unwanted invasive weeds.
- Strimming back of vegetation and sward growth where applicable.
- Ensuring adequate fertilisation of the vegetation.
- Examining and testing of irrigation.

9

Solar PV Solutions

Our photovoltaic solutions are innovative, penetration-free systems for use in flat, green and blue roof applications.

Both our systems are extremely quick to install and provide a cost effective and highly efficient solution.

OVERVIEW OF SOLAR PV

UWE ENTERPRISE ZONE

Location: **Bristol**

"The system we chose means the panels are welded into place, reducing load, and the need for roof penetrations and thereby risk of leaks. The University will use 100% of the power generated, equal to the amount of nearly 200 homes with solar panels. As a large organisation we want to set an example for others to undertake similar projects."

Fabia Jeddere-Fisher, Energy Engineer, UWE

Our photovoltaic solutions are specifically designed to deliver the most efficient energy generation solution on flat and green roofs. Our systems are designed to ensure the waterproofing system beneath remains completely intact and without compromise, which can occur when mechanical fixing methods are used that penetrate the roof.

The entire installation process of both of our photovoltaic systems is quick and simple and only our approved contractors, engineers and installers are fully trained and certified to install our unified rooftop solutions.

Through our systems we guarantee the entire specified roof package rather than a separate element, giving single source point of contact and responsibility to reduce risk.

We have two systems within our photovoltaic portfolio:

BauderSOLAR for Flat Roofs

Our BauderSOLAR flat roof PV solution is suitable for new build and retrofit projects and features a mounting system that is secured to the roof using membrane-to-membrane welding techniques on our bituminous or single ply waterproofing.

The modules are positioned at a 12° angle to maximise energy generation and can be installed in both south facing and east/west orientations pending on site requirements.

Bauder BioSOLAR for Green and Blue Roofs

Bauder BioSOLAR is a unified solution for mounting solar PV arrays where the substrate and vegetation provide the ballast to secure the array.

The combination of systems and the height at which the panels are positioned allow for vegetation to establish across the entire roof area helping the building achieve enhanced BREEAM ratings and meet planning targets for both the green roof and solar PV requirements.

PV Partners – Assuring Quality

We provide the ultimate solution for our clients through our partnerships with JA Solar, Aleo Solar, and LG as we trust their uncompromising quality standards to ensure that every module produced delivers the same quality output and high efficiency.

It is all too common that performance and quality can frequently vary dramatically between/amongst manufacturers, even if the same cells are used and the modules appear to be similar; and so it becomes increasingly apparent that the superiority and reliability of the manufacturer is far more important than selecting modules by output statements alone.

Our ethos is to work so that every Bauder installation is as good as the next.

Specification Support

Specification downloads:
www.bauder.co.uk/technical-centre

NBS Plus · BIM · DWG

Telephone helpline:
0845 271 8800

SOLAR TRADE ASSOCIATION

ENVIRONMENTAL CREDENTIALS

breeam

On the 23rd March 2018, BREEAM UKew Construction 2014 closed for new registrations and was replaced by BREEAM UK New Construction 2018. Should your scheme be a new registration under the 2018 criteria, please contact our technical department for advice on how our systems can support your scheme.

BREEAM 2014 Accreditation

The BREEAM assessment method evaluates the sustainability of built environments through the different stages of their life cycle. The schemes include:

- BREEAM Communities for the master-planning of a larger community of buildings.
- BREEAM New Construction for new build, domestic and non-domestic buildings.
- BREEAM In-use for existing non-domestic buildings in-use.
- BREEAM Refurbishment for domestic and non-domestic building fit-outs and refurbishments.

Energy

Ene 04 Low and Zero Carbon Technologies
Compliance CN10
Potential credits 2

A BauderSOLAR and Bauder BioSOLAR Green Roof PV array each create local energy generation from renewable sources which can supply a compliant percentage of energy to the building.

Aiding Biodiversity and Meeting a Biodiversity Action Plan (BAP)

Our BioSOLAR roof can provide a natural habitat for the local ecology, in which vegetation will establish and provide a home for smaller elements of wildlife as well as insects and invertebrates. The provision of a healthy habitat in a place that could otherwise be empty encourages wildlife to remain in the area, provides support for the natural colonisation of locally arising plants, birds and small animals, boosting a wider spread of species in the area.

Recycling, End-of-Life and Upcycling of Our Products

In Europe, solar panel disposal falls under the European Union's Waste of Electrical and Electronic Equipment (WEEE) directive and is strictly regulated.

PV CYCLE

Photovoltaic Panels and Components

Our module supply partners are all members of PV Cycle framework which is a not-for-profit association managing a fully operational collection and recycling scheme for end-of-life photovoltaic modules. www.pvcycle.org

BauderSOLAR

The individual components of our BauderSOLAR Flat Roof system are single-origin and can be individually removed and completely recycled. The main support structure and locking pin are made from plastic category 05 Polypropylene and is widely recycled; with the base plate, bayonet fitting and module clamp all from plastic category 07 Polyamide which is recycled into plastic lumber and other custom-made products.

Bauder BioSOLAR

The mounting boards for our BioSOLAR system that provides the water retention and drainage layer for the vegetation beneath the array are made from HDPE which is widely recycled.

The support system for our Bauder BioSOLAR system is made from aluminium; the arms, support rails and clamps can be recycled through melting down and reforming the metal without losing quality.

TECHNICAL CREDENTIALS

Regulations, Guidelines and Standards

Our products are built in accordance with applicable standards and technical regulations and therefore correspond to all relevant technical standards. This applies to both material selection and structural design.

BSEN 62446 Grid Connected Photovoltaics
BSEN 61853-1 Defining Solar Photovoltaic Power
BSEN 1991-1-4 Wind Actions on Structures

The aluminium alloy framed modules are certified through VDE (IEC 61215 Ed. 2, IEC 61730-1 Ed.1 and IEC 61730-2 Ed. 1)

Array Designs

Bauder PV array proposals are designed to meet MCS requirements and IET Codes of Practice.

Maximising the Roof Area

Our photovoltaic solutions are designed to allow for the maximum number of modules to be installed on the roof area for both east-west or south orientations. This gives prime energy generation from the roof compared to standard 30° fixed tilt solutions.

Assuring Quality of PV Panels

It is all too common that performance and quality can vary dramatically between manufacturers, even if the same cells are used and the modules appear to be similar; and so it becomes increasingly apparent that the reliability of the manufacturer is far more important than selecting modules by output statements alone.

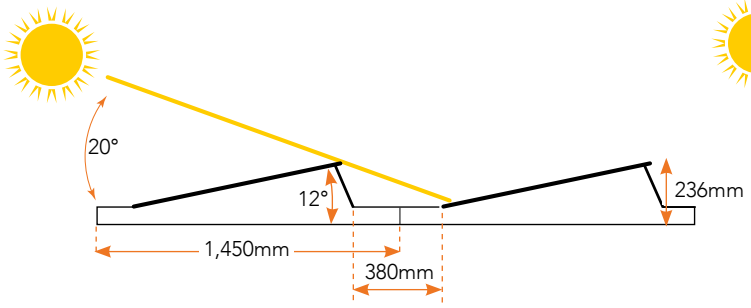
The superior manufacturing and quality testing of the JA Solar, Aleo Solar and LG modules ensure that quality output and high efficiency is standardised on all our installations.

Increasing Efficiency

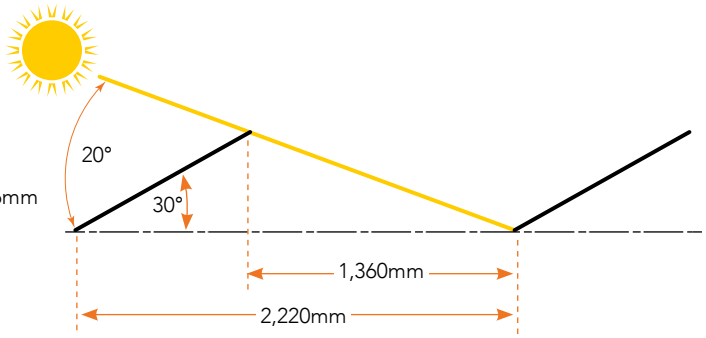
The BioSOLAR system has the advantage of increasing the efficiency of the solar array because the vegetation preserves ambient rooftop temperatures, keeping the PV modules at optimal output and increasing energy yields by 5% - 7%.

PV CYCLE

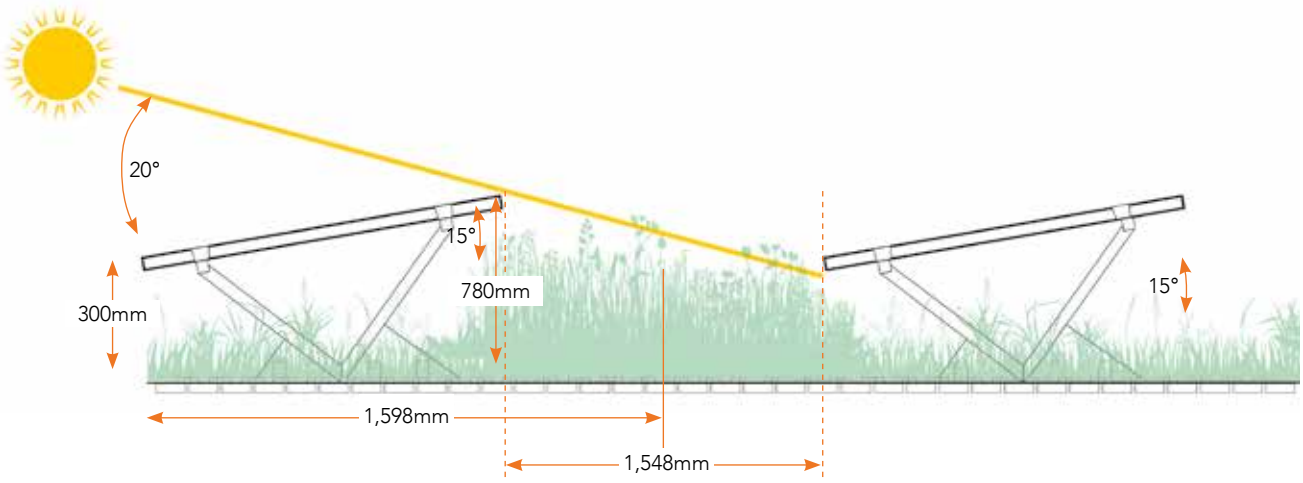
BauderSOLAR panels installed at 12° on a flat roof



Typical panels installed at 30°



Bauder BioSOLAR panels installed at 15 degrees



SOLAR PV SOLUTIONS

BAUDERSOLAR FOR FLAT ROOFS

Image courtesy of
Ivan Moore
Lambert Smith Hampton

11 FREEBOURNES ROAD

Location: **Witham**

"We actively look for opportunities to implement renewable energy and knew that this storage facility lent itself well to PV retrofit. Our system selection process involved the due diligence you would expect from a local authority and we decided to go with Bauder because of its comprehensive system portfolio that meant we could have a single source supply and all-inclusive guarantee; giving us complete confidence in the roof's performance."

Julian Sanchez, Commissioning Delivery Manager for Essex County Council

11 Freebournes Road is a large derelict warehouse located in Witham, has undergone major renovation to transform it into a storage centre for Essex County Council. The roof was waterproofed with over 5,200m² of Bauder's reinforced bitumen system and then fitted 588 solar PV modules enabling the client to generate at least 134.70 Megawatt Hours of solar power each year.

Image courtesy of Essex County Council

Our flat roof solar PV solution is an aerodynamically optimised system for framed modules suitable for both new build and retrofit projects. The mounting units are secured to the roof using membrane-to-membrane welding techniques on our bituminous or single ply waterproofing systems. This installation method means that the roof is not compromised by penetrations for fixings nor is it ballasted, which would add significant weight loading to the roof.

Key Features

- Risk-free installation due to penetration free fixing methods to the flat roof waterproofing.
- Tool free installation of modules is quick and simple.
- High output to roof space ratio.
- Range of PV modules available to suit client needs and budget.
- Lightweight system 9-12.5Kg/m², depending on the module selected.
- Aerodynamic to reduce the impact of wind uplift.
- Low profile with modules set at 12°, which can overcome some planning challenges.
- Single source for complete design of waterproofing and PV array with clear accountability.

Our combined solar array and waterproofing offer provides a single-source solution with clear accountability to reduce risk and bring peace of mind through all aspects of the flat roof.

The BauderSOLAR solution utilises high efficiency JA Solar, Aleo Solar and LG modules with a range of panel options to suit client needs and budget.

Specification Support

Specification downloads:
www.bauder.co.uk/technical-centre

NBS Plus BIM DWG

Telephone helpline:
0845 271 8800

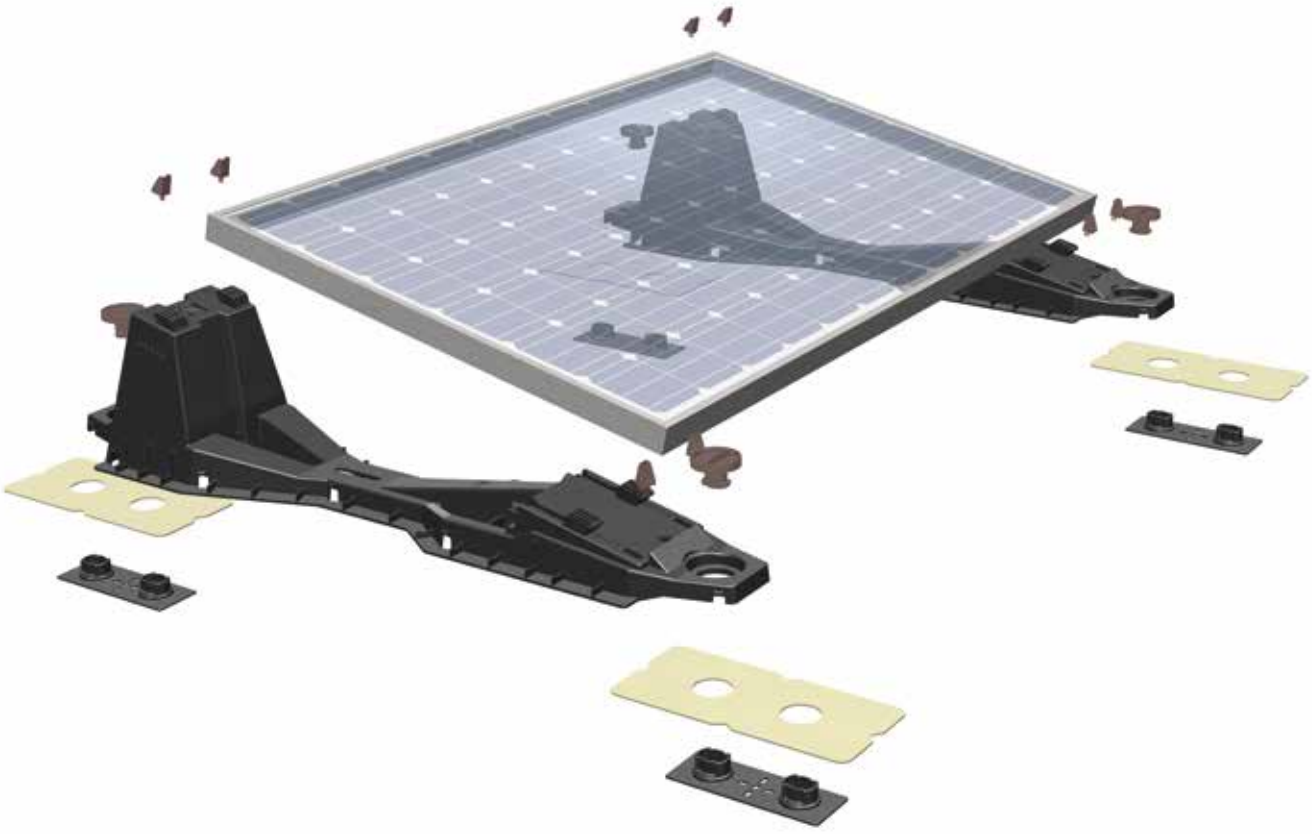
PV CYCLE

BAUDERSOLAR

Risk Free Installation

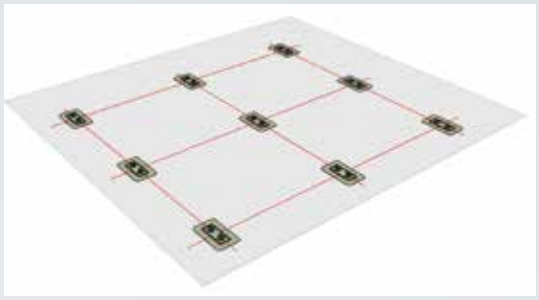
BauderSOLAR delivers a technically advanced solution through design of the mounting system and manufacture and efficiency of the PV modules.

The entire installation is designed to embrace our ethos that you should not and do not need to use penetrative fixings or heavy ballast loads to mount a PV array as this could compromise the integrity of the waterproofing and roof deck.

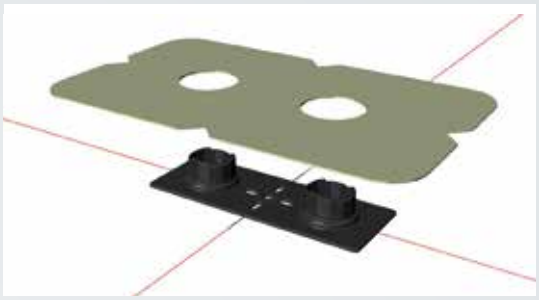


The distinctive element of our lightweight PV energy system is the prefabricated Bauder membrane sleeves which slip over the mounting plates and are welded into position, anchoring the plates to the surface of the Bauder waterproofing system. Once this is completed, the rest of the PV installation is simply locked into place without any requirement for tools or sharp fixings.

The attachment of the mounting components is very stable so that even in extreme weather the entire array is secure on the roof. Any minor movement of the panels, which is generally created by wind uplift, is easily tolerated and does not affect the fixings, or waterproofing system.



1. Positioning the Baseplates
The baseplates are plotted and measured out to ensure correct positioning according to the array design.

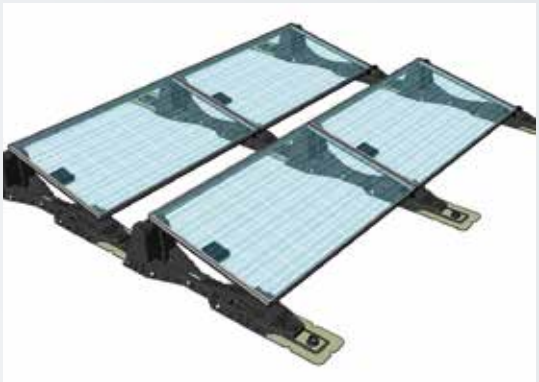


2. Attaching to Roof Surface
The waterproofing membrane sleeves are placed over each of the baseplates and welded into position.

The large attachment footprint is very stable and the entire array is secure on the roof even in extreme weather.

3. Installing the Substructures
The substructures are positioned over the mounting plates and locked into place.

The distance between the module rows is always 1450mm due to the fixed length of the substructures.



4. Placement of the PV Modules
The PV modules are placed onto the substructure mounting system and mechanically secured using a tool free fixing method.

Finally the cable support system and electrical connections conclude the installation.

PROJECT STUDIES
BauderSOLAR

UWE Enterprise Zone

BauderSOLAR SYSTEM

BUILDING BOARD	
Project:	**UWE Enerprise Zone**
Location:	**Bristol**
PV Roof Area:	**12,000m²**
Client:	**University of the West of England**
Main Contractor:	**BAM Construction**
Specifier:	**Parsons Brinckerhoff**
Approved Contractor:	**Mitie Tilley Roofing**
PV Installer:	**Dulas**

APPLIED PRODUCTS

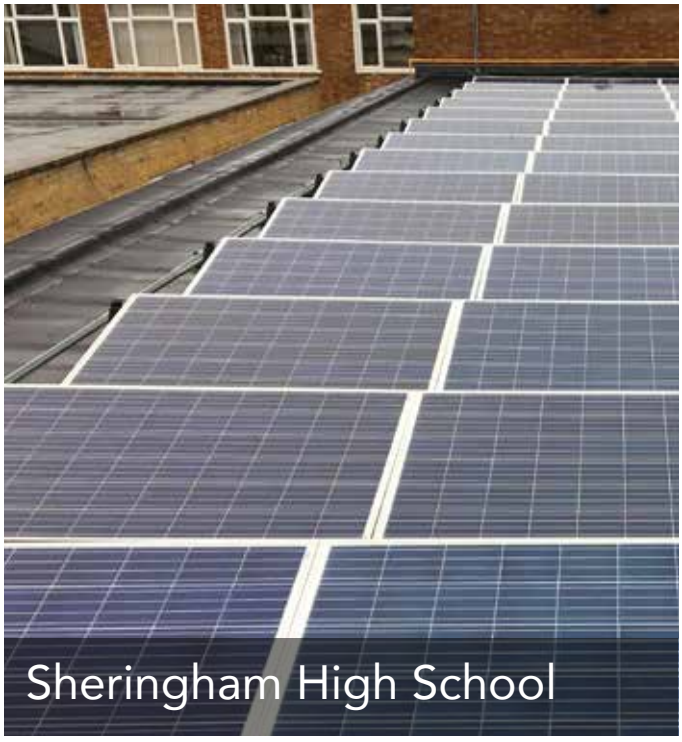
- 1,713 BauderSOLAR PV modules were fitted generating at least 402 Megawatt Hours of solar power each year.

The University of the West of England (UWE) quadrupled its solar generating capacity through the installation of 1,731 solar panels, enabling it to produce over 400 MWh of electricity each year and making it the largest solar panel array in the UK university sector.

The solar array was installed on the roof of the University Enterprise Zone and the Bristol Robotics Laboratory, which both underwent extensive refurbishment as part of the required works. Prior to the PV being installed, approved contractor Mitie Tilley Roofing overlaid the original single ply waterproofing with over 12,000m^2 of Bauder's lightweight, robust PVC single ply waterproofing system Thermofol. The solar modules, which weigh less than 12Kg/m^2, were then fitted using a unique penetration-free method by renewable energy specialists Dulas.

The PV system should generate enough electricity each year to; cover half of the energy usage within the building, save around 200 tonnes of carbon and provide annual savings of over £50,000 a year. The university is committed to sustainability and this project is just part of a much wider plan to achieve its carbon reduction goals.

"The system we chose means the panels are welded into place, reducing load, and the need for roof penetrations and thereby risk of leaks. The University will use 100% of the power generated, equal to the amount of nearly 200 homes with solar panels. As a large organisation we want to set an example for others to undertake similar projects."
Fabia Jeddere-Fisher, Energy Engineer UWE



Sheringham High School

Sheringham High School is a secondary school located in Norfolk that underwent significant refurbishment to repair a number of its failing roofs. The client wanted the school's campus to act as a benchmark for sustainability with the addition of solar panels.

Working closely with the surveyor PCH Associates, Bauder performed a comprehensive roof evaluation survey to identify the full extent of water ingress being experienced and to confirm the suitability of adding solar.

The school had 150 BauderSOLAR PV modules fitted by electrical Joju Solar. As a result the school will be able to generate at least 34.61 Megawatt Hours of power each year, all without any capital expenditure or any disruptions to the school term. Funding for the solar PV array was provided through a community share offer. The Schools' Energy Co-operative, ensuring both the school and the local community benefited financially from the solar installation whilst also providing clean renewable energy.

BUILDING BOARD	
Project:	**Sheringham High School**
Location:	**Sheringham, Norfolk**
PV Roof Area:	**1,500m²**
Surveyor:	**PCH Associates**
Approved Contractor:	**R T Roofing**
PV Installer:	**Joju Solar**
Fundraising Specialist:	**Energy4All**

APPLIED PRODUCTS

- Bauder Total Roof System with 35yrs BBA certified life expectancy.
- 150 BauderSOLAR PV modules were fitted, achieving a kilowatt peak of 39.00.

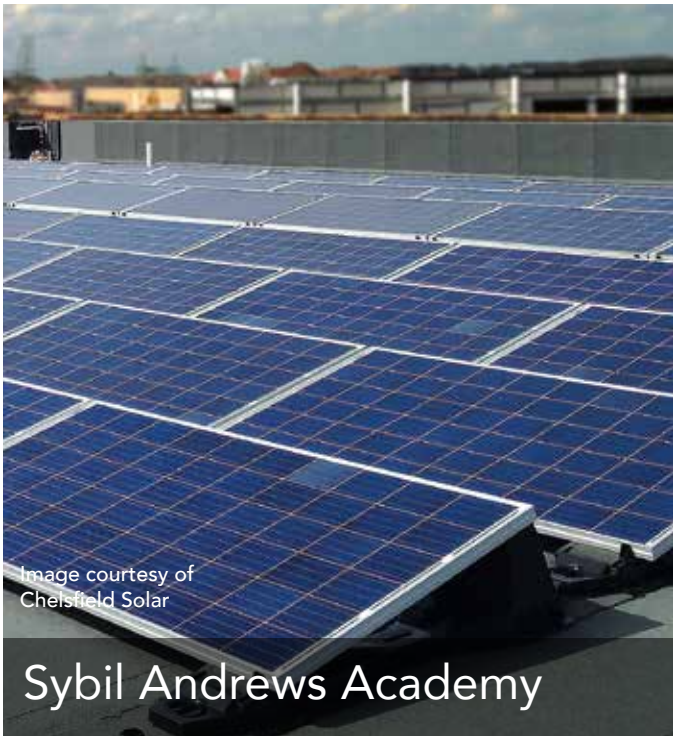


Image courtesy of Chelsfield Solar

Sybil Andrews Academy

A brand new school on the outskirts of Bury St. Edmunds in Suffolk was built to accommodate 1,600 students. The project was designed and managed by Concertus Design & Property Consultants on behalf of Suffolk County Council, who wanted the school to act as a benchmark for sustainability with the building's roofs playing an integral part in achieving this through the inclusion of solar panels.

Working closely with the architect and the client, Bauder developed a bespoke specification package that was designed to maximise the solar output from the available roof space and satisfy all relevant local planning conditions. Four buildings on the school's campus were waterproofed with over 5,000m² of Bauder's reinforced bitumen system, Bauderflex, by approved installer GRM Roofing, before having 313 PV modules fitted by Chelsfield Solar; enabling the client to generate at least 74.32 Megawatt Hours of solar power each year.

BUILDING BOARD	
Project:	**Sybil Andrews Academy**
Location:	**Bury St. Edmunds, Suffolk**
PV Roof Area:	**5,000m²**
Client:	**Suffolk County Council**
Project Manager:	**Concertus Design & Property Consultants**
Approved Contractor:	**GRM Roofing**
PV Installer:	**Chelsfield Solar**

APPLIED PRODUCTS

- K4E is a bituminous capping sheet with a life expectancy in excess of 30 years.
- 313 BauderSOLAR PV modules were fitted, achieving 79.82kWp.

BAUDER BIOSOLAR FOR GREEN

CLAPHAM PARK

Location: **Clapham, London**

At the J3 building on the Clapham Park Estate, a green roof, with integrated PV panels, was specified in order to attenuate rainwater run-off and to provide a general environmental improvement. We decided to specify the Bauder system for this element of the project on the basis of their comprehensive range of systems and components, their technical expertise and support and their effective approved contractor programme. We have worked with Bauder on a number of projects over the past few years and generated a very good working relationship with them which was used to good effect to overcome the challenges posed in this successfully completed project.

George Pace, Partner, Pace Jefford Moore Architects

AND BLUE ROOFS

Our BioSOLAR is an integrated solution for mounting photovoltaic renewable energy on a green roof or a blue roof where the substrate and vegetation provide the ballasted installation mechanism to secure the array. The system is suitable for both new build construction and retrofit projects.

This system allows for the entire roof area to qualify as a green roof, and if a biodiversity vegetation finish is elected for, this can further enhance the BREEAM credit rating for the roof element.

Key Features

- No roof penetrations as substrate and vegetation ballast the PV array.
- Maximises solar output and allows entire roof to qualify as biodiverse green roof.
- Maximises solar energy generation as green roof preserves ambient rooftop temperatures, keeping the modules at optimal output. The cooling effect increases panel output by up to 5%.
- Raised modules allow light and moisture under the panels and the creation of a variety of habitats supporting a greater range of plant species and small invertebrates.
- System can be retrofitted on many roofs without structural modification to the building.
- Single point responsibility for the waterproofing, green roof and PV installation.
- Increased module space between substrate and panels reduce risk of panel damage during green roof maintenance.

Varied Habitats for Flora and Fauna

The panels create a mixture of sunny, shaded and sheltered areas and together with a variable depth of FLL compliant extensive substrate the roof gives a matrix of different habitats, which allow a broader range of plant species to thrive, and small invertebrates to seek refuge from strong wind and rain. Additionally undulations in substrate can be created to enrich the rooftop growing conditions for an even broader mix of flowering vegetation, providing a rich foraging environment for bees and insects.

Symbiotic Relationship

A key element of the BioSOLAR system is that the front edge of the PV panel is set at around 300mm above the level of the substrate, which allows liberal growing room for the extensive vegetation without blocking light to the crystalline solar cells that would otherwise reduce the efficiency of the modules. This height setting also enables light and moisture to reach beneath the panel to support the plants below and allows for maintenance of the green roof.

Specification Support

Specification downloads:
www.bauder.co.uk/technical-centre

NBS Plus BIM DWG

Telephone helpline:
0845 271 8800

PV CYCLE

BIOSOLAR
Safe Guarded Installation

Optimising the Combined Technologies
In the Bauder BioSOLAR solution, the solar modules are raised above the substrate and angled at 15° to optimise the capacity for solar energy production and green roof area so that both can easily occupy the same space and work in synergy. In alternative systems the technologies compete against each other for roof space, with one conceding to the other.

The PV panels are set at around 300mm above the level of substrate so that the growth of the vegetation does not reduce the efficiency of the panels through shading and allows for maintenance of the green roof. The height also lets sufficient levels of moisture and light infiltrate beneath the modules, supporting different species of plants and enhancing the biodiversity of the roof.

Improved Solar Panel Efficiency
A combined green roof with PV delivers advantages to the building as the cooling effect of the vegetation and water held within the green roof system preserves a cooler ambient temperature around the photovoltaic array. Studies in Germany have shown that PVs work most efficiently with an ambient temperature of around 24°C and that when an array is combined with a green roof, the panels are expected to achieve around a 5-7% higher output compared to an installation on membrane alone.

The mounting board is a bespoke moulded landscaping component manufactured from HDPE with a deep recessed profile that provides water storage and multidirectional drainage whilst also providing a repository for the green roof substrate. A support profile is formed in the centre of the board to which the mounting arms are attached.

The boards are positioned on the top of separation and protection layers which prevent mechanical damage to the waterproofing.

1. Positioning the Mounting Boards
The mounting boards are positioned according to the array design with any areas between the boards or around the perimeter finished using our DSE 40 board.

2. Attaching the Railing System
The aluminium arms and carrier rails are fixed in to position.

3. Installing the Substrate
The substrate is poured into the mounting board to ballast the array.

4. Placement of the PV Modules
The PV panels are secured to the carrier rails with clamps.

5. Seeding the Vegetation
The Bauder Flora 3 seed mix is broadcast onto the pre-watered substrate so that the seeds can germinate and grow.

PROJECT STUDY

Clapham Park

BUILDING BOARD	
Project:	**Clapham Park**
Location:	**Clapham Park, Lambeth, London**
PV Roof Area:	**500m² green roof layered with 116m² of PV**
Specifier:	**PJMA Architects**
Approved Contractor:	**EJ Roberts Ltd**
PV Installer:	**M & M Electrical Ltd**

APPLIED PRODUCTS

- Bauder Total Green Roof System is a premier bituminous waterproofing with a life expectancy of over 40 years.
- Bauder BioSOLAR integrates a green roof and photovoltaics into one system drawing the maximum potential from a flat roof.
- Flora 3 Seed Mix is a blend of 49 British native species seed, to maximise diversity of vegetation on green roofs.

The regeneration at Clapham Park involved the demolition of old housing stock to make way for new affordable homes. The 5-storey building with 21 dwellings incorporating the latest rooftop technology which blends a biodiverse green roof and unified solar PV array. This approach met the planning requirements and maximised the limited roof space to generate energy for the residents. The development was certified BREEAM 'Outstanding' due to its environmental, economic and social sustainability attributes.

One of the major challenges of the project was the roof and a renewable energy system to meet the main objectives of sustainability and energy efficiency of the development highlighted by the planning committee. The roof contributed towards requirements under National Planning Policy Framework (NPPF) Chapter 11: Conserving and enhancing the natural environment andThe London Plan 2011 Policy 5.2 - Minimising Carbon Dioxide Emissions, Policy 5.3 - Sustainable Design and Construction and Policy 5.7 - Renewable Energy. The green roof is layered with a raised PV array so that the entire roof qualifies as a green roof whilst also providing energy generation.

The Bauder BioSOLAR system has National House Building Control (NHBC) approval and meets local authority building control (LABC) requirements. The system was installed on zero falls roof deck, making it a very cost-effective solution.

The biodiverse green roof which includes 35 plant species recognised by the RHS as Perfect for Pollinators, covers the totality of the roof area and offers a large variety of vegetation. The building reduces its carbon impact with the highly efficient PIR insulation and generates approximatively 10% of the flats usage with a maximum possible output of 75kWp from the 70 PV modules. The solar PV mounting units are ballasted by the substrate and vegetation, removing the need for any penetrating products in the waterproofing.

Bauder BioSOLAR System

BioSOLAR Vegetation

The Bauder Flora 3 Seed Mix is a blend of seed, tackifier and additives developed to maximise diversity of vegetation on green roofs. Bauder Flora 3 has all the components required to improve the germination and the successful establishment of vegetation for a variety of rooftop conditions: light and shade; exposed and sheltered. The varied mix of species is designed to deliver the British native, biodiverse species required for BREEAM compliance.

Bauder Flora 3 contains a broad range of wildflowers chosen to give an extended flowering season providing nectar and pollen rich habitat for priority pollinators, larval food plants for butterflies and seed sources for birds.

Typically the mix will produce flowers from April to October starting with species Wild Strawberry and Cowslip, through the summer with Yarrow and Black Knapweed with Lady's Bedstraw flowering later into the autumn. The annuals, biennials and grasses will provide cover and colour in the first season allowing time for the slower growing perennials to establish in later years. The mix has been specified to be drought tolerant with sedum species and low growing perennials. Plants are chosen that do not exceed 40cm in height to avoid problems with shading of solar panels when the vegetation is used in conjunction with Bauder BioSOLAR. Shade tolerant ground cover plants were specified that will occupy semi-shade microclimates under the panels.

The seed source is British Provenance (with the exception of sedum species) and suppliers of the mix adopt the Flora Locale Code of Practice for collectors, growers and suppliers of native flora.

Flora 3 seed mix at point of sowing

Vegetation growth at 3 months

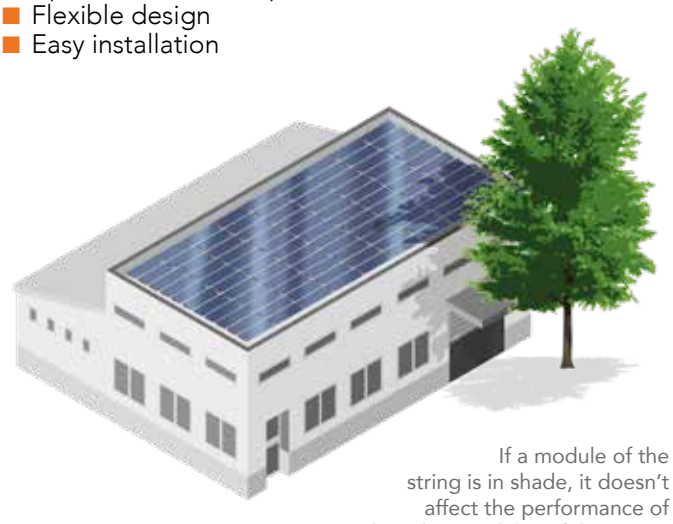
Vegetation established at 6 months

EFFICIENCY AND QUALITY

Power Optimisation

The power optimiser replaces the traditional junction box and is responsible for determining the individual MPP of each module. This ensures that shading, for whatever reason does not impact on the entire string.

- Up to 25% more output
- Flexible design
- Easy installation



If a module of the string is in shade, it doesn't affect the performance of the other modules of the string.

Remote Monitoring

Web based, module level monitoring increases the reliability by ensuring that problems can be identified and dealt with extremely quickly, providing the most productive performance on a permanent basis.

- Cost effective maintenance
- Automatic alerts
- Easy access to real time data

Optimized by solaredge

We strive to specify the best quality, innovative inverters, such as SolarEdge, that have a range of benefits to both the end user and installer. The SolarEdge inverters allow the system to be monitored and managed as easily as possible.

Turnkey Service

Successful solar project management requires experience; we combine technical knowledge and business acumen to support our clients throughout their project to achieve the best possible outcome.

We provide the following services to all our clients:

Brief and Consultation

You give us your remit for the roofing project, your budget and how the programme of works can be formulated.

Design and Specification Package

You will receive the detailed specification package for your project, which answers your brief and includes a technical layout of the PV units and system engineering.

Grid Connections and Funding Options

Our team has an in depth understanding of energy efficiency funding and can help you find a suitable financial package should it be desired. We can also initiate the planning process from the building plans and electricity consumption data supplied, and assist with necessary paperwork to register the solar installation with the national electricity network.

Contractor Selection and Installation

Your Bauder technical manager will assist in the selection of appropriate contractors from a national network of MCS accredited contractors who are approved in the installation of Bauder's various roof and PV systems.

Once our approved contractor has been appointed, a pre-contract meeting will make sure that the project delivery is well coordinated. The works are closely monitored by our site technicians with regular inspections to ensure quality and waterproof integrity of the final scheme.

Sign off and Guarantee

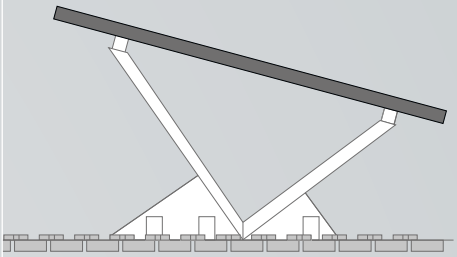
A full final inspection by our PV team on completion of the works with the energy performance of the array assessed. Comprehensive guarantees for the roof and PV system are provided.

Monitoring and Maintenance

Proactive monitoring systems enable us to ensure the maximum possible energy generation and financial return over the system's lifespan, and to identify faults or maintenance requirements remotely. After the project has been successfully completed we can continue to support you with aftercare advice and post occupancy evaluation.

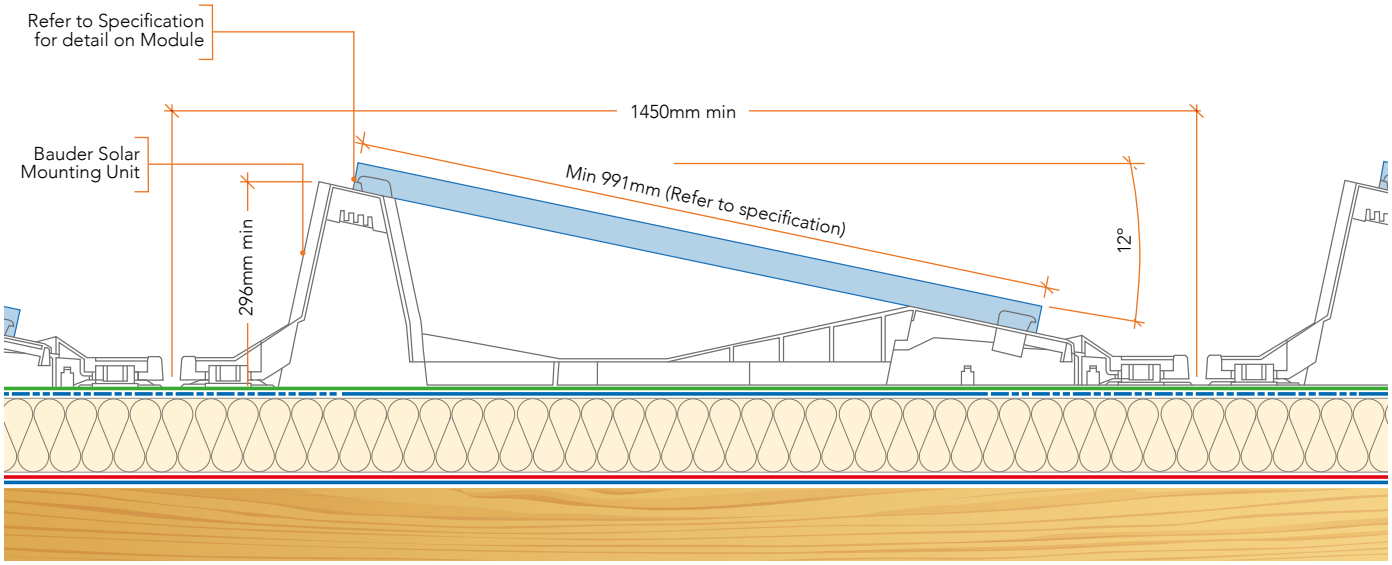
TECHNICAL DATA

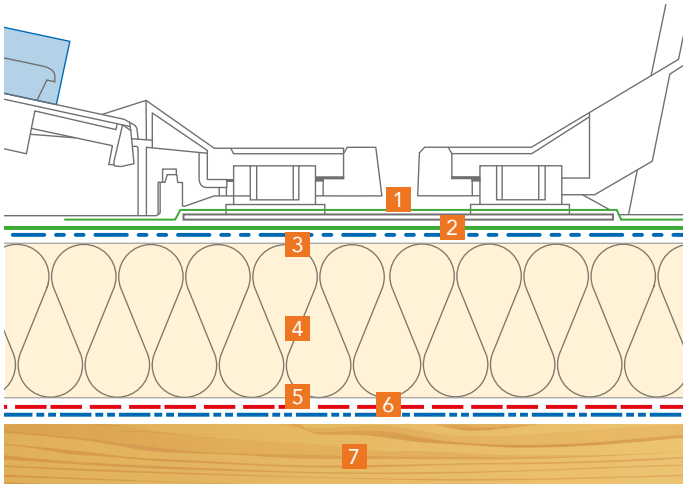
DESCRIPTION	JA SOLAR JAP60S01	ALEO SOLAR X59	LG NEON R
Weight	18.2kg±3%	19	18.5
Dimensions	1650×991×35mm	1660 x 990 x 42	1,700 x 1,016 x 40 mm
No. of Cells	60 (6×10)	60 (6×10)	60 (6×10)
Junction Box	IP67, 3 diodes	IP67, 3 diodes	IP68 with 3 Bypass Diodes
Connector	MC4 Compatible	MC4	MC4
Frame Material	Al alloy, silver	Al alloy, black	Anodized Aluminium, Black
Rated Maximum Power (Pmax) [W]	275	310	365
Open Circuit Voltage (Voc) [V]	38.38	39.9	42.8
Maximum Power Voltage (Vmp) [V]	31.34	32.8	36.7
Short Circuit Current (Isc) [A]	9.29	10.02	10.08
Maximum Power Current (Imp) [A]	8.77	9.51	9.95
Module Efficiency (%)	16.82	18.9	21.1

MOUNTING UNIT DATA		BauderSOLAR	Bauder BioSOLAR
			
Length x width x height	mm	1420 x 340 x 235	1980 x 970 x 60
Material		Polypropylene (PP)	Mounting Board - (HDPE) Railing Support Arms - Aluminium
Module level inclination		12˚	15˚

GENERAL DETAILING

Bauder Solar

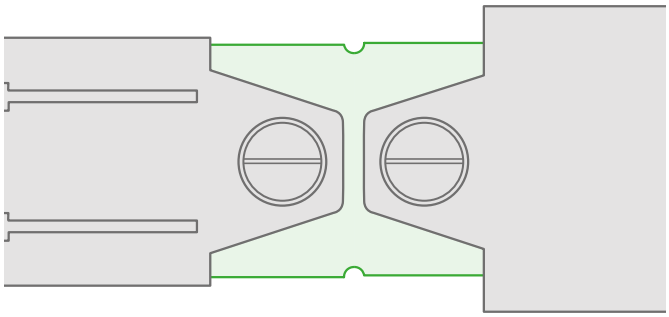




Solar Module Unit Connection

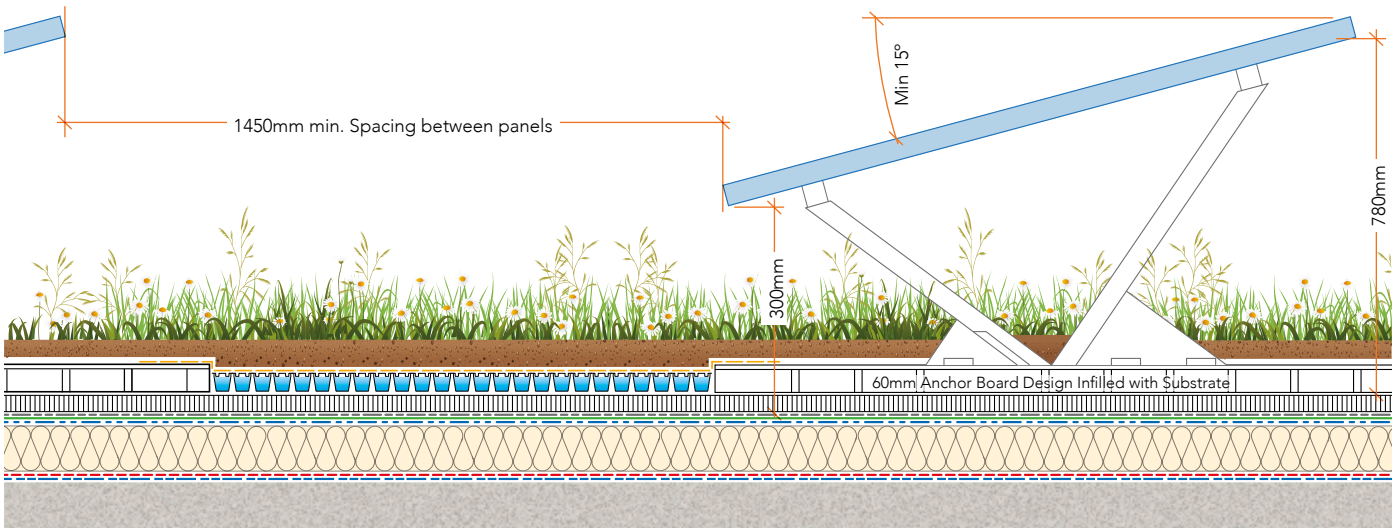
Key

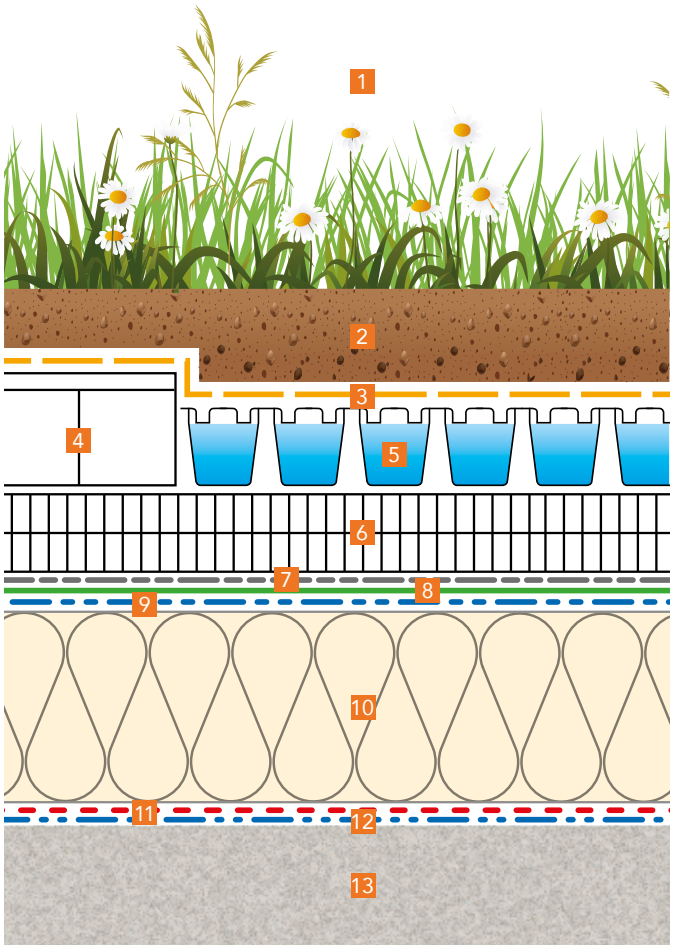
1. **Bauder Solar Weld Patch**
2. **Bauder Capping Sheet**
3. **Bauder Underlayer**
4. **Bauder Insulation**
5. **Bauder Vapour Control Layer**
6. **Bauder Random Nailed Layer used on Timber Boarded Decks Only**
7. **Unknown Deck/Substrate**



Top View: Mounting Unit Connection

BioSOLAR PV System with Blue Roof SuDS

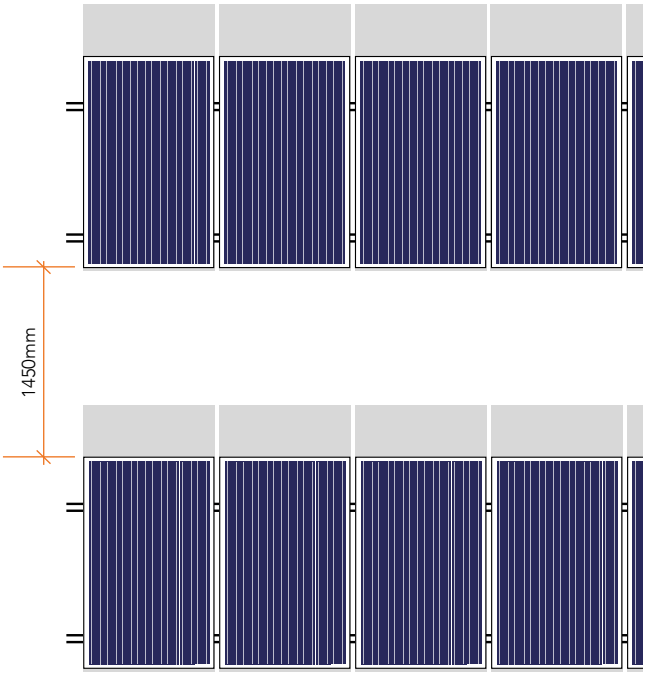


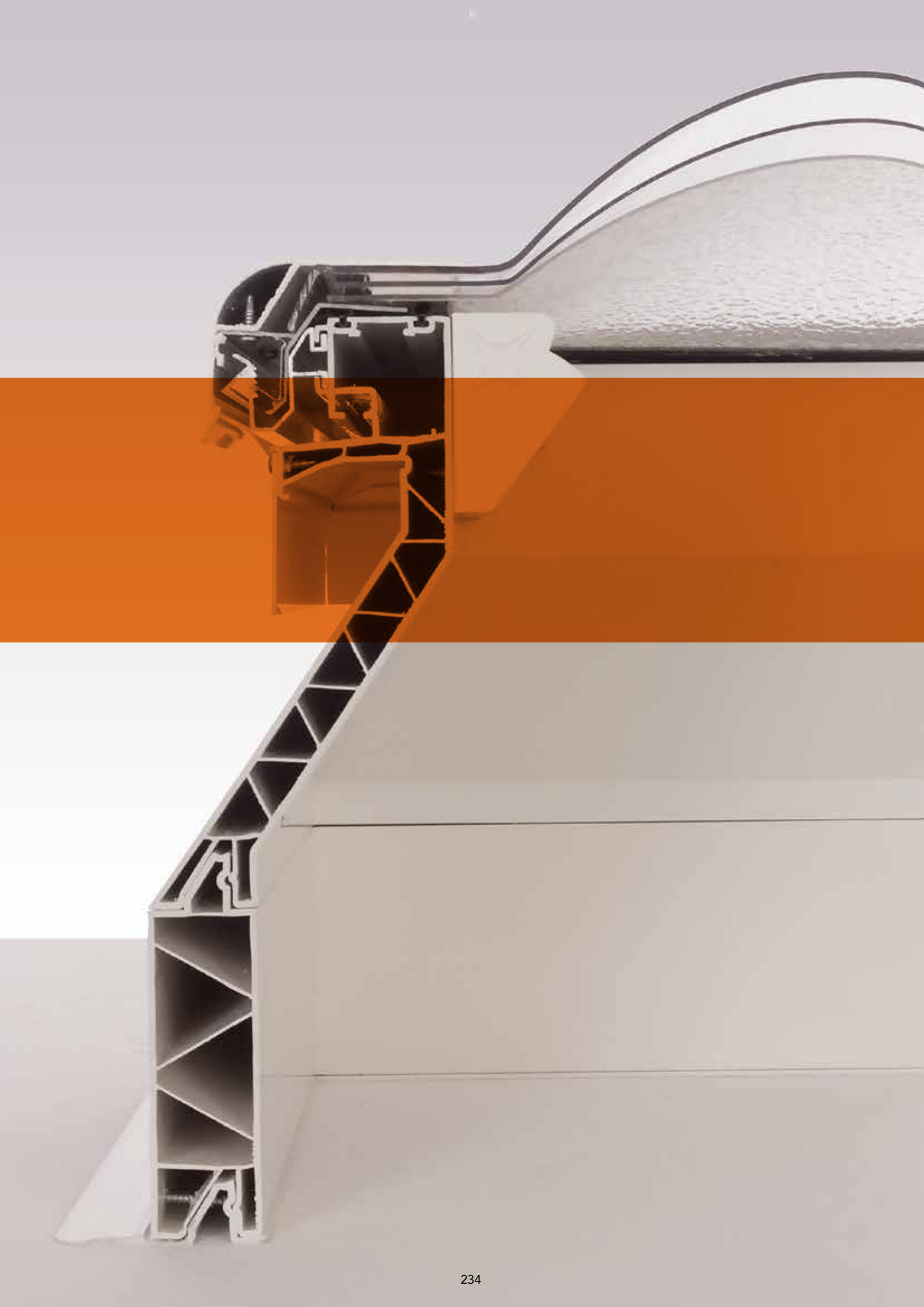


Key

1. Vegetation - Flora 3 Seed Mix
2. Biodiverse Substrate
3. Bauder Filter Fleece
4. Bauder BioSOLAR Anchor Board
5. DES40 Drainage Board
6. Attenuation Cell 100
7. Bauder Protection Mat
8. Bauder Capping Sheet
9. Bauder Underlayer
10. Bauder Insulation
11. Bauder Vapour Control Layer
12. Bauder Underlayer
13. Unknown Deck / Substrate

Grid Arrangement





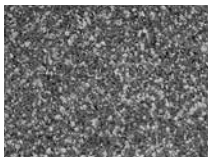
10

Rooflights, Outlets & Products

Thermofol U15 FB
Adhered System

WATERPROOFING MEMBRANES

BITUMEN MEMBRANE CAP SHEETS

	SURFACE		REINFORCEMENT	TENSILE STRENGTH (EN 12311-1)	ELONGATION AT BREAK (EN 12311-1)	COLD BENDING TEST °C (EN 1109)	HEAT STABILITY °C (EN1110)	THICKNESS mm (nominal)	WEIGHT (nominal) Kg/m²	ROLL SIZE (W X L)
	TOP	BOTTOM								
K5K Cap Sheet										
	Charcoal grey, brown or natural slate mineral	Thermofusible polyethylene	250g/m² Recycled Spunbond polyester	Length ≥ 1000N/50mm Diagonal ≥ 1000N/50mm	Length ≥ 45% Diagonal ≥ 45%	-36	+120	5.2	6 Brown + natural slate 6.5 Charcoal	1 x 5m
K5E Cap Sheet										
	Mica	Thermofusible polyethylene	250g/m² Recycled Spunbond polyester	Length ≥ 800N/50mm Diagonal ≥ 800N/50mm	Length ≥ 40% Diagonal ≥ 40%	-30	+110	5	5.8	1 x 5m
Plant-E										
	Green mineral	Thermofusible polyethylene	250g/m² Recycled Spunbond polyester	Length ≥ 1000N/50mm Diagonal ≥ 1000N/50mm	Length ≥ 45% Diagonal ≥ 45%	-36	+120	5.2	6	1 x 5m
K4E Cap Sheet										
	Charcoal grey, natural slate or brown mineral	Thermofusible polyethylene	250g/m² Recycled Spunbond polyester	Length ≥ 800N/50mm Diagonal ≥ 800N/50mm	Length ≥ 40% Diagonal ≥ 40%	-30	+110	4.2	5 Brown + natural slate 5.5 charcoal	1 x 7.5m
X4S Cap Sheet										
	Mica	Thermofusible polyethylene	250g/m² Recycled Spunbond polyester	Length ≥ 800N/50mm Diagonal ≥ 800N/50mm	Length ≥ 35% Diagonal ≥ 35%	-25	+100	4.2	5	1 x 10m
BauderTEC KSO SN										
	Brown and natural slate mineral	Release film over self-adhesive bitumen	200g/m² Glass grille	Length ≥ 1000N/50mm Diagonal ≥ 1000N/50mm	Length ≥ 2% Diagonal ≥ 2%	-30	+100	4	4.6	1 x 5m
Bauder Pro F										
	Green/white, or natural slate mineral	Thermofusible polyethylene	250g/m² Recycled Spunbond polyester	Length ≥ 1000N/50mm Diagonal ≥ 1000N/50mm	Length ≥ 45% Diagonal ≥ 45%	-36	+120	5.2	6	1.1 x 5
BauderTHERM SL500										
	Natural slate mineral	Thermally activated bitumen stripes	250g/m² Recycled Spunbond polyester	Length ≥ 1000N/50mm Diagonal ≥ 1000N/50mm	Length ≥ 45% Diagonal ≥ 45%	-30	+105	5.2	6	1 x 5m
Bauder KSO-P SN Detailing Cap Sheet										
	Charcoal grey slate mineral	Release film over self-adhesive bitumen	215g/m² Polyester fleece	Length ≥ 1000N/50mm Diagonal ≥ 900N/50mm	Length ≥ 40% Diagonal ≥ 40%	-30	+100	4	5.2	1 x 5m

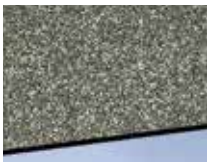
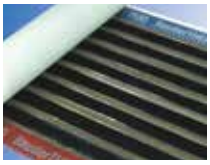
WATERPROOFING MEMBRANES

BITUMEN MEMBRANE UNDERLAYERS

	SURFACE		REINFORCEMENT	TENSILE STRENGTH (EN 12311-1)	ELONGATION AT BREAK (EN 12311-1)	COLD BENDING TEST °C (EN 1109)	HEAT STABILITY °C (EN1110)	THICKNESS mm (nominal)	WEIGHT (nominal) Kg/m²	ROLL SIZE (W X L)
	TOP	BOTTOM								
SPRINT DUO										
	Foil	Release film over self-adhesive bitumen	120g/m² Glass fleece	Length ≥ 1000N/50mm Diagonal ≥ 1000N/50mm	Length ≥ 2% Diagonal ≥ 2%	-30	+100	2	2.5	1 x 15m
BauderTEC KSA DUO										
	Foil	Release film over self-adhesive bitumen	200g/m² Glass lattice	Length ≥ 1000N/50mm Diagonal ≥ 1000N/50mm	Length ≥ 2% Diagonal ≥ 2%	-25 Top -30 Bottom	+100	3	3.5	1 x 7.5m
EGV 3.5										
	Mica	Thermofusible polyethylene	80g/m² Glass lattice	Length ≥ 500N/50mm Diagonal ≥ 500N/50mm	Length ≥ 2% Diagonal ≥ 2%	-10	+100	Ca. 3.5	Ca. 4.7	1 x 8m
G4E										
	Mica	Thermofusible polyethylene	200g/m² Woven glass	Length ≥ 1200N/50mm Diagonal ≥ 1200N/50mm	Length ≥ 2% Diagonal ≥ 2%	-30	+110	4	4.8	1 x 7.5m

WATERPROOFING MEMBRANES

BITUMEN MEMBRANE VAPOUR CONTROL LAYERS

	SURFACE		REINFORCEMENT	TENSILE STRENGTH (EN 12311-1)	ELONGATION AT BREAK (EN 12311-1)	COLD BENDING TEST °C (EN 1109)	HEAT STABILITY °C (EN1110)	THICKNESS mm (nominal)	WEIGHT (nominal) Kg/m²	ROLL SIZE (W X L)
	TOP	BOTTOM								
VB4-EXPAL										
	Mica	Thermofusible polyethylene	Polyester coated aluminium foil and 60g/m² glass fleece	Length ≥ 400N/50mm Diagonal ≥ 400N/50mm	Length ≥ 2% Diagonal ≥ 2%	-20	+70	Ca. 3.5	Ca. 4.5	1 x 7.5m
EVA 35										
	Mica	Thermofusible polyethylene	Polyester coated aluminium foil and 60g/m² glass fleece	Length ≥ 400N/50mm Diagonal ≥ 400N/50mm	Length ≥ 2% Diagonal ≥ 2%	-15	+70	Ca. 3.5	Ca. 4.5	1 x 8m
THERM DS1 DUO										
	Foil & mica	Release film over self-adhesive bitumen	Polyester coated aluminium foil and 60g/m² glass fleece	Length ≥ 400N/50mm Diagonal ≥ 400N/50mm	Length ≥ 2% Diagonal ≥ 2%	-25	+70	Ca.4	Ca. 4.5	1.08 x 7.5m
TEC KSD MICA										
	Mica	Release film over self-adhesive bitumen	Polyester coated aluminium foil and 200g/m² glass fleece	Length ≥ 1000N/50mm Diagonal ≥ 1000N/50mm	Length ≥ 2% Diagonal ≥ 2%	-25	+70	Ca. 2.5	Ca. 2.5	1.08 x 10m

BITUMEN MEMBRANE VAPOUR CONTROL LAYERS FOR SINGLE PLY SYSTEMS ONLY

TEC KSD FOIL										
	Aluminium Foil	Release film over self-adhesive bitumen	60g/m² glass fleece	Length ≥ 400N/50mm Diagonal ≥ 400N/50mm	Length ≥ 2% Diagonal ≥ 2%	-30	+100	Ca. 1.5	Ca. 1.8	1x15m
TEC DBR										
	Aluminum foil	Release film over self-adhesive bitumen	Aluminum foil and 50g/m² polyester	Length ≥ 950N/50mm Diagonal ≥ 750N/50mm	Length ≥ 4% Diagonal ≥ 4%	-40	N/A	0.4	0.4	1.25 x 60m

Other bituminous vapour barriers can also be specified in a single ply system

POLYETHYLENE VAPOUR CONTROL LAYER FOR SINGLE PLY SYSTEMS ONLY

DB100 AND DB200										
	DB100 Blue Polyethylene	N/A	N/A	>140 W/50mm	>300%	N/A	N/A	0.16	0.15	4 x 25m
	DB200 Orange Polyethylene	N/A	N/A	>185 W/50mm	>7500%	N/A	N/A	0.25	0.24	4 x 25m

WATERPROOFING MEMBRANES

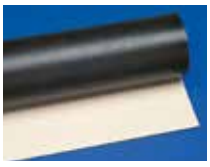
SINGLE PLY PVC MEMBRANES

	SURFACE		REINFORCEMENT	TENSILE STRENGTH (EN 12311-1)	ELONGATION AT BREAK (EN 12311-1)	COLD BENDING TEST °C (EN 1109)	HEAT STABILITY °C (EN1110)	THICKNESS mm (nominal)	WEIGHT (nominal) Kg/m²	ROLL SIZE (W X L)
	TOP	BOTTOM								
Thermofol U12										
	Light grey	Dark grey	Pre-coated cross-weave polyester	md ≥ 1000N/50mm cd ≥ 900N/50mm	>19%	≥-30	N/A	1.2	1.47	1.5 x 20m
Thermofol U15										
	Light grey, blue grey or anthracite	Dark grey	Pre-coated cross-weave polyester	≥ 1000N/50mm	>19%	≥-30	N/A	1.5	1.81	1.5 x 20m Cover Strip 0.2 x 20m
Thermofol U18										
	Light grey, blue grey or anthracite	Dark grey	Pre-coated cross-weave polyester	≥ 1000N/50mm	>19%	≥-30	N/A	1.8	2.16	1.5 x 20m
Thermofol U20										
	Light grey	Dark grey	Pre-coated cross-weave polyester	≥ 1000N/50mm	>20%	≥-30	N/A	2.0	2.46	1.5 x 20m
Thermofol U15FB										
	Light grey, blue grey or anthracite	Polyester fleece	Pre-coated cross-weave polyester	≥ 1000N/50mm	>20%	≥-30	N/A	2.5	2.04	1.5 x 20m
Thermofol D										
	Light grey, blue grey or anthracite	Grey	None	≥ 15N/50mm	>300%	-30	N/A	1.5	1.7	0.5 x 10m
Thermofol Walkway Membrane										
	Dark grey (RAL 7012) embossed	Dark grey	None	≥ 700N/50mm	>300%	-30	N/A	2.0	2.2	0.75 x 20m

	DESCRIPTION	RAL NUMBER
Thermofol PVC	Light Grey	7035
	Blue Grey	7031
	Anthracite	7016
	Walkway	7012

WATERPROOFING MEMBRANES

SINGLE PLY FPO MEMBRANES

	SURFACE		REINFORCEMENT	TENSILE STRENGTH (EN 12311-1)	ELONGATION AT BREAK (EN 12311-1)	COLD BENDING TEST °C (EN 1109)	HEAT STABILITY °C (EN1110)	THICKNESS mm (nominal)	WEIGHT (nominal) Kg/m²	ROLL SIZE (W X L)
	TOP	BOTTOM								
Thermoplan T SV 12										
	Pearl white only	Black	Pre-coated cross-weave polyester	md ≥ 1200N/50mm cd ≥ 1150N/50mm	>19%	≥ -30	N/A	1.2	1.5	1.5 x 25m
Thermoplan T SV 15										
	Silver grey or pearl white	Black	Pre-coated cross-weave polyester	≥ 1200N/50mm	>19%	≥-30	N/A	1.5	1.84	1.5 x 20m
Thermoplan T SV 20										
	Pearl white only	Black	Pre-coated cross-weave polyester	≥ 1200N/50mm	>19%	≥-30	N/A	2	2.47	1.5 x 20m
Thermoplan T SV 15FB										
	Silver grey or pearl white	Polyester fleece	Pre-coated cross-weave polyester	≥ 1200N/50mm	>19%	≥-30	N/A	2.5	2.12	1.5 x 20m
Thermoplan TL Membrane										
	Silver grey or pearl white	Black	None	≥ 1100N/50mm	>1000%	-45	N/A	1.8	2.6	0.5 x 10m
Thermoplan Walkway Membrane										
	Dark grey (RAL 7016) embossed	Black	None	≥ 1100N/50mm	>1000%	-30	N/A	1.88	2.2	0.75 x 10m

PRODUCT	DESCRIPTION	RAL NUMBER
Thermoplan FPO	Silver Grey	7001
	Pearl White	1013
	Walkway	7016

LIQUID WATERPROOFING

HOT MELT SYSTEM

	COLOUR	SOLID CONTENT	MINIMUM INSTALLATION TEMPERATURE	FLASH POINT	HEAT STABILITY	BLOCK WEIGHT Kg	COVERAGE @ 6mm
Bauder Hot Melt							
	Black	100%	-18°F	555°F / 291°C	5h @ 199°C	22.6kg	6.5 kg/m²

	TENSILE STRENGTH	TEAR RESISTANCE	MUILER BURST (PSI)	THICKNESS (mm)	ROLL WEIGHT kg	ROLL SIZE
Reinforcing Sheet						
	109 N	38 N	17	0.2	5.7	182 x 0.914m

	SURFACE FINISH	REINFORCEMENT	TENSILE STRENGTH	ELONGATION AT BREAK	THICKNESS	WEIGHT Kg	ROLL SIZE
AP1							
	Fine sand	60g/m² glass tissue	Length Av 430N/50mm Diagonal Av 355N/50mm	N/A	1.5mm	1.8kg/m²	1 x 20m
AP2							
	Green mineral	250g/m² Spunbond polyester	Length ≥ 1000N/50mm Diagonal ≥ 1000N/50mm	Length ≥ 45% Diagonal ≥ 45%	4.2mm	5 kg/m²	1 x 7.5m

	THICKNESS	WEIGHT PER BOARD	% WATER ABSORPTION	PUNCTURE RESISTANCE (UNI 8202P.12)	STATIC INDENTATION RESISTANCE (UNI 8202 P.11)	SIZE
AP3						
	3mm	12 kg	Impermeable	PD4	PS4	2 x 1m

	COLOUR	TENSILE STRENGTH ASTM D412	ELONGATION ASTM D2240	TEAR RESISTANCE ASTM D624	UV RESISTANCE ASTM D1149	ROLL WEIGHT approx	ROLL WIDTH	ROLL LENGTH
Neoprene								
	TOP Black BOTTOM Black	660 kN/m	400%	76 kN/m	No Deterioration	11.36 kg 22.73 kg 29.55 kg 60 kg	150mm 450mm 600mm 900mm	30.48m

LIQUID WATERPROOFING

COLD LIQUID APPLIED SYSTEMS

LiquiPRIME 1 & 2

LiquiPRIME 1

Primer for timber and exposed bitumen substrates (eg. asphalt)

Rainproof time 25 - 60mins
Walk on time / next coat 45 - 90mins

LiquiPRIME 2

Primer for brickwork, blockwork and concrete

Rainproof time 25 - 60mins
Walk on time / next coat 45 - 90mins

LiquiDEK

Main area waterproofing for roofs

Rainproof time 30 - 90mins
Walk on time / next coat 45 - 120mins

LiquiDETAIL

Upstand and detail waterproofing

Rainproof time 30 - 90mins
Walk on time / next coat 45 - 180mins

LiquiFIBRE

Waterproofing for awkward to access areas

Rainproof time 30 - 90mins
Walk on time / next coat 45 - 120mins

TEC KSD DUO

Vapour Control Layer / Carrier Membrane
Roll Size 1m x 15m
Thickness 1.5mm
Top - alu/polyester
Bottom - self adhesive bitumen

LiquiBALKON

Main area waterproofing for balconies, walkways and terraces

Rainproof time 30 - 90mins
Walk on time / next coat 45 - 180mins

LiquiPAVE R

Resin component for balcony, walkway and terrace surfacing

Rainproof time 30mins
Walk on time 60mins
Next coat 2 hours

LiquiPAVE F

Filler component for balcony, walkway and terrace surfacing

Rainproof time 30mins
Walk on time 60mins
Next coat 2 hours

LiquiFINISH

Colour and seal coat

Rainproof time 30mins
Walk on time 60mins
Colours - Approx RAL 7030, 7031, 7043

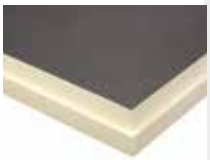
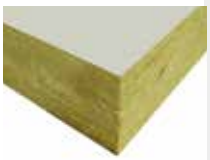
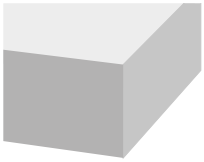
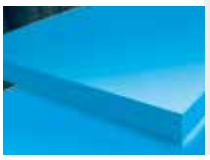
110g Reinforcement Fleece

Reinforcement fleece for LiquiDEK, LiquiBALKON and LiquiDETAIL

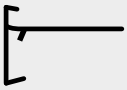
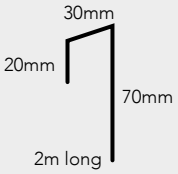
Roll length 50m
Roll widths 262, 350, 525 & 1050mm

INSULATION

WARM AND INVERTED ROOFS

	SURFACE		AVAILABLE THICKNESS	DENSITY	THERMAL CONDUCTIVITY (Lambda Value)	COMPRESSIVE STRENGTH	COMPRESSIVE CREEP EN1606	BOARD SIZE
	TOP	BOTTOM						
PIR FA-TE Flatboard								
	Aluminium foil	Aluminium foil	30, 40, 50, 60, 80, 100, 120, 140, 160mm	Min 30kg/m³	0.022W/mK	Minimum 0.12N/mm²	0.024N/mm²	1200mm x 600mm
PIR FA Flatboard								
	Black aluminium foil	Aluminium foil	Including moisture correction factor 60, 80, 100, 120, 140, 160mm	Min 30kg/m³	0.022W/mK	Minimum 0.12N/mm²	0.024N/mm²	1200mm x 2400mm
PIR Flatboard								
	Mineralised glass fibre	Mineralised glass fibre	30, 40, 50, 60, 80, 90, 100, 110, 120, 140, 160, 180, 200mm	Min 30kg/m³	≤ 80mm = 0.027 W/mK 80 -119mm = 0.026W/mK ≥ 120mm = 0.025W/mK	Minimum 0.12N/mm²	0.024N/mm²	1200mm x 600mm
PIR Tapered								
	Unfaced	Unfaced	20mm to 400mm	Min 30 Kg/m³	≤ 80mm = 0.027 W/mK 80-119mm = 0.026 W/mK ≤ 120mm = 0.025 W/mK	Minimum 0.12N/mm²	0.024N/mm²	1200mm x 800mm
VIP								
	17mm high density BauderPIR **Core** Vacuum silica encased by multi layer composite aluminium foil.	3mm rubber granulate mat	60mm (40mm core) 80mm (60mm core)	13 Kg/m² 17 Kg/m²	0.0063 W/mK vacuum core 0.009 W/mK for the combined panel	0.12 N/mm² min.	N/A	1000 x 1000mm 1000 x 500mm
ROCK								
	300g/m² glass fibre	Unfaced	60, 85, 105, 115, 150, 170, 185mm 120, 150mm underlay boards	160Kg/m³ approx	0.039 W/mK	Minimum 0.08N/mm²	N/A	1200mm x 1000mm
JFRI (200 HP)								
	Unfaced	Unfaced	100 - 240mm	30Kg/m³ approx	0.035 W/mK	Minimum 0.20N/mm²	0.06N/mm²	1215mm x 1215mm
JFRI (200) / JFRI (300)								
	Unfaced	Unfaced	100, 110, 120, 130, 140, 150, 160, 170, 180, 190, 200, 205, 210, 220, 225, 230, 240mm	JFRI (200) = 30 Kg/m³ JFRI (300) = 40 Kg/m³	0.038 W/mK*	JFRI (200) = 0.20 N/mm² JFRI (300) = 0.30 N/mm²	0.06N/mm² x 0.09N/mm²	1215mm x 1215mm
XPS (CO2)								
	Smooth self-finish	Smooth self-finish	30 - 140mm	Min 35 Kg/m³	100 mm = 0.037W/mK* 101-120 mm = 0.036W/mK* >120mm = 0.038W/MK*	0.30 N/mm²	0.06N/mm²	600mm x 1250mm

ANCILLARY PRODUCTS

	FACING MATERIAL TOP	FACING MATERIAL BOTTOM	DIMENSIONS	WEIGHT	COLOUR	SUPPLY FORM
GRP Trim						
	N/A	N/A	A choice of profiles.  (type 2 shown here)	N/A	Black as standard	2.5m lengths
Termination Bar						
	N/A	N/A	 82mm total depth	N/A	Black GRP or aluminium	2.5m lengths
Lightning Conductor Clips						
	N/A	N/A	100mm x 100mm	N/A	• **BITUMEN** Charcoal grey or brown mineral, natural slate. • **SINGLE PLY** Pearl white, light grey, blue grey, anthracite	Type 2 for uncoated Type 4 for PVC coated conductor tape
Insulated Upstand Support Bracket						
	N/A	N/A		N/A	N/A	N/A
Single Ply Metal						
	**THERMOPLAN**					
	Polyolefin	N/A	1m long x 2m wide x 1.4mm thick	5kg/m²	Silver grey or pearl white	N/A
	THERMOFOL					
	Polyvinyl chloride	N/A	1m long x 2m wide x 1.4mm thick	5kg/m²	Light grey, blue grey or anthracite	N/A

LiquiFIBRE Kit

A thick liquid waterproofing compound with built-in reinforcement fibres, which can be used in conjunction with bituminous membrane roofing systems as a solution for waterproofing around awkward penetrations of all shapes and sizes.

The product is supplied in a kit form, with all necessary tools to enable it to be brush applied simply and correctly with minimal fuss.

	REFURBISHMENT	TENSILE STRENGTH (EN 12311-1)	ELONGATED AT BREAK (EN 12311-1)	COLD BENDING TEST (EN 1109)	HEAT STABILITY (EN 1110)	WEIGHT	DIMENSIONS
R333 Taping Strips							
	333 g/m²	Length ≥ 300 N/50mm Diagonal ≥ 300 N/50mm	Length ≥ 2% Diagonal ≥ 2%	0°C	+ 70°C	Ca. 0.8 kg/m²	Thickness Ca. 1.5mm Roll Size 0.2 x 20 m
TA600 Nailed Layer							
	Recycled 180 g/m² polyester fleece	Length ≥ 600 N/50mm Diagonal ≥ 450 N/50mm	Length ≥ 35% Diagonal ≥ 45%	-25°C	+ 100°C	Ca. 2.8	Thickness Ca. 2.2mm Roll Size 1 x 15 m

ROOFLIGHTS

Glazing to complement our flat roofs

Bauder can satisfy all your rooftop glazing requirements, from standard modular units to specialist structural glazing. For both new build and refurbishment projects your experienced area technical manager will be able to fully advise and guide you in the selection of suitable rooflights.

In refurbishment situations we will ensure that a survey is undertaken to establish the size and details of the existing glazing, along with the associated supporting kerb, to ensure that the new product proposed will provide a perfect replacement.

From the initial survey to the completed installation you are assured of the best technical support and advice.

Our rooflights are installed with a comprehensive guarantee to give total confidence and complete peace of mind.

All our roof glazing products are manufactured to comply with current Building Regulation and Health & Safety requirements and are fully compatible with our roof waterproofing systems.

BBA APPROVAL INSPECTION TESTING CERTIFICATION
CERTIFICATE 05/4291

The Euroglaze and BauderDOME range of modular rooflights are certified by the BBA under certificate number 05/4291.

Bauder Euroglaze

The Bauder Euroglaze is a superior modular rooflight designed to provide high standards of illumination, insulation and ventilation to the interior of flat roofed buildings. All are fully compatible with our roof waterproofing systems and hold BBA certification.

These bespoke modular rooflights are made to suit the desired size with dimensions between 600 x 600mm up to 2400 x 1200mm.

Euroglaze rooflights can be made to fit any roof opening size

Glazing

The triple skinned polycarbonate, dome or pyramid profiled glazing can be supplied either completely clear, or with a diffused inner skin.

Fire Performance

Fire performance classifications for Bauder Euroglaze rooflights are as follows:

- BS476 Part 7 – Class 1
- Building Regulation classification - TPa. (Rigid). can be deemed as class O.

Upstand

Euroglaze is supplied with an integral upstand, in brilliant white. The upstand profile is dependent on the particular application and rooflight specification.

Security Frame

Euroglaze features a brilliant white metal security frame to conceal all glazing fixings, thereby improving the security of the rooflight unit.

Thermal Performance

Euroglaze with its integral kerb and triple skin polycarbonate glazing achieves Ud Values as low as 1.6W/m2K.

Ventilation Options

Euroglaze is supplied as standard with closable 'hit and miss' vents in two sides, but additional vents can be supplied if required.

Hinged, wormgear opening rooflights and units with a power fan incorporated into the glazing are also available.

Access Hatches

Euroglaze Access Hatches are available for applications where both daylight and access to the roof is required.

BauderDOME

The BauderDOME standard range of modular rooflights are designed to provide a simple but effective solution to the requirement for daylight and ventilation to the interior of flat roofed buildings.

Available in a wide range of standard sizes, they offer a commercial alternative to the specifier on a limited budget whilst providing an excellent solution.

Glazing

The triple skinned polycarbonate, dome or pyramid profiled glazing can be supplied either completely clear, or with a diffused inner skin.

Upstand

The integral upstand of BauderDOME is manufactured in UPVC at a height of 237mm, to allow successful waterproofing. The profile of the upstand makes it easy to directly apply all kinds of our waterproofing membranes. Bitumen membranes, synthetic single ply membranes and cold applied liquid systems are all compatible.

Fire Performance

Fire performance classifications for BauderDOME are as follows:

- BS476 Part 7 – Class 1
- Building Regulation classification - TPa. (Rigid). Can be deemed as class O.

Thermal Performance

BauderDOME with its integral GRP kerb and triple skin glazing achieves a Ud value of 1.8W/m²K.

Ventilation Options

BauderDOME is supplied unvented as standard, but closable 'hit and miss' vents can be incorporated in 2 sides where required. Hinged, wormgear opening rooflights and units with a power fan incorporated into the glazing are also available.

Bauder Special Modular Rooflights

Bauder can satisfy any special modular rooflight requirements that may arise.

Circular rooflights

Circular units with thermally broken metal upstands and triple skinned polycarbonate dome shaped glazing are available up to 1800mm diameter. These are especially useful as replacements for existing glazing on roof refurbishment projects with circular apertures.

Glass rooflights

Glass glazed modular rooflights are available, incorporating the UPVC upstand that features in the Euroglaze range. As standard, the glass is a 31mm flat double glazed unit, comprising 6mm clear toughened outer leaf with low 'E' coating, 16mm argon filled cavity and 9.5mm clear laminated inner leaf. The glazing is set at an angle of 3°to aid rainwater run-off.

ROOFLIGHTS

Specialist Glazing for our flat roofs

Continuous Rooflights

Continuous rooflights provide an excellent source of natural daylight for any new build or refurbishment project. Bauder continuous rooflights are triple glazed as standard and are available in a width of up to 2.4m.

The range for fast track procurement is available in the following formats:

- Thermo-formed Barrel Vaults
- Linked Pyramids
- Linked Domes

Bauder Continuous Rooflights are made of enhanced UV-protected polycarbonate with vented airspaces, meeting Part L criteria. The Cascade water management system ensures that any moisture is drained to the outside of the structure and that air leakage satisfies Part L requirements.

Walk-On Rooflights

The Bauder Walk-On rooflight allows and supports foot traffic on roof terraces and gardens and ground floor areas overbasementroomswhilstprovidingnaturaldaylighttothe rooms below.

The rooflight is set into the structure to allow adjacent decking or paving slabs to be set level and sit flush with the top face of the rooflight unit ensuring a smooth surface. Care must be taken in wet or icy conditions. Etched glass can offer additional safety.

The double-glazed units are comprised of 21.5mm clear toughened laminated outer pane, a 16mm airspace and 6mm of clear toughened low E inner pane. The kerb is heavy duty folded aluminium which is thermally broken, and the standard finish is powder coated white, although other colours are possible. The glazing is available in rectangular, square or round shapes and is set to minimal fall to prevent water ponding

Bauder Walk-On rooflights are custom designed, detailed and manufactured for each individual application. Each rooflight is delivered fully assembled ready for installation on a prepared flat level roof opening.

Loading capacities

- Floor loading – 1.8 kN/m²
- Concentrated loading – 1.4 kN/m²

Note: Higher loadings can be catered for.

Modular Link Glazing

The Bauder Modular Link Glazing System is a panel glazing system suitable for both new build and refurbishment projects. The custom built, aluminium framed panels are designed and built for each individual building.

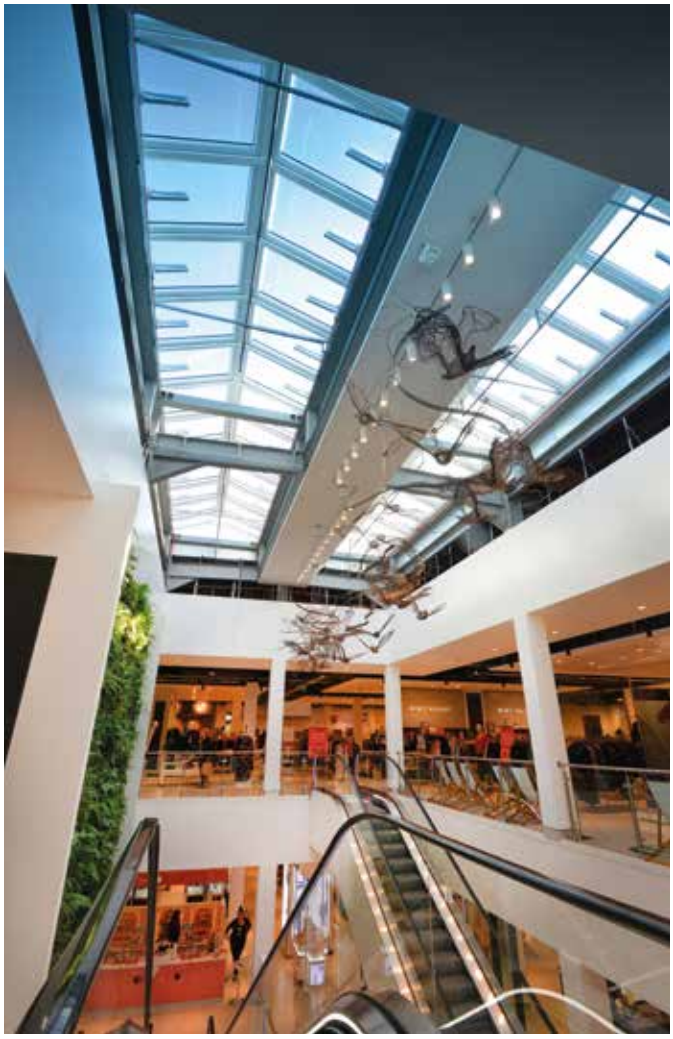
Bauder Modular Link Glazing is:

- Lightweight
- Impact resistant
- Thermally efficient
- Robust
- Easy to handle
- Fully assembled in the factory
- Available in opal, bronze and grey
- Available with a comprehensive guarantee

Bauder Modular Link Glazing can be installed at a minimum 10° pitch and can be used for northlights, patent glazing replacement and monopitch rooflights and on ridges and gutters. This versatility provides designers with new options to introduce natural light into building projects.

Structural Rooflights

Bespoke structural glazing installations allow designers and architects complete freedom when incorporating natural daylight to a roofing project.



The Bauder range of structural glazing solutions offers an extensive choice of high quality material including polycarbonate, glass and the latest Nanogel® technology. Alongside this we incorporate in all our offerings;

- Cascade water management system
- Custom engineered connections
- Bespoke closing functionality
- Custom flashings
- Comprehensive warranty

There are a number of Bauder Structural Rooflights that can be utilised to fulfil the requirements of a roof refurbishment or enhance the design of a new build project.

- Mono-pitched
- Pitched polygon
- Self-supporting pyramid
- Ridgelight
- Hipped-end
- Low-profiled barrel vault

ROOFLIGHTS
Fire protection glazing

AOVs
AOVs improve the conditions inside a building in the event of a fire by allowing hot air and smoke out, and allowing cool air to flow in.

This system is particularly effective in protecting occupants attempting to evacuate or awaiting rescue, as well as reducing the risk for firefighters.

AOV's form part of a building's fire protection system and will require the services of a specialist M&E contractor for correct operation. It is important to remember that an AOV is not an access hatch. It is a dedicated outlet for the removal of smoke from a building.

AOVs are particularly recommended in areas with low or no other ventilation outlets and high traffic routes such as single stair apartment blocks; vertical smoke shafts; common escape routes and enclosed car parks.

Bauder AOVs are:

- CE certified, tested to EN 12101-2.
- Glazed in glass, polycarbonate or a solid metal lid.
- Available in thermally broken insulated metal to achieve a U Value as low as 1.0 W/m²k.
- An uninsulated version suitable for unheated spaces, such as smoke shafts, is available.
- 140° opening.
- Can be powder coated to any RAL colour.

INSULATED RAINWATER OUTLETS

Maintaining thermal continuity at drainage points

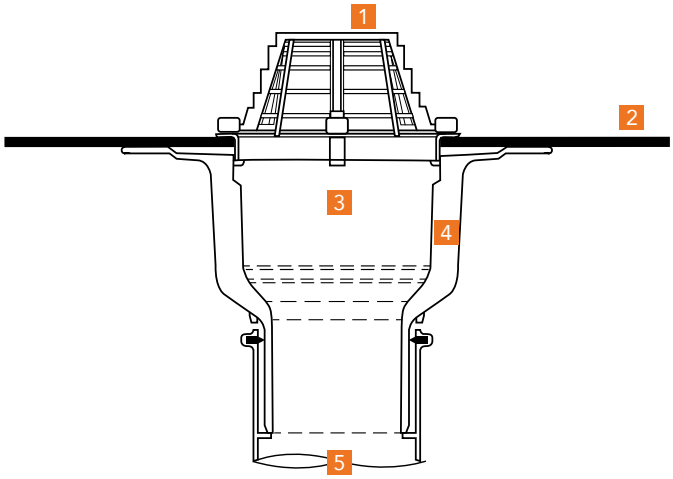
Bauder Insualted Rainwater Outlets

Combining tradition and innovation has made our Bauder Insulated Outlets offer a solution to the problem of maintaining thermal continuity at drainage points.

Ideal for warm, cold and inverted roof construction. The BRE Certified high thermal value of the rigid foam body prevents condensation from forming on the underside of the outlet body.

Designed for use when connecting to conventional gravity drainage systems, Bauder Insulated Outlets offer excellent flow rate performance. Our range incorporates products suitable for both new build and refurbishment roof situations.

When specified within Bauder waterproofing systems as an integrated component, these products are included within our Bauder System Guarantee.



1. Polyamide grille
2. Bituminous connection membrane
3. Integral sump bowl and spigot
4. Polyurethane rigid foam body
5. Spigot connection

Key Characteristics

- High insulation value of the outlet reduces heat loss – BRE Certified.
- UV/IR radiation resistant
- Shock and impact proof
- Robust and Durable
- Low noise drainage
- High drainage capacity
- Installation is fast, simple and very secure – utilising a thermally insulated housing unit.
- Allows plumbing connection at vapour barrier stage, thus providing initial weather proofing and drainage of the roof, whilst internal work commences.
- The design of the polyamide domical leaf grille ensures a free flow of water, whilst preventing leaves and debris from entering the drainage system.

One of the benefits of using a two part outlet is that the first section, the outlet bowl can be installed to the deck, allowing the vapour barrier to be installed and the internal pipework connected. This provides waterproof integrity and allows internal work to commence.

Once the insulation is installed, the extension unit housing and extension unit can be fitted.

A special sealing ring inserted into the outlet bowl ensures total waterproof integrity with the extension unit spigot.

The underlayer membrane is installed and torch welded onto the extension unit's integral SBS bitumen membrane connection flange, followed by the installation of the capping sheet, ensuring complete security.

Once the insulation is installed, the second section, the extension piece can be fitted through the extension unit housing (and packer if required), and then the waterproofing can be installed. This avoids the need for isolation detailing around the outlet and assists with overall 'air tightness'.

OUTLETS – Bitumen Membrane Systems

Bauder Bitumen Compact Vertical Outlet DN 100

Supplied in 100mm (internal diameter) to suit 110mm internal pipework. These units have a good flow rate and will suit most deck types, but can also be used where the deck construction is shallower, due to the more compact bowl and shorter spigot. It should be used in conjunction with the extension unit and extension unit housing when specified within warm roof systems.

The outlet is supplied with a tough, but lightweight, polyamide domical leaf grille that permits free flow of water, whilst preventing leaf litter or other debris from entering the outlet. This push fit grille is easily removed to allow for maintenance. The domical leaf grille is supplied with the outlet and is used for the extension unit in warm roof constructions.

Bauder Bitumen Compact Extension Unit

The Bitumen Compact Extension Unit is available in spigot length 60mm-220mm to accommodate differing insulation thickness specified. These are always incorporated within warm roof system construction to maintain thermal integrity.

Bauder Extension Unit Housing

High density PIR housing to ensure correct seating of the extension unit. Can be used in conjunction with Bauder flatboard insulation to create the correct sump depth or ensure the level position of the extension unit to the waterproofing system.

Bauder Bitumen Vertical Outlet DN 70 & 150

Available in both 70mm and 150mm (internal diameter) to suit 75mm and 160mm internal pipework respectively. These outlets have excellent flow rates and will suit most deck types, but are particularly suited for deeper deck constructions such as concrete (particularly within green roof systems), due to the deeper bowl and spigot length. The 70mm outlet can be used in conjunction with a Bauder Blue Roof. The outlet should be used in conjunction with the extension unit and extension unit housing when specified within warm roof systems.

The outlet is supplied with a tough, but lightweight, polyamide domical leaf grille that permits free flow of water, whilst preventing leaf litter or other debris from entering the outlet. This push fit grille is easily removed to allow for maintenance. The domical leaf grille is supplied with the outlet and is used for the extension unit in warm roof constructions.

Bauder Bitumen Extension Unit

The Extension Unit is available in spigot length 60mm-220mm to accommodate differing insulation thickness specified. These are always incorporated within warm roof system construction to maintain thermal integrity.

Bauder Extension Unit Housing

High density PIR housing to ensure correct seating of the extension unit. Can be used in conjunction with Bauder flatboard insulation to create the correct sump depth or ensure the level position of the extension unit to the waterproofing system.

OUTLETS – Bitumen Membrane Systems

Bauder Bitumen Refurbishment Warm Roof Outlet DN 63 & 90

Available in both 63mm and 90mm spigot sizes. The 63mm spigot, when fitted with the special 'push fit' seal, will accommodate internal diameters ranging from 68mm–86mm and is designed to fit inside existing 75 mm pipework or within existing 75mm (3") outlets.

The 90mm spigot when fitted with the special 'push fit' seal, will accommodate internal diameters ranging from 98mm-107mm and is designed to fit inside existing 100 mm pipework or within existing 100mm (4") outlets.

These outlets are designed to be used within a replacement roof system incorporating insulation (warm roof) when overlaying existing waterproofing, either connecting to existing pipework or through existing outlets where these cannot be removed and the nominal bore is suitable.

When retaining the existing outlet, it is important that the waterproof seal on the end of the outlet spigot of the Bauder Refurbishment Warm Roof Outlet passes beyond the existing outlet and seals to the pipework below it. The length of spigot required to achieve this should be determined and then the spigot cut to the required length.

Bauder Refurbishment Warm Roof Outlet Housing Unit 63 & 90

High density PIR housing to ensure correct seating of the Warm Roof refurbishment outlet.

Can be used in conjunction with Bauder flatboard insulation to create the correct sump depth or ensure the level position of the outlet to the waterproofing system.

OUTLETS – Bitumen Membrane Systems

DN 95

DN 125

Bauder Bitumen Refurbishment Outlet DN 95 & 125

Available in both 95mm and 125mm spigot sizes. 95mm outlet: There are two flexible seals supplied with the outlet. The smaller seal (lip seal) to fit pipework 100-110mm and the larger seal (profiled seal) to fit pipework 107-140mm. There is no reason to use both seals, so discard the seal that is not required.

125mm outlet: There are two flexible seals supplied with the outlet. The smaller seal (lip seal) to fit pipework 134-144mm and the larger seal (profiled seal) to fit pipework 140-168mm. There is no reason to use both seals, so discard the seal that is not required.

When retaining the existing outlet, it is important that the waterproof seal on the end of the outlet spigot of the Bauder Refurbishment Outlet passes beyond the existing outlet and seals to the pipework below it. The length of spigot required to achieve this should be determined and then the spigot cut to the required length.

Connection to Pipework

Our vertical spigot outlets are suitable for connection to:

- Socketed and socket-less cast iron pipework to BS416:1973 and EN 887. Please note that socketed pipework will require cold caulking or the use of PVC to cast iron adapters.
- HDPE pipes with appropriate proprietary coupling.
- PVC 'O' ring socketed soil grade pipework to BS 4514:1983. Connection can be made directly or using shrink adapters where required.

OUTLETS – Bitumen Membrane Systems

Bauder Bitumen Parapet Outlet DN 100

Suitable as a secure through chute to external hopper drainage when used in conjunction with the 110mm connection pipe (available from Bauder), as an alternative to traditional lead chute fabrication.

Incorporating an angled base facing for ease of installation.

A flexible vapour barrier seal component is used as part of the waterproofing installation when a warm roof design is specified, where insulation is incorporated on the vertical abutment. A connection pipe is used.

Vertical Insulation 80mm plus: Formation of a timber frame is unnecessary. However, a flexible vapour barrier component must be used to seal the pipe entry where it passes through the parapet wall or kerb.

The reason for the different method of detailing is due to the need to accommodate the outlet spigot and connecting pipe socket.

Parapet Connection Pipe DN 100

A connection pipe is used for connection to the parapet outlet.

OUTLET SELECTOR – Bitumen Membranes

Product Selector	Bitumen Compact Vertical Outlet DN 100	Bitumen Vertical Outlet DN 70 & 150	Bitumen Warm Roof Refurbishment Outlet DN 63 & 90	Bitumen Refurbishment Outlet DN 95 & 125	Bitumen Parapet Outlet DN 100
Bitumen connection flange	■	■	■	■	■
Insulated Extension Unit available	■	■			
Extension housing unit available	■	■	■		
Suitable for internal drainage	■	■	■	■	
Suitable for external drainage					■
Suitable for new build	■	■			■
Suitable as a replacement outlet	■	■			
Suitable for retrofit installation			■	■	
Suitable for shallow deck construction	■		■	■	
Suitable for deeper deck construction		■	■		
Suitable for long leg leaf guard	■	■			
Suitable for short leg leaf guard			■		

Outlet Flow Rate Performance

Drainage Flow Rate	
Compact Vertical Outlet DN 100	6.1 litres/sec
Bitumen Vertical Outlet DN 70	7.1 litres/sec
Bitumen Vertical Outlet DN 150	7.2 litres/sec
Parapet Outlet DN 100	0.7 litres/sec
Warm Roof Refurbishment Outlet DN 63	6.1 litres/sec
Warm Roof Refurbishment Outlet DN 90	5.7 litres/sec
Cold Roof Refurbishment Outlet DN 95	4.0 litres/sec
Cold Roof Refurbishment Outlet DN 125	6.0 litres/sec

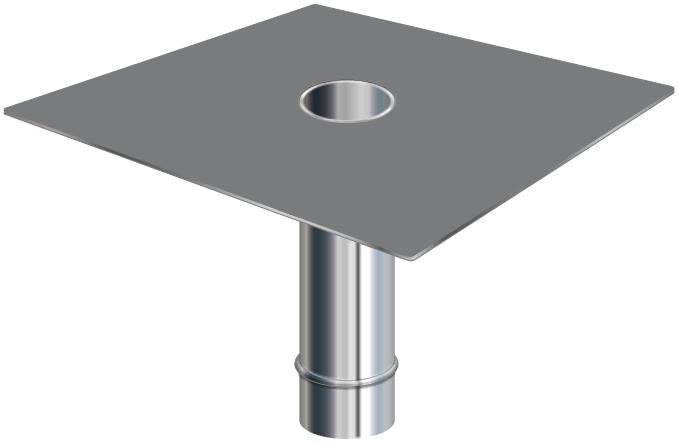
*Above figures based upon a 35mm head of water pressure – according to BS EN 12056-3:2000.
The shape of the bowl affects the flow rate performance; however the flow rate increases as the head of water increases.
For project specific drainage advice and/or calculations please contact your local area technical manager.

OUTLETS - PVC Single Ply Systems

Bauder outlets are sized to show the diameter of the spigot they will connect into. For information on non-standard sizes and refurbishment applications, please contact Bauder Technical Department.

Bauder Thermofol Rigid PVC Rainwater Outlets

A rigid PVC rainwater outlet enabling Thermofol membrane to be welded to the flange plate. UV stable throughout. The unbacked Thermofol membrane should be heat welded up to the aperture to ensure colour consistency on the roof.



Bauder Thermofol Stainless Steel Rainwater Outlets

A high performance Stainless Steel outlet with factory installed Thermofol membrane flange. Supplied with an O-ring and a wire ball leaf grill.

Bauder Thermofol Rigid PVC Parapet Outlet

A 110mm rigid PVC parapet rainwater outlet enabling Thermofol membrane to be welded to the flange plate. UV stable throughout. The unbacked Thermofol membrane should be heat welded up to the aperture to ensure colour consistency on the roof.

Bauder Thermofol Emergency Overflow Outlet

An extruded PVC emergency overflow outlet compatible with Thermofol membrane. 50mm diameter through wall overflow outlet manufactured in light grey colour.

Bauder outlets are sized to show the diameter of the spigot they will connect into. For information on non-standard sizes and refurbishment applications, please contact Bauder Technical Department.

Bauder Thermoplan Rigid FPO Rainwater Outlets

A rigid FPO rainwater outlet enabling Thermoplan membrane to be welded to the flange plate. UV stable throughout. The unbacked Thermoplan membrane should be heat welded up to the aperture to ensure colour consistency on the roof.

Bauder Thermoplan Rigid FPO Parapet Outlet

A 90mm diameter rigid FPO parapet rainwater outlet enabling Thermoplan membrane to be welded to the flange plate. UV stable throughout. The unbacked Thermoplan membrane should be heat welded up to the aperture to ensure colour consistency on the roof.

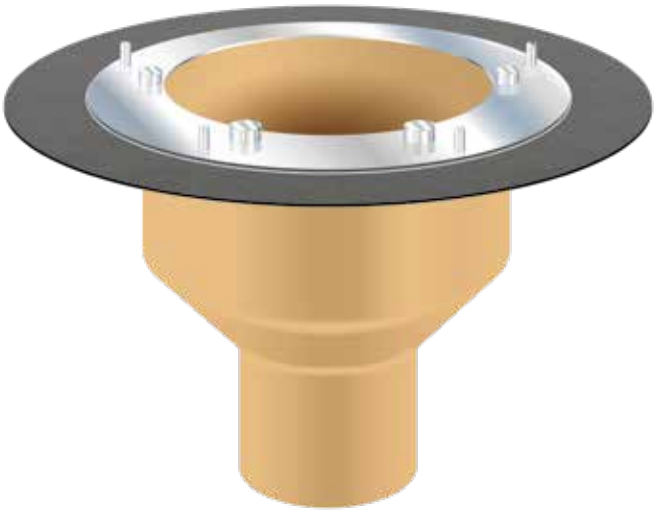
Bauder Thermoplan Emergency Overflow Outlet

An extruded FPO emergency overflow outlet compatible with Thermoplan membrane.63mm diameter through wall overflow outlet manufactured in pearl white colour.

Bauder Leaf Guard for Rigid PVC & FPO Vertical Outlets

An extruded PVC emergency overflow outlet compatible with Thermofol membrane. 50mm diameter through wall overflow outlet manufactured in light grey colour.

OUTLETS - Hot Melt System



Bauder Hot Melt Compact – Vertical Outlet DN70

A thermally insulated rainwater outlet with vertical spigot designed for use when connecting to conventional gravity drainage systems, giving thermal continuity and excellent flow rate performance.

The integrated screw down clamping ring and neoprene gasket ensures a mechanical hold between the waterproofing system and the outlet.

A tough, but lightweight, polyamide domical leaf grille permits free flow of water, whilst preventing leaf litter or other debris from entering the outlet. This push fit grille is easily removed to allow for maintenance.

BLUE ROOF FLOW RESTRICTORS

Bauder Bitumen Blue Roof Flow Restrictor

The Bauder Bitumen Blue Roof Flow Restrictor is designed to be used in conjunction with a standard Bauder Bitumen Blue Roof Vertical Outlet DN70. The Bauder Blue Roof Bitumen Flow Restrictor is comprised of four parts; Baseplate, overflow pipe, Baseplate inner and Baseplate outer seal. The polyamide Baseplate fits within the 70mm vertical outlet, with the EPDM outer seal creating a watertight fit. The HDPE Overflow slots into the central hole of the Baseplate with an inner EPDM seal preventing any leaks.

Baseplate has a number (1-12) of 10mm restrictive flow holes bespoke to the project.

Bauder Hot Melt Blue Roof Flow Restrictor

The Bauder Hot Melt Blue Roof Flow Restrictor is designed to be used in conjunction with a Bauder Hot Melt Compact Vertical Outlet DN70. The Bauder Hot Melt Blue Roof Flow Restrictor is comprised of four parts; Baseplate, Overflow pipe, inner and outer seal. The polyamide Baseplate fits within the 70mm vertical outlet, with the EPDM outer seal creating a watertight fit. The HDPE Overflow slots into the central hole of the Baseplate with an inner EPDM seal preventing any leaks.

The Baseplate has a number (1-12) of 10mm restrictive flow holes bespoke to the project.

PRIMERS

Bauder Quick Dry Bitumen Primer

A bitumen based primer which has been specially formulated to increase the bond strength of torch-applied bitumen or hot melt membranes to the wide range of substrates that can be found on a typical flat roof.

Bauder SA Primer

A roller applied synthetic rubber based primer, developed especially to increase the bond strength of self-adhesive bitumen membranes to a wide range of substrates.

Bauder Multi-Purpose Primer/Activator

This synthetic rubber based spray applied primer has been developed to provide the necessary preparation of substrates prior to installation of both self-adhesive and torch-applied bitumen membranes.

Bauder Polymer Primer

A synthetic rubber based primer designed specifically to enhance the adhesion of Bauder Hot Melt Waterproofing to difficult surfaces and speed up the total time of installation due to its quick drying time.

ADHESIVES

SINGLE PLY MEMBRANE ADHESIVES

Thermofol Contact Adhesive - Drum

Suitable for the adhesion of non fleece backed PVC membranes onto a number of different substrates. It is NOT suitable for use with EPS, XPS and un-faced PIR insulation boards.

Fleece-Backed Membrane Adhesive - Drum

For bonding both Thermofol PVC fleece backed membranes and Thermoplan FPO Fleece Backed Membranes to a variety of approved substrates.

Spray Contact Adhesive - Canister

Spray applied adhesive for installing Thermofol Fleece-Backed membrane and all Thermoplan FPO membranes to a variety of substrates.

PU Fleeced-Backed Membrane Adhesive - Canister

Spray applied adhesive for installing Fleece-Backed membranes to a variety of substrates.

INSULATION ADHESIVES

Bauder PU Insulation Adhesive - Tin

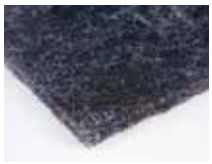
Solvent-free, one component, moisture curing, foaming insulation adhesive for securely bonding insulation boards to various vapour control layers and roof substrates.

Bauder PU Insulation Adhesive - Twin Cartridge

Solvent-free, two component, chemically curing insulation adhesive for securely bonding insulation boards to various vapour control layers and roof substrates.

GREEN ROOF COMPONENTS

SEPARATION, PROTECTION AND FILTRATION LAYERS

	THICKNESS (NOMINAL)	COVERAGE	WEIGHT (NOMINAL)	SATURATED WEIGHT	ROLL SIZE
Foil Separation Layer					
	0.2mm	200m² per roll	190 g/m²	190 g/m²	4x50m (folded to 1m width)
FSM600 Protection Mat					
	4mm	60m²	600 g/m²	600 g/m²	2x30m
FSM1100 Protection Mat					
	8mm	30m²	1.1 kg/m²	1.1 kg/m²	2x15m
Pro-Mat Protection Mat					
	6mm	12.5m²	4.3 kg/m²	4.3 kg/m²	1.25x10m
Eco-Mat Protection Fleece					
	6mm	60m²	600 g/m²	3.8 g/m²	2x30m
Filter Fleece					
	1 mm	100/200m²	125 g/m²	125 g/m²	1x100m 2x100m

DRAINAGE AND WATER RETENTION LAYERS

	COMPRESSIVE STRENGTH	THICKNESS (NOMINAL)	COVERAGE	WEIGHT (NOMINAL)	SATURATED WEIGHT	WATER STORAGE CAPACITY	SIZE
SDF Mat							
	20 kN/m²	20mm	50m²	0.6kg/m²	0.6kg/m²	0	1x50m
DSE20							
	110 kN/m² when unfilled ≥ 1000 kN/m² when filled	20mm	2.5m²	1.2kg/m²	8.6kg/m² when laid flat. 19.7kg/m² when filled with Bauder Mineral Drain.	7.4 litres/m²	1.06x2.36m
DSE40							
	80 kN/m². when unfilled ≥ 1000 kN/m² when filled	40mm	2.1m²	1.8kg/m²	15.3 kg/m² 26.5 kg/m² when filled with Bauder mineral drain	13.5 litres/m² when flat Approx 3-4 litres/m² when filled with Bauder Mineral Drain	1.04x2.03m
DSE60							
	100 kN/m² when unfilled. ≥ 1000 kN/m² when filled	60 mm	2m²	2.0kg/m²	40kg/m² when filled with Bauder saturated mineral drain	10-12 litres/m² when filled with Mineral Drain	1x2m
Versicell 20							
	≥1,000 kN/m²	20mm	0.25m²	2kg/m²	2kg/m²	0	500x500mm
Reservoir Board							
	35 kN/m²	75mm	1m²	0.95kg/m²	0.95kg/m²	21.5 litres/m²	0.780x1.283 m boards
		50mm		0.65kg/m²	0.65kg/m²	10 litres/m²	
PLT10							
	400 kN/m²	10mm	25m²	0.75kg/m²	0.75kg/m²	0	2x12.5m
Attenuation Cell 100						**WATER HOLDING CAPACITY**	
	≥400 kN/m²	100mm	0.36m²	2.9kg/m²	2.9kg/m²	95 litres/m² (95% void space)	0.6 x 0.6m

GREEN ROOF COMPONENTS

SUBSTRATES

	SUPPLY FORM	COVERAGE	SATURATED WEIGHT	WATER STORAGE CAPACITY
Mineral Drain				
	Big bags or sacks	N/A	1500 kg/m³	N/A
Extensive Substrate				
	Silo, tipper, big bags or sacks	Dependent on depth required for specification	1200 kg/m³	35% Vol
Biodiverse Substrate				
	Silo, tipper, big bags or sacks	Dependent on depth required for specification	1200 kg/m³	35% Vol
Intensive Substrate				
	Tipper, big bags or sacks	Dependent on depth required for specification	1250 kg/m³	45% Vol
Seed Bed Substrate				
	Tipper, big bags or sacks	Dependent on depth required for specification	1250 kg/m³	45% Vol

VEGETATION

	SUPPLY FORM	THICKNESS (NOMINAL)	COVERAGE	SATURATED WEIGHT	SIZE
XF301 Sedum System					
	Roll	28mm	2m² as standard	44 kg/m²	2x1m (non standard lengths up to 10m, cut in increments of 1m)
WB Native Wildflower Blanket					
	Roll	30 - 35mm	2m²	≤ 30 kg/m²	1x2m
SB Substrate Sedum Mat					
	Roll	20mm	2.4m²	≤ 24 kg/m²	1x2.4m
Plug Plants					
	Maximum of 60 trays per pallet	N/A	Refer to specification	Approx 5 kg per tray	4cm sedum plugs. 104 per tray 5-6cm perennial plugs. 54 per tray

Bauder Flora Seed Mixes

- These mixes can be used as a mix on there own, or combined with Bauder British native plugs or other mixes to give a wider vegetation sellection.
- All the mixes are sown at the same rate (100g/m²) and applied in the same way.
- Bauder are member of Flora Locale. All the wildflower eed comes from Flora Locale certified collectors allowing us to use their kit mark.

- The mixes are also RHS approved Perfect for Pollonaters allowing the 'Bee' logo to be displayed.

- The installation is covered in the Bauder Green Roof Installation guide.

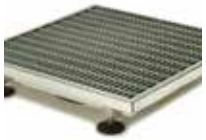
NAME	LOCATION	DESCRIPTION	NUMBER OF SPECIES	WILD FLOWERS	ANNUALS	SEDGE & GRASSES	SEDUM	COVERAGE	RHS PERFECT FOR POLLONATORS	LAVAL FOOD
Bauder Flora 3	General (BioSOLAR)	A broad mix of low growing and some shade tollerant species ideal, for most roof enviroment. It is also the mix Bauder recommend for BioSOLAR installations	49	31 (65%)	8 (20%)	8 (15%)	2	100g per m²	35	12
Bauder Flora 5	Urban	A mix of species ideal for city environments. The plants chosen are able to absorb polution and CO2 and give a suitable environment for insects and invertibates	38	28 (80%)	6 (10%)	2 (10%)	2	100g per m²	34	9
Bauder Flora 7	Chalk Grassland	The mix contains many of the key wild flower species found on the Downs and other Chalk Grassland.	28	23 (85%)	None	5 (15%)	0	100g per m²	22	11
Bauder Flora 9	Coastal	The species mix reflects the harsh evironment found around Britains coastline, it contains species hat are able to copy with higher winds and a more saline environment.	24	14 (75%)	3 (10%)	4 (15%)	3	100g per m²	20	8
Bauder Flora 11	Scottish	This mix contains a range common, Scottish green roof species. All the seeds are certified to be of Scottish providence. It enable Scottish sites to have truly native vegetation	33	26 (75%)	3 (15%)	2 (10%)	2	100g per m²	29	6

GREEN ROOF COMPONENTS

ACCESSORIES

	SUPPLY FORM	DIMENSIONS
AL40 Sedum Blanket Edge Trim for XF301		
 Perforated edge/drainage trim for Bauder XF301 sedum system	10 lengths per box including connectors	40mm (H) x 73mm (W) x 2000mm (L)
AL80/100		
 Perforated edge/drainage trim for use with sedum blankets or substrate based extensive green roof system	Individual lengths ordered as required	80mm (H) x 100mm (W) x 2500mm (L)
AL150		
 Connector Perforated edge/drainage trim and connector for substrate base extensive green roof systems	Individual lengths ordered as required	150mm (H) x 146mm (W) x 2500mm (L)
Sedum Blanket Retention Strip		
 Mechanical retention strip supplied with protective plastic cover	24 per box	22mm (H) x 100mm (W) x 800mm (L)
Inspection Chamber ALU250		
 1.5mm perforated aluminium sheet with opening lid. Silver grey RAL 9006	Individual Units	250mm x 250mm height 100mm with support flanges 350mm x 450mm
Height Adaptor for ALU250		
 100mm height adaptor - added as necessary to achieve the desired height. Silver grey RAL 9006	Individual Units	250mm x 250mm height 100mm
Height Adaptor for ALU250		
 50mm height adaptor - added as necessary to achieve the desired height. Silver grey RAL 9006	Individual Units	250mm x 250mm height 50mm

ACCESSORIES

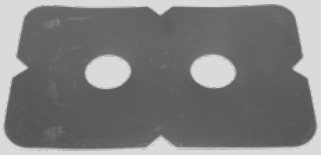
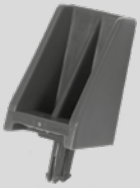
	DIMENSIONS
Linear Drain MR 150/60 (Drain Channel and Grille Plate Only)	
 Stainless steel channel drainage system used around door thresholds and changes in landscape finish.	60mm (H) x 150mm (W) x 1000mm (L)
Linear Drain KH50 Adjustable Support Legs	
 Height adjustable support legs, Supplied as two pairs	Adjustable to 75mm - 120mm
Linear Drain Rainwater Outlet Access Cover	
 Available in two sizes	**GA250** 60 - 90mm (H) x 250mm (W) x 250mm (L)
	GA400 60 - 90mm (H) x 400mm (W) x 400mm (L)
Linear Drain Channel Connection Clip	
 Bauder channel connection clips	Thickness 1mm
Linear Drain Channel Stop End	
 Bauder channel stop end	Thickness 1mm

SOLAR PV

BAUDERSOLAR

BauderSOLAR is a flat roof PV mounting solution for framed solar modules. The mounting units are secured to the roof using a unique membrane-to-membrane welding technique. This installation method means that the roof is not compromised by penetrations for fixings nor is it ballasted, which would add additional weight loading to the roof.

BauderSOLAR is specifically designed to be installed on Bauder bituminous or single ply waterproofing systems and provide a lightweight, low risk and quick to install mounting solution for framed solar modules manufactured by our module partners.

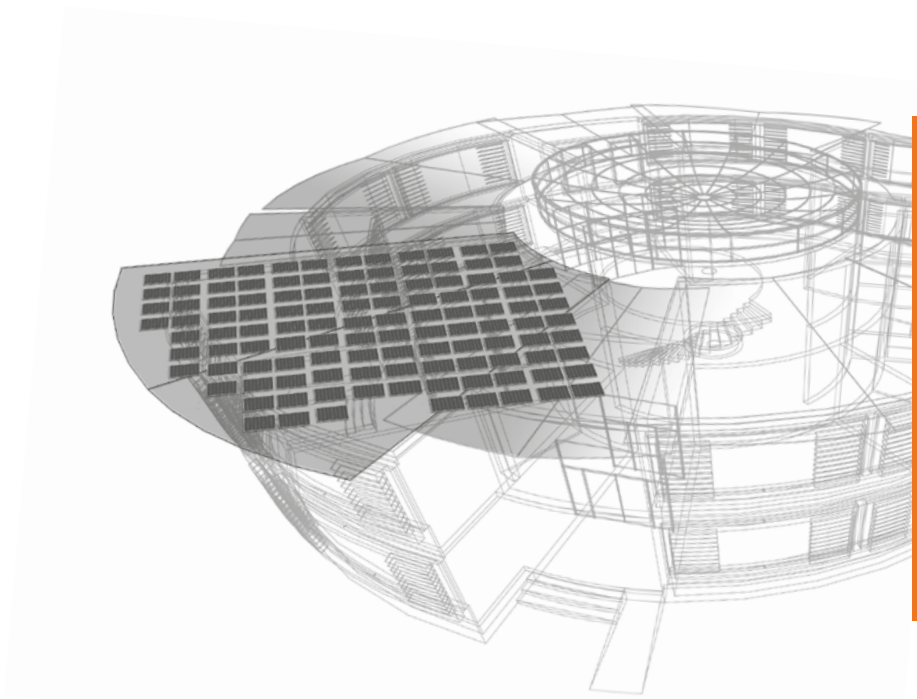
	PRODUCT NAME	QUANTITY	DESCRIPTION
	Main Substructure	1 Pcs.	**Substructure** with integrated **module clamps** (Polypropylene PP)
	Baseplate	Subject to design	**Receivers** for the bayonet twist lock fitting (Polyamide PA6-GF30)
	Welding Sleeve	Subject to design	**Roof mounting** for welding to the roof (Bitumen, PVC or FPO roof membrane)
	Bayonet Cap	2 Pcs.	**Twist lock** for locking to the base plate (Polyamide PA6-GF30)
	Locking Pin	4 Pcs.	**Module securing device** with two snap-in hooks below (Polypropylene PP)

BAUDER BIOSOLAR PV MOUNTING SYSTEM

Bauder BioSOLAR is designed for applications where both a green roof and solar PV solution are required to meet planning and/or BREEAM requirements. The green roof substrate and vegetation provide the ballast mechanism for the entire solution which removes the need for penetrating the waterproofing to secure the units to the roof and maximises the available area for the plants.

Bauder Biosolar should be used in conjunction with our BauderSOLAR Flora 3 seedmix which contains both drought and shade tolerant herb and wildflower species and is suitable for roofs with a fall of up to 3°.

	PRODUCT NAME	DESCRIPTION
	Anchor Board 2m x 1m	Profiled substructure for containing substrate and mounting BioSolar angle bracket.
	Quick fix Angle Bracket 164cm x 5cm x 5cm	Aluminium angle bracket for mounting module rail.
	Modular Carrier Rail 6m x 4.5cm x 4.5cm	Aluminium profiled rail for mounting framed modules.
	Screw M8 x 55A2	55mm fixing screw for Quick-Fix angle bracket. 6mm Hex bit required
	Screw M8 x 20 A2	20mm fixing screw for module rail to angle bracket. TX40 bit required.
	Middle Clamp	Clamp for fixing modules within the row.
	End Clamp	Clamp for fixing modules at the end of a row.
	Sealing Cap	Plastic cap to protect cut ends of module carrier rail.
	Profile Connector	Aluminium profile to connect lengths of module rail over 6m in length.



Get your specification right

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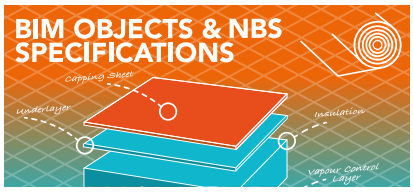

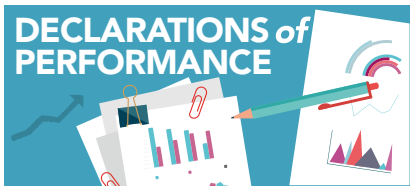

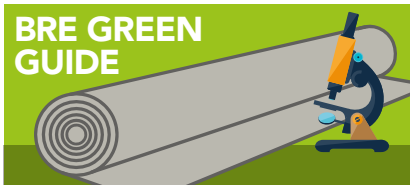

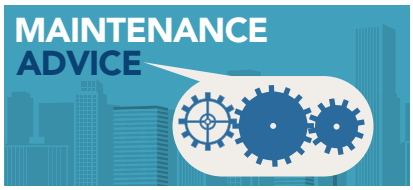

Technical Centre
BIM objects and NBS specifications
CAD detail drawings
System summaries
Certification
Declarations of Performance
Products
Design guides
Brochures
BRE Green Guide
Maintenance advice
Technical CPD seminars

Online technical resources for your flat roof project

At Bauder our service is free to you and covers all elements for a successful project delivery from initial concept or site survey, through to specification package with bespoke drawings and calculations, on site monitoring and final sign-off and handover.

We appreciate that there are times when you need resources to get your project started and the Bauder Online Technical Centre will support you.

Specification Hotline: 0845 271 8800

HOTLINE 0845 271 8800

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Recommendations for use should be verified as to the suitability and compliance with actual requirements, specifications, installation techniques and any applicable laws and regulations.

Disclaimer:
The photographs on pages 124 and 128 are only example images of balconies that Bauder Ltd delivers to clients and it should not be considered that Bauder Ltd delivered these specific projects.

This technical design guide has been carbon captured through the Woodland Trust's Woodland Carbon scheme, creating 40.12m² of new native woodland in the UK. Capturing carbon dioxide for continual benefit to the environment and creating new habitats for wildlife and biodiversity.

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