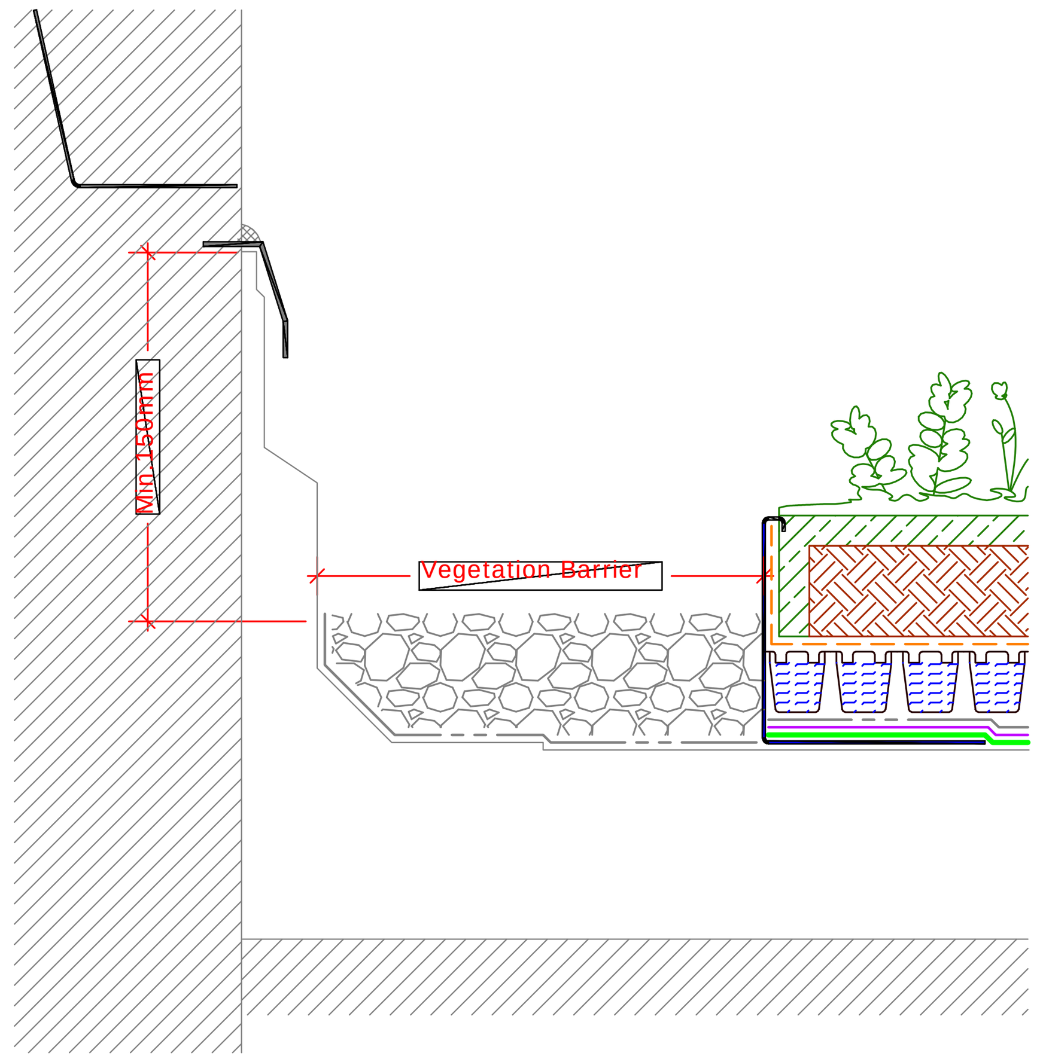
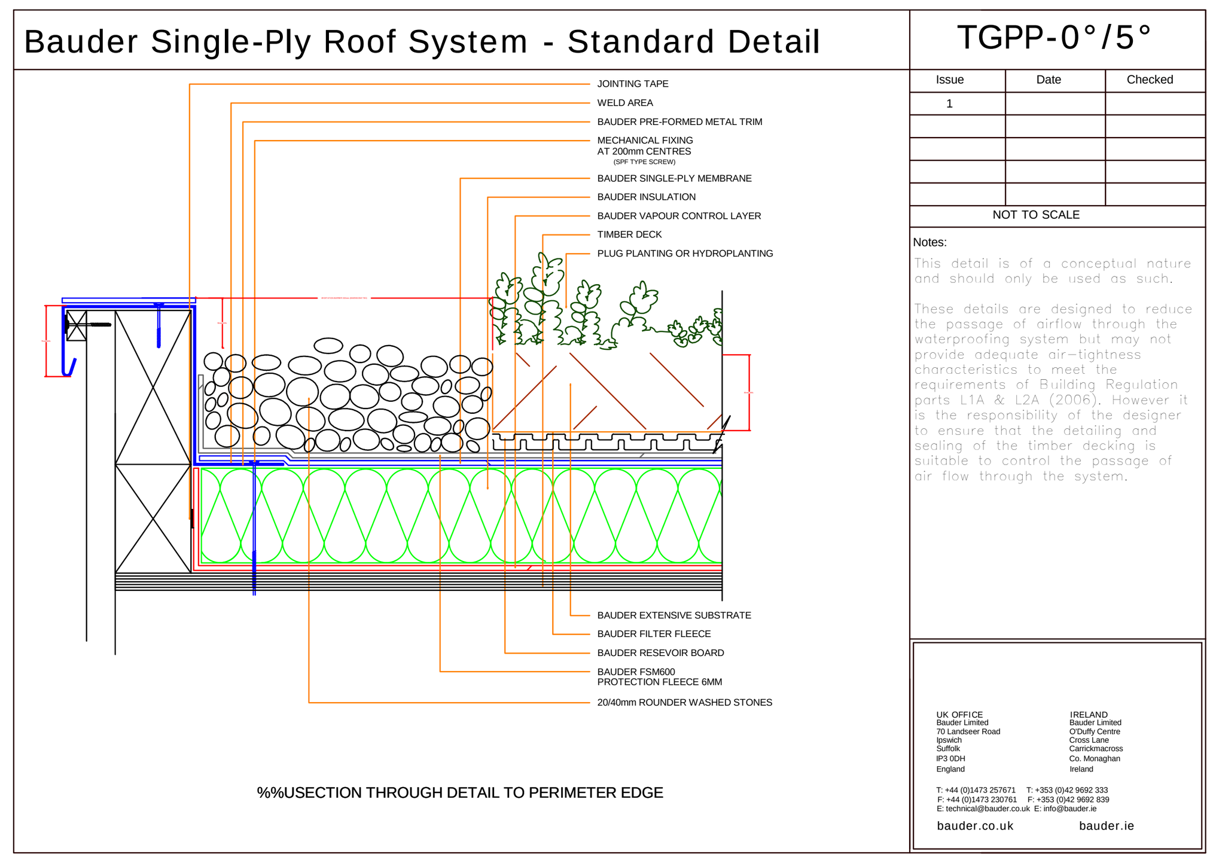
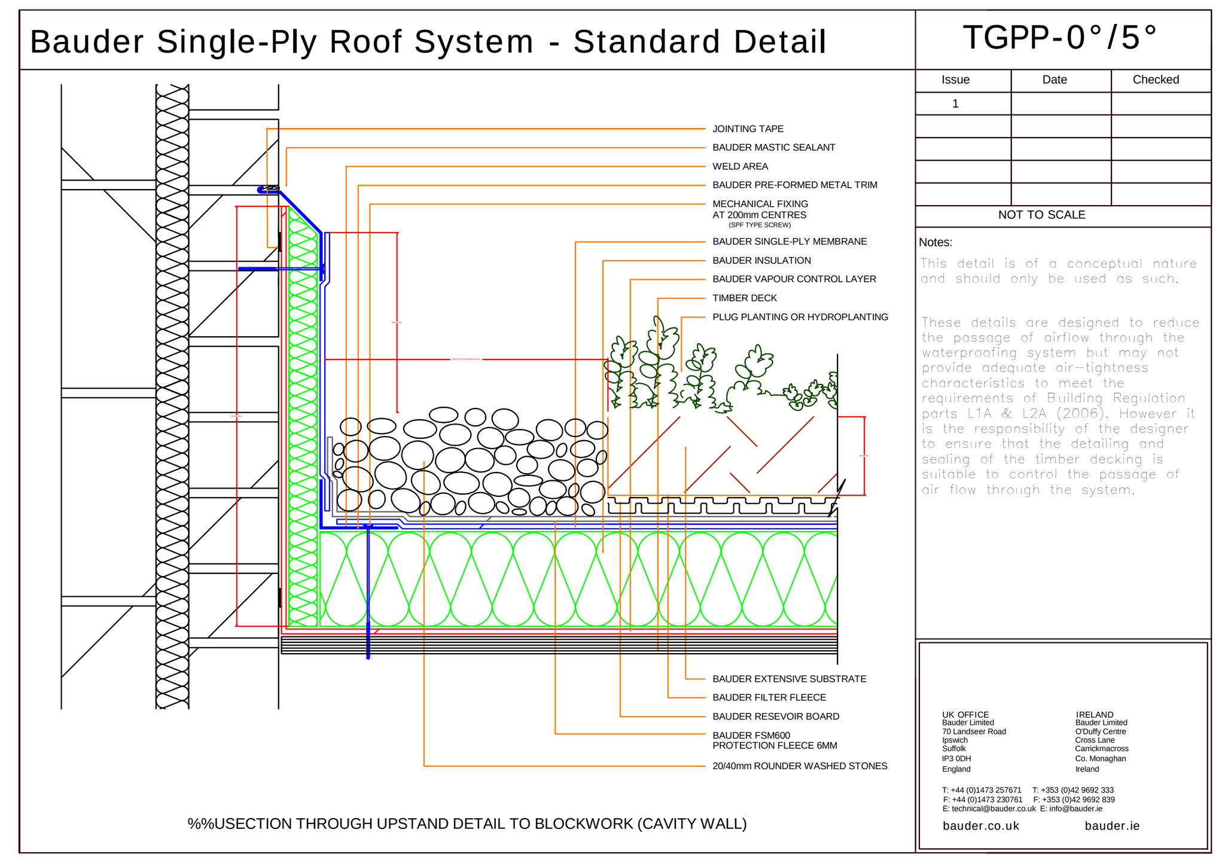
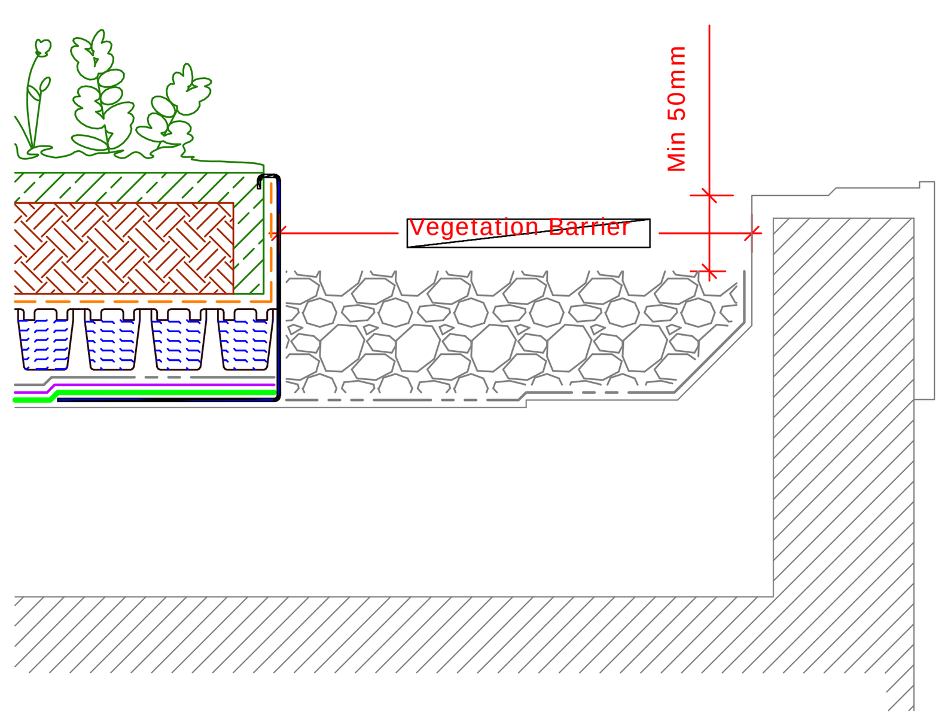


Upstand

(Drg.No: D0901/03-00W_0-4Deg_001-ExtInt_001)

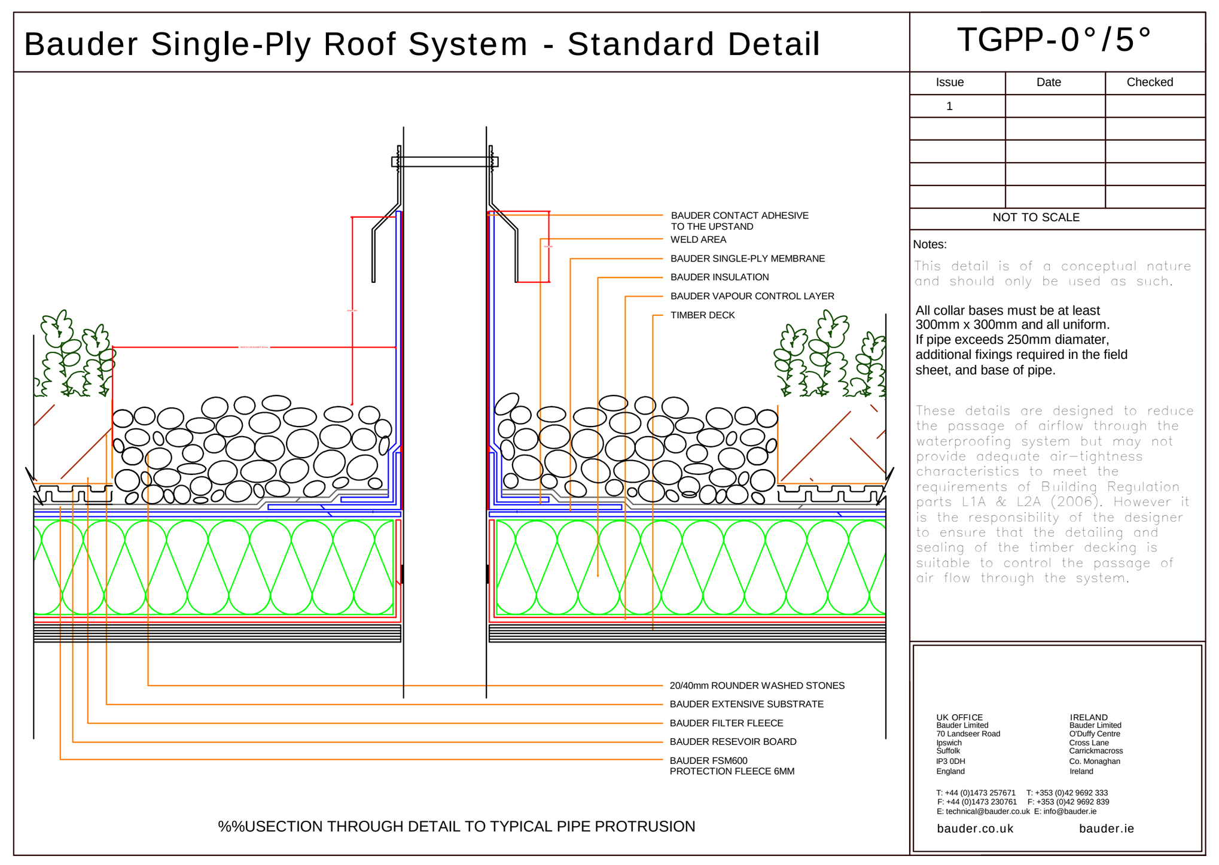


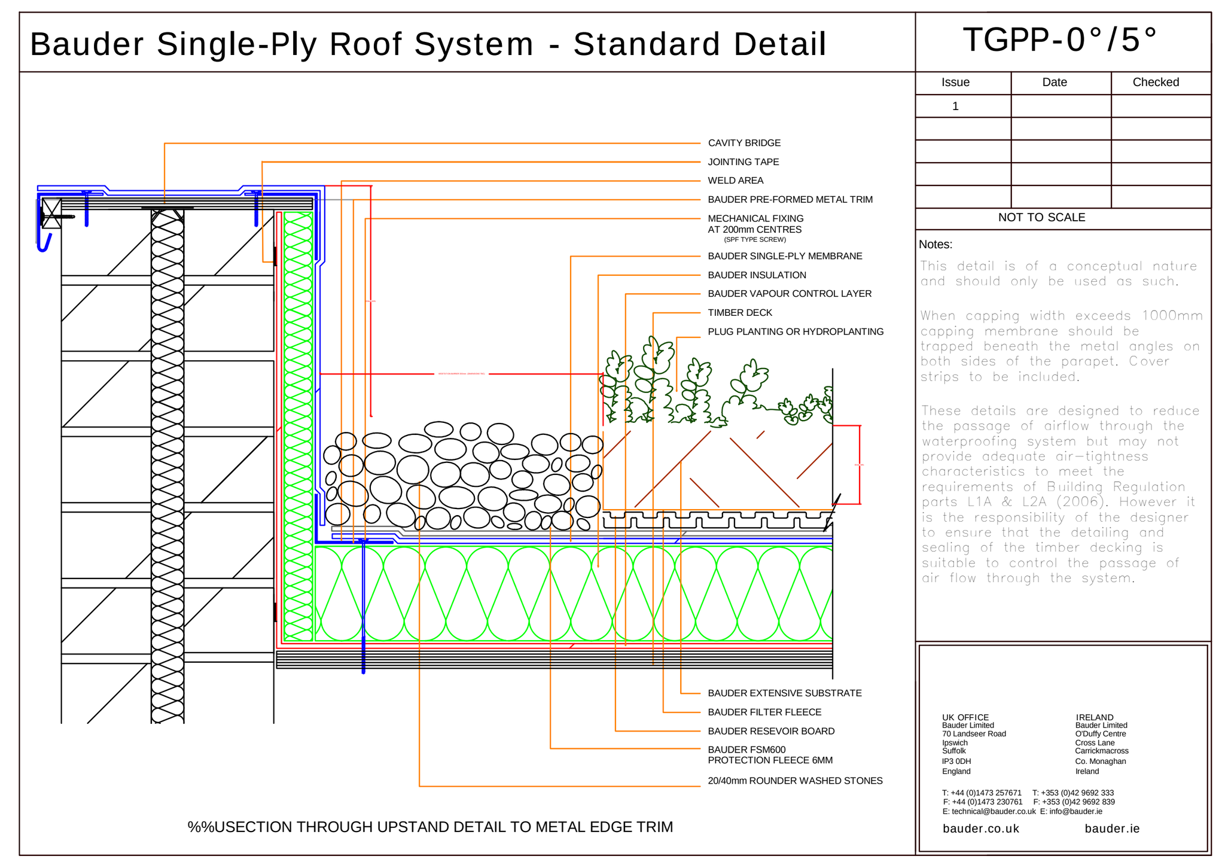


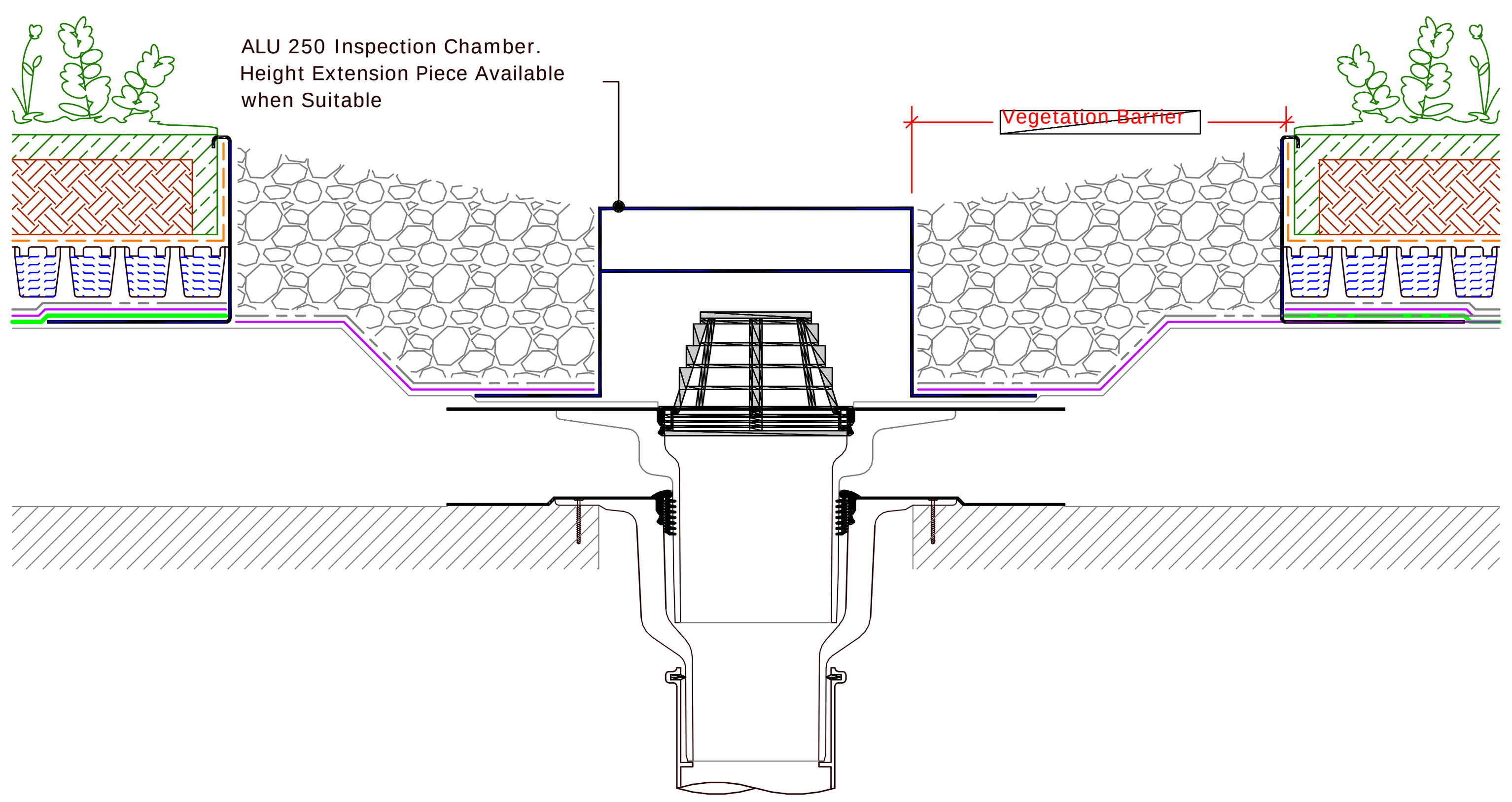


Perimeter Kerb

(Drg.No: D0901/03-00W_0-4Deg_002-ExtInt_001)

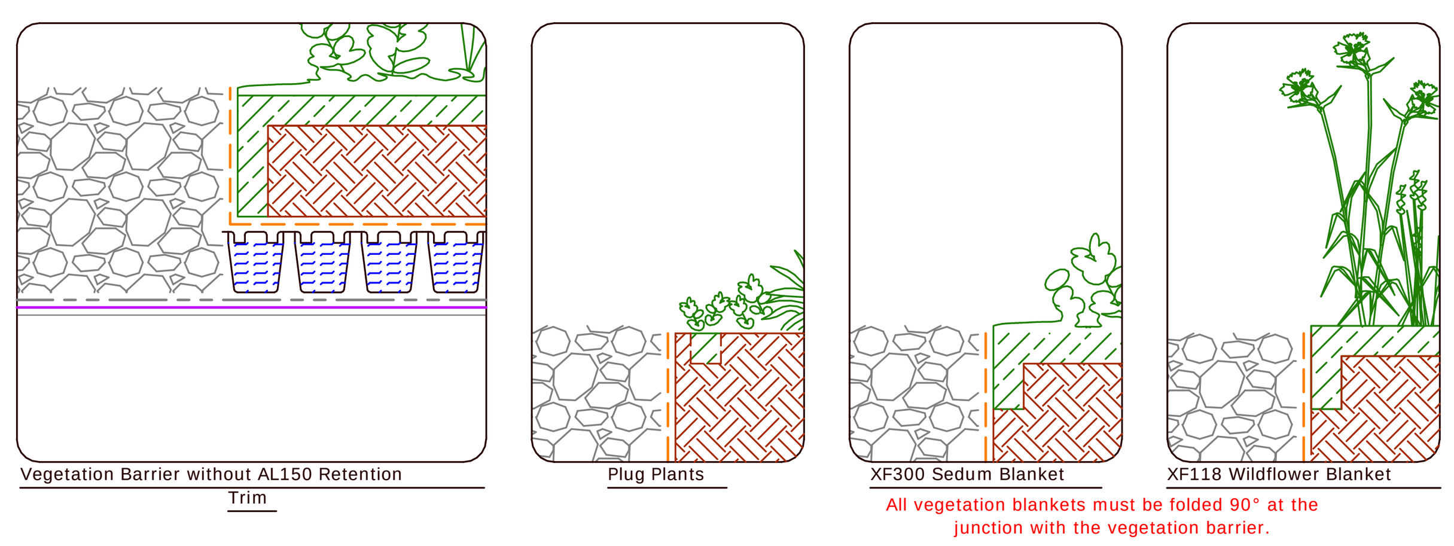




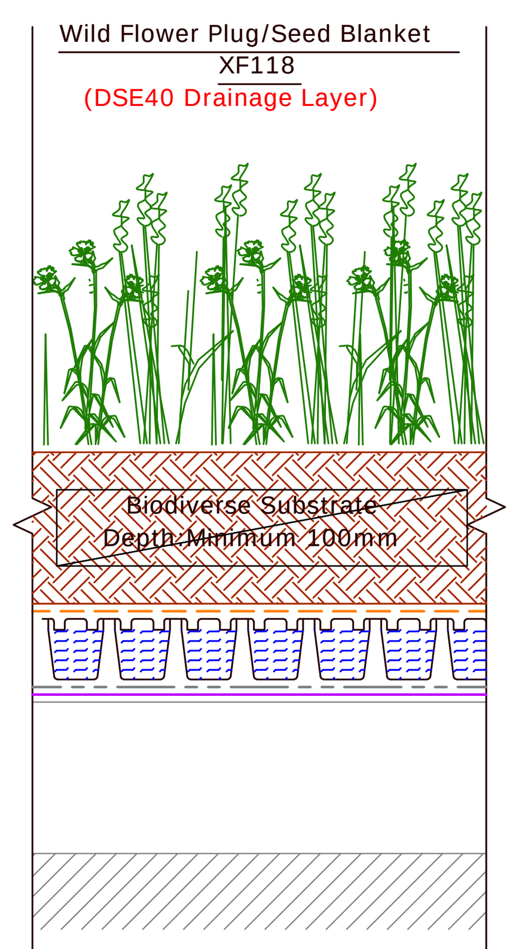


Bauder Outlet - Compact

(Drg.No: D0901/03-00W_0-4Deg_006-ExtInt_001)



Vegetation Termination Detail



Buildup Depth: 169.7mm

Saturated Weight: 181Kg/m²

(Excluding Waterproofing System)

Extensive Soft Landscaping

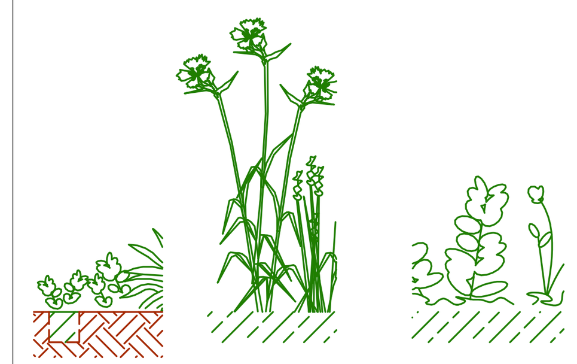
(0-4°)

General notes:

Do not scale from this drawing or the digital data, only figured dimensions are to be used. For Planning refer to linear scale. Check all dimensions on site prior to carrying out any works – advise any discrepancy

Notes/Legends

Key



(Vegetation type is indicative only. Refer to the specification for the correct vegetation to be Used)

- Extensive Substrate
- DES40 Drainage Board (Refer to Specification for Correct Board to be Used)
- Bauder Filter Fleece
- Bauder Protection Mat
- Bauder PE Foil - Not required on Single Ply
- Additional Bauder Capping Sheet / Membrane to Secure the Metal Trim (Refer to Specification for Correct Option)
- Bauder Waterproofing System. (Refer to Specfic Bauder Waterproofing Details Drawings.)
- Deck / Substrate
- Vegetation barrier
  Minimum 80mm deep & 300mm wide.
  Width must be increased to at least 500mm when positioned adjacent to opening rooflights, windows or door openings. In accordance with both gro green and fll roof codes.
- AL150 Edge / Drainage trim. Secured in place by separate pieces of torch applied Bauder Plant-E Capping Sheet.
  For vegetation/substrate build-up depths greater than 150mm, a bespoke perforated edge/drainage trim is required.

IMPORTANT NOTE :
This Drawing Shows Alternative Details. For the Correct Solution to be Used, Refer to the Project Specific Specification.

Rev	Description	Date	Chkd
T3	Stage 3 Tender	27/11/2017	RM

Stamp

CONTRACT ISSUE (04.05.2018)

IMPORTANT NOTES:

1. This detail is suitable for the following Bauder Systems:
   Bauder Total Green Roof System
   Bauderflex Green
   Thermofol and Thermoplan (Excluding Intensive)
2. This Drawing Shows Alternative Options. For the Correct Solution to be Used, Refer to the Project Specific Specification.
3. Do not scale to ascertain dimensions.
4. All dimensions to be checked and verified on site prior to commencement of work.
5. This drawing is to be read in conjunction with the specification and associated drawings.
6. This detail is a guideline only, representing typical detailing conditions and illustrate the correct application of the above Bauder System. It may be necessary to modify this detail to suit specific project design constraints and conditions.
7. Refer to the Bauder Specification for the product description and method of application. For clarity the method of attachment has not been shown.
8. Provision should be made by the installer for mechanically fixing the top

By

BAUDER

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Extensive/Intensive Green Roof System
(0°-4° Slope)

KSRARCHITECTS
KSR Architects LLP
14 Greenland Street
London NW1 0ND
mail@ksrarchitects.com
t: +44 (0)20 7692 5000
www.ksrarchitects.com

Project:

THE WATER HOUSE

Title:

Green Roof Details from Bauder

Date: 07/14/17		Drawn By: Author	Checked: RS
Scale: As Drawing	Sheet: A1	Status: Contract	
Project Ref: 17007	Drawing No: 17007-4-101		Revision: T3

Rev 6 dated 4.10.11

MAINTENANCE PROCEDURE

BAUDER EXTENSIVE GREEN ROOF SYSTEMS

What to Expect From a Bauder Extensive Green Roof System

There is a common misconception that extensive green roofs, and sedum plants in particular, are always green and that from ground level they resemble grass. This is misleading, as they consist mainly of low growing, drought tolerant sedum plants and may also include other species such as Saxifrage, wild flowers, grasses, moss and herbs.

The appearance of the vegetation within an extensive green roof will change year on year, dependent upon fluctuations in the seasonal weather throughout the period. It should also be expected that more grass and moss will be present during the wetter months, because the conditions will be ideal for these species to exist, although they will tend to die off during the dry summer months, as free-draining extensive substrates will not hold sufficient moisture for them to survive.

It is another misconception that extensive green roofs are maintenance free, this is wrong and they are best described as 'low maintenance' rather than 'no maintenance'. As an example, the Xero Flor Sedum Blanket contains little in the way of natural nutrient, so fertiliser must be applied annually to ensure that the plants become resistant to extremes of weather and temperature.

The Bauder XF301 Sedum Blanket contains approximately 8-10 different plant species, some very similar in appearance to others but being more drought tolerant. Not every species incorporated will survive and the more dominant will be expected to prevail over time because they will adapt better to a particular location. Regardless of this, we would anticipate that at least 50% of the species will flourish.

Extensive green roofs that have a deeper substrate growing medium, where the vegetation is provided either by selected plug plant species, vegetation cuttings or seeds, will generally support a broader species mix, which can include wild flowers, grasses and herbs. An increased amount of dead vegetation will arise from this type of species mix following flowering, which will need to be cut back and removed, both to reduce the bio-mass on the roof and to encourage seed drop from the dead flower heads.

In the early spring the first signs of life returning to the vegetation within an extensive green roof are lead by any grasses present, quickly followed by a general "colouring up" of the sedum foliage, with other species following suit shortly thereafter. The growth and flowering of the individual species within the vegetation mix through the late spring and summer will be dependent upon the weather prevailing at the time, which will also determine which species will be most prominent in any given year.

In the winter, sedum plants will appear to shrink back, the leaves will become smaller and turn red/brown in colour as they prepare themselves to withstand the coming winter frosts. This gives extensive vegetation mixes a generally red/brown hue in the late autumn and winter months, which is sometimes mistaken for the plants being distressed, when in fact they are in optimum condition for the time of year.

General Maintenance

General maintenance is normally carried out annually during springtime. However, certain tasks which will be dependent upon the location of the roof, such as the removal of weeds, seedlings and accumulated leaf litter from overhanging trees may also need to be done during the autumn.

The following procedures should be carried out as indicated below, in order to ensure that the roof is maintained in good condition and to protect the validity of the guarantee.

Preliminary Maintenance Procedures:-

- Ensure safe access can be gained to the roof and that relevant Health and Safety procedures are followed when working at roof level. It is advised that the contractor should always seek proof of current maintenance for any man-safe roof access systems prior to proceeding with the work on site.
- Remove all dead vegetation and debris from the roof surface, taking particular care to ensure that all chute outlets, gutters and downpipes are clear. Where the species mix incorporates wild flowers and grasses it is recommended that all dead vegetation is strimmed off and the waste lowered to the ground and carted away.

  Please note! Roofs in the vicinity of taller trees will need more frequent maintenance. We recommend removing dead leaves during the spring and again in the autumn, to ensure that they to not damage the roof vegetation.
- Remove the lids of all Inspection chambers, ensure that all rainwater outlets and downpipes are free from blockages and that water can flow freely away.
- Ensure that any protective metal flashings and termination bars remain securely fixed in place. Advise the client of the need to repair or renew as necessary.
- Examine all mastic sealant and mortar pointing for signs of degradation. Advise the client of the need to repair or renew as necessary.
- Check that all promenade tiles and paving slabs are securely fixed to the roof surface and in good condition.
- Ensure that any new items of plant/equipment on the roof are mounted on suitable isolated slabs and that any fixings used to secure the plant/equipment in place do not penetrate the waterproofing. If in doubt, please contact Bauder for further advice.
- The Building owner should keep a record of all inspections and maintenance carried out on the roof. Any signs of damage or degradation to the waterproofing should be reported to Bauder immediately, in order that arrangements can be made for remedial work to be carried out if necessary. Damage to the landscaping should be reported to the building owner. If this damage includes Bauder components, then Bauder may be contacted for remedial advice.
- Works to adjoining areas - When carrying out maintenance to these areas, care must be taken not to damage either the landscaping or the waterproofing system. If it is considered that either has been affected, then Bauder should be contacted for advice. Any waterproofing damage caused after completion of the original installation may invalidate the guarantee.
- Alterations - Any unauthorised alterations to the waterproofing system will invalidate the guarantee. If such a situation should arise, then Bauder should be contacted so that we may advise on the alteration and how it should be incorporated without affecting the guarantee.

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VEGETATION MAINTENANCE TASKS REQUIRED

The following tasks should be carried out annually: -

1 Plant encroachment.

Any vegetation which has encroached into drainage outlets, walkways and the vegetation barriers (pebbles) should be removed. The vegetation removed may be set aside and used to repair any bare patches if required (see below). If movement/settlement of the pebble vegetation barrier has occurred, additional washed stone pebbles similar to the existing are to be added.

2 Monitor the colour and rate of growth.

The colour and rate of growth of the vegetation should be reviewed to establish the health of the plants. It should be noted that many factors can affect the growth and colour of the vegetation and that plants tend to be greener in wetter, mild conditions (springtime) and where the roof pitch is shallow.

Notes!

- During May, June and July, sedum plants flower and you will see a mixture of colours – predominantly whites, pinks and yellows with some purple. The foliage of some species of sedum, such as Sedum Album "Coral Carpet", blush red naturally during the summer and autumn, and so the vegetation can take on a more 'red/brown appearance. This becomes more noticeable once plants have flowered, leaving remnants of dry brown seed heads. The best visible indication of the health of a plant is if the leaves are fleshy and contain plenty of water.
- When exposed to extreme conditions, sedum plants have a tendency to turn a deep red colour. This is a natural phenomenon and is important to help the plant to acclimatize, ready to survive a cold winter or hot summer. This will usually occur during extreme cold weather as well as periods of prolonged drought, in very exposed locations or when the plants are in distress through lack of nutrient (fertiliser).
- If an irrigation system is fitted, it is best to run it only during prolonged dry weather and for limited periods – see 'Irrigation' information below,
- If sedums are showing signs of distress, but have received regular rainfall, then the most likely problem is a lack of nutrient and a fertiliser should be applied.
- Only a relatively few species of sedum and other plants suitable for an extensive green roof installation will persist in partial and full shade, and they will generally be greener in colour and grow "leggier" in these locations. There will be a significant variance in the growth and colour between the plants growing in full or partial shade and those in full sun and this should be recognised as a feature of the living nature of each individual roof.
- If problems with the vegetation are suspected, Bauder may be contacted for advice and, if necessary, a suggested course of action.

3 Weeding.

With the exception of saplings, which should always be removed, weeds in an extensive green roof should be considered as a problem only of aesthetics. If considered excessive, they can be removed either manually or by using a 'spot weed wipe', ensuring that care is

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taken to follow specific instructions regarding the use of any proprietary products. After the removal of weeds and saplings, treat the affected area as if it were a bare patch (see below). All extensive green roof installations will at times include some moss and grass.

4 Repairing Bare Patches.

Bare patches can be easily repaired and this is best done during the main growing seasons of March/April or from late August until the end of September. Take vegetation cuttings from surrounding areas of abundant growth and place on bare patches, pressing gently into the soil. A light sprinkling of sand mixed with compost should then be dressed over the affected area to improve the uptake of the cuttings. The best results will be achieved if this work is carried out during spring maintenance and the affected area is kept moist for a short period afterwards. Please contact Bauder for further project-specific advice.

Please note: In areas of extreme exposure or where localised wind-swirl is caused by adjacent structures, it is possible that both the vegetation and substrate will be disturbed by periods of high wind. Should this occur, consideration should be given to how best to secure the installation against similar conditions in the future prior to re-instatement. If a problem of this type is suspected, Bauder may be contacted for advice and, if necessary, a suggested course of action.

5 Fertiliser for Bauder XF301 sedum blankets

Bauder Sedum Blankets are grown in a shallow growing medium which contains very little nutrient, so the annual application of fertiliser is crucial to ensure that the plants remain healthy. Fertiliser should ideally be applied during March/April, as it helps the plants to prepare for extreme weather conditions and flowering whilst also allowing the different species to gain sufficient nutrients without competing against each other.

Organic fertilizer can be obtained direct from Bauder in 25kg bags, which is sufficient for an area of 312.5m2 when applied at the recommended rate of 80gm/m². Areas of up to 30m² may be applied using either a hand held spreader or strewn by hand from a bucket. Larger roofs should always be done using a trolley applicator, which can be purchased direct from Bauder. Always apply the fertiliser at the given rate written on bag.

It is recommended that the fertiliser is lightly ‘watered in’ immediately after application, to avoid “burning” of the foliage, which may occur if fertilizer pellets settle on the leaves. Dung-based organic fertilizers should be avoided.

6 Fertiliser for either plug planted or hydro-planted extensive green roofs

Use a 6-month slow release chemical fertiliser with an NPK ratio of 15, 9, 14. Areas of up to 30m² may be applied using either a hand held spreader or strewn by hand from a bucket. Larger roofs should always be done using a trolley applicator, which can be purchased direct from Bauder. Always apply the fertiliser at the given rate written on the bag. This product may also be used on sedum blankets.

7 Irrigation

Extensive Substrate Installations

It is generally not considered necessary to irrigate extensive substrate green roof systems. It is, however, always advisable to ensure that there is a water supply point adjacent to the green roof, both to assist with general maintenance and as a precaution against extreme

drought conditions.

Bauder XF301 Blanket Systems

The sedum plants used in the Bauder XF301 blanket system absorb and store water in their leaves, which they then use to survive during periods of drought. The purpose of the moisture retention fleece, which is incorporated into the system beneath the blanket, is to hold water after rainfall to give the plants sufficient time to take on as much water as possible. The moisture retention fleece is not a water storage medium, so you should not be concerned if it dries out during periods of dry weather. If drought conditions arise it is important to check the plant leaves to see if they are still fleshy and not completely dried out.

When the Bauder XF301 blanket system is installed we recommend the provision of either a leaky pipe or drip line irrigation system where the following conditions apply: -

- All south-facing roof slopes exceeding a 5° pitch.
- All roof slopes exceeding a 10° pitch.
- Exceptionally windy and exposed site locations, where the wind can dry out the blanket.
- Sites up to 50 miles inland of the east coast of the UK mainland.

Irrigation should only be activated during prolonged periods of hot, dry weather, or if the sedum plants are showing signs of distress. The irrigation system is best activated for 2-3 hours, preferably at dawn or dusk to minimize unnecessary evaporation. Then once every 4-6 days for the duration of the hot weather conditions. This can be easily managed by using an inexpensive battery-powered, programmable timer.

Please note - continuous daily watering is neither recommended nor necessary, and will only promote weeds and other unwanted plant species.

Advice and Supply of Irrigation Equipment

Access Irrigation Ltd is one of the country's longest established irrigation specialists and has considerable experience in green roofs. They are happy to provide irrigation advice on any Bauder project and can supply a wide range of irrigation products. Please contact:-

Access Irrigation Ltd
Crick Northampton NN6 7XS
T: 01788 823811 F: 01788 824256 E: sales@access-irrigation.co.uk
www.access-irrigation.co.uk

Support

Extensive roofs should require only minimal maintenance. Bauder is happy to offer advice on any issues concerning your green roof and any such query should be forwarded to the Bauder Green Roof Technical Department at the address below in the first instance. We believe our products and systems are of the highest standard and are always prepared to discuss any queries or concerns that may arise. It is always of great help if you can provide photographs of the affected area(s) to accompany any such queries.

Please note: In the event of any query arising which it is thought may affect the condition of the system, then Bauder should be contacted at the address below. We cannot accept responsibility for any problem or failure due to use outside those parameters for which the system was designed or 'acts of god' beyond our control e.g. extreme weather conditions or damage through pests.

BAUDER

VEGETATION FOR EXTENSIVE & BIODIVERSE GREEN ROOFS

Edition: One (February 2012)

Bauder reserves the right to amend information and product specifications without prior notice. All reasonable care has been taken to ensure that all information is current at the time of print, however, because Bauder pursues a policy of constant development, we recommend ensuring that your copy of this manual is current by contacting our marketing department.

Tel: +44 (0)1473 257671

Recommendations for use should be verified as to the suitability and compliance with actual requirements, specifications and any applicable laws and regulations.

OVERVIEW OF VEGETATION OPTIONS

Extensive and biodiverse green roofs are designed to be lightweight and support a low maintenance vegetation landscape which is wind and frost resistant. They are not intended for general access or for leisure purposes and are primarily used for their ecological or aesthetic benefits.

A biodiversity roof looks to deliver additional benefits by creating a natural living habitat and will have a substantial emphasis on native species plants.

The vegetation options that Bauder supply can be used in singularity or in combination, depending on the green roof finish required.

VEGETATION BLANKETS PAGES 4-7

Green roof vegetation blankets provide an instant carpet of plant coverage, are lightweight and include a broad mix of plant species for diversity in foliage and flower. The pre-cultivated plants are grown on a patented geo-textile carrier fleece with ultraviolet-resistant nylon loops which provides a support base for the specially developed substrate growing medium that gives stability to the vegetation.

We have two plant choices for vegetation blanket:-

- Sedum Blanket - XF300 and XF301 (which includes an integrated moisture retention fleece)
- Native Species Wildflower Blanket - XF118

PLUG PLANTS PAGES 8-11

This option for planting allows for greater variety of vegetation which can be pre-selected to suit the location, rooftop growing conditions, colour scheme or biodiversity action plan required. Individual immature plants or 'plugs' are planted into the substrate by hand which will then grow on to give good cover over the next two full growing seasons.

We have two categories of plant lists from which the flora plugs can be selected and include sedums, wildflowers, herbs and grasses:-

- Traditional Plugs
- UK Provenance Native Species Plugs

SEED MIXES PAGE 12

The Bauder seed mix for green roofs is a hand or machine broadcast mix of seed applied to a substrate finish for natural colonisation over at least two growing seasons. It is made up of predominantly herbaceous species to provide a mix of floral colour blooming at different times of the year. It can be used as a singular planting scheme or in combination with plug plants.

MAINTENANCE PAGES 13-15

The Bauder range of green roof vegetation products all require some degree of maintenance, initially to help the plants establish well in their new surroundings and latterly to keep them healthy and strong through the changing seasons. Here you will find a brief outline of what is required for each system to achieve the desired long-term result.

SEDUM VEGETATION BLANKET XF301

The Bauder XF301 is our sedum blanket system featuring up to 11 species of sedums with some mosses and grasses to ensure plant diversity. All plants are selected to suit our climate and keep weight and maintenance to a minimum. The sedum blankets provide 90% ground coverage at installation.

Bauder has approximately 150,000m^2 under cultivation to cater for the ever increasing annual demand for Bauder sedum green roofs.

KEY FEATURES

- Most lightweight green roof system available, making it ideal for retrofitting on a building or on new build construction.
- Delivers instant greening of a roof with sedums and other species all able to flourish in our climate
- Cost effective
- Developed to meet FLL guidelines
- Cradle-to-Cradle certification
- Sedum blankets are grown on our farm in the UK and delivered to site within 24 hours of harvesting
- Carry fire ratings of EXT.F.AA and EXT.S.AA

The Bauder Xero Flor XF301 Sedum Blanket is a very lightweight and cost-effective way of quickly delivering an established sedum vegetation finish onto a flat roof.

The core of the multifunctional Xero Flor XF301 Sedum Blanket is its patented carrier, which holds both the substrate and vegetation firmly in place whilst also providing the water retention and drainage characteristics necessary to keep the vegetation healthy. The sedum vegetation provides a dense foliage that delivers colour and interest through the spring and early summer.

For speed of installation the product can be supplied in 10m rolls for crane-assisted positioning, and is also available in 2 x 1m roll sizes to allow for manual handling on smaller projects.

For further information on the Bauder XF301 sedum blanket green roof system please see the Bauder Flat Roof Solutions brochure or visit www.bauder.co.uk and click on the green roof section.

BAUDER SEDUM BLANKET XF301 INDICATIVE PLANT LIST

Species
Sedum acre
Sedum album - 'bella d' Inverno
Sedum album - coral carpet
Sedum ewersie
Sedum Kamtschaticum - ellacombianum
Sedum Kamtschaticum - weinstephaner gold
Sedum montanum orientale
Sedum pulchellum
Sedum rupestri (reflexum)
Sedum sexangulare
Sedum spurium - mesemlanthemum = Delosferma
Sedum spurium - mesemlanthemum = hallii
Sedum verticillatam

Royal Opera House
Production Workshop

Mount St. Vincent
Co Limerick

SEDUM VEGETATION BLANKET XF300

The XF300 Sedum Blanket utilises the vegetation support layer and is installed over a substrate base of around 80mm depth which allows for increased rainwater attenuation capacity, thus reducing the level of rainwater entering the drainage system.

KEY FEATURES

- Delivers instant greening of a roof with sedums and other species all able to flourish in our climate
- Quick and easy to establish
- Cost effective
- Developed to meet FLL guidelines
- Cradle-to-Cradle certification
- Sedum blankets are grown on our farm in the UK and delivered to site within 24 hours of harvesting

The patented carrier of the Xero Flor XF300 Sedum Blanket provides a strong, flexible soil retention layer able to hold both the substrate and vegetation firmly in place against wind and sheer loads whilst allowing the roots to grow through and establish into the substrate of the green roof system below.

The sedum vegetation is the same as is used in our Xero Flor XF 301 and will provide dense foliage cover with a lot of colour and interest through the spring and early summer.

The product can be supplied in 10m rolls for crane-assisted installation and is also available in standard 2 x 1m roll sizes.

For further information on the Bauder XF300 Sedum Blanket please see the Bauder Green Roof Vegetation Installation Guide and the Bauder Extensive Green Roof Maintenance Guide, both of which can be found at www.bauder.co.uk.

BAUDER SEDUM BLANKET XF300 INDICATIVE PLANT LIST

Species
Sedum acre
Sedum album - 'bella d' Inverno
Sedum album - coral carpet
Sedum ewersie
Sedum Kamtschaticum - ellacombianum
Sedum Kamtschaticum - weinstephaner gold
Sedum montanum orientale
Sedum pulchellum
Sedum rupestri (reflexum)
Sedum sexangulare
Sedum spurium - mesemlanthemum = Delosferma
Sedum spurium - mesemlanthemum = hallii
Sedum verticillatam

WILDFLOWER BLANKET XF118

Xero Flor XF118 wildflower blanket has been developed to meet the growing demand for a native species vegetation blanket to satisfy the requirements of both BREEAM and Sustainable Homes codes. The product utilises the technology and much of the experience that we have gained over the last 15 years in growing and installing sedum-vegetated blankets, and as a result shares many of the benefits of these proven products.

The 24 species of wildflowers and herbs incorporated into the blanket have been selected to provide a viable and vibrant plant community whilst also delivering a range of native species that will be present on most of the biodiversity action plan lists that project-specific ecology reports now demand.

The unique blanket carrier incorporates a polypropylene mesh stitched to a permeable geotextile membrane, which ensures minimum compaction of the blanket substrate whilst allowing the vigorous root growth of the wildflowers to quickly establish into the substrate installed underneath.

Whilst the XF118 wildflower blanket is always installed as part of an extensive, substrate-based green roof system, the weight of the build-up and its establishment and ongoing maintenance requirements are amongst the lowest for this type of system.

KEY FEATURES

- Lightweight green roof system, making it ideal for retrofitting on a building or on new build construction.
- Effective solution where BREEAM and Sustainable Homes codes require a biodiversity strategy
- Delivers instant greening of a roof with native species wildflower plants
- Cost effective
- Cradle-to-Cradle certification
- Vegetation blankets are cultivated by Bauder and delivered to site within 24 hours of harvesting

Key to the success of the Bauder XF118 Wildflower Blanket is whether it is being specified to support the ecology or if its visual appearance will be the primary requirement. If the former is required then a basic level of irrigation and maintenance after installation will be sufficient, and if the latter then a greater level of maintenance and irrigation will be of much assistance in achieving the desired effect.

For further information on the Bauder XF118 Wildflower Blanket please see the Bauder Green Roof Vegetation Installation Guide and the Bauder Extensive Green Roof Maintenance Guide, both of which can be found at www.bauder.co.uk.

XF118 WILDFLOWER INDICATIVE SPECIES LIST

Botanical Name	Height	Blossom	Flowering Season
Achillea millefolium	8-40 cm	White	June-August
Armeria maritima	5-20 cm	Pink	April-October
Bellis perennis	3-12c m	White / Yellow	March-October
Campanula glomerata	3-30 cm	Blue	June-October
Campanula rotundifolia	15 cm	Blue	July-September
Centaurea cyanus	20-50 cm	Blue	June-August
Centaurium erythrea	10-40 cm	Pink	July-August
Dianthus deltoides	15-30 cm	Pink	April-October
Echium vulgare	30-60 cm	Blue	June-September
Galium verum	15-60 cm	Yellow	July-August
Geum rivale	20-40 cm	Pink	April-August
Linaria vulgaris	20-40 cm	Yellow	July-September
Lotus corniculatus	10-20 cm	Yellow	June-September
Lychnis flos-cu-culi	50-60 cm	Pink	May-August
Papaver rhoes	20-60 cm	Red	June-August
Pilosella aurantiaca	20-60 cm	Orange	July-October
Prunella vulgaris	5-20 cm	Purple	June-October
Rhianthos minor	30-50 cm	Yellow	May-August
Saponaria officianalis	20-40 cm	Light Pink	July-September
Scabiosa columbaria	15-50 cm	Blue	July-October
Sedum acre	5-10 cm	White / Yellow	July-August
Silene uniflora	8-25cm	White	June-August
Silene vulgaris	25-50 cm	White	June-August
Thymus polytricus	4-10 cm	Mauve	May-August

TRADITIONAL PLUG PLANTS

Bauder offers a range of vegetation in plug plant format for use in green roof installations. The plants have individual structure and form and the variety of colours provide a diverse aesthetic appearance of the roof.

KEY FEATURES

- Broad palette of plants for varied aesthetic appearance.
- Greater depth of substrate enables a broader range of plant species to be incorporated on the roof
- Increased rainwater attenuation capacity compared to XF301 vegetation blanket installations
- Cost effective on large roofs

PLANT TYPES

Sedums –These succulent plants are drought, wind and frost tolerant, will steadily grow and spread to provide an even vegetative cover over time.

Wildflowers, Herbs and Grasses - For greater biodiversity and interest, we also provide a mix of wildflowers, herbs and grasses, to be incorporated with sedums at the rate of 2 sedums to 1 other species.

SEDUM PLUG PLANTING SELECTION

Available as 4 cm units. Recommended substrate depth of 80 mm

Botanical Name	Height	Blossom	Exposure (sun or shade)	Shallow Substrate Option (60mm depth)
Sedum acre	30 mm	Yellow	☼	
Sedum acre aurea	50 mm	Yellow	☼	
Sedum aizoon	400 mm	Yellow	☼	
Sedum album	100 mm	Opaque	☼	✓
Sedum album 'Micrantha'	50 mm	White	☼	
Sedum album 'Coral Carpet'	150 mm	White	☼	✓
Sedum album 'Murale'	150 mm	Pink	☼	✓
Sedum album 'Laconicum'	150 mm	Pink	☼	
Sedum anacampseros	150 mm	Pink	☼	
Sedum cauticolum	200 mm	Reddish	✹	
Sedum ewersii	150 mm	Pink	☼	✓
Sedum floriferum	100 mm	Yellow	✹	✓
Sedum forsteranum	150 mm	Yellow	☼	✓
Sedum hybridum	150 mm	Yellow	✹	✓
Sedum hyspanicum	100 mm	White	☼	
Sedum kamtschatikum	200 mm	Yellow	☼	✓
Sedum kamtschaticum var.	150 mm	Red / Yellow	☼	
Sedum lydium	150 mm	Pink	☼	
Sedum reflexum	150 mm	Yellow	☼	✓
Sedum sarmentosum	120 mm	Yellow	☼	
Sedum selskianum	50 mm	Light Yellow	☼	
Sedum sexangulare	50 mm	Yellow	☼	✓
Sedum spathulifolium	150 mm	Yellow	☼	
Sedum spurium 'coccineum'	150 mm	Red	☼	✓
Sedum spurium 'kaukasus-sedum	120 mm	Red	✹	✓
Sedum spurium 'Album	120 mm	Pink / White	☼	✓
Sedum spurium "Tri-color"	120 mm	Pink / Yellow	☼	
Sedum telephium'	400 mm	Red	☼	✓

SPECIES SELECTION

Bauder Species Selection

Our Green Roof Technical Team provides a service whereby we will select the type of plants best suited to the building location, height of the roof, slope and orientation. This helps to ensure that the optimum mix is selected and reduces loss of individual species because of incorrect specification.

If any species is not available we will provide alternative species from the growers stock.

Client Selection from Stock

The client may have a preference for the species to be planted and can do so from our large range of traditional plug plants. These plants are grown as standard supply stock and are available on confirmation of quantity. This list indicates the regular varieties offered, and if any are not available, due to previous high demand, we will suggest alternatives prior to delivery.

Custom Growing of Plug Plants

On larger developments, where specific requirements for an exact combination of vegetation mix is required we are able to propagate the plants to suit the project. This service requires sufficient notification of species and quantities required as well as adequate lead time to enable the specified plants to reach established early stage growth before the predetermined delivery date. This could be as much as eight months.

Custom grown plug plants will incur additional charges should the order be modified or cancelled prior to delivery.

This bespoke service is arranged with your Area Technical Manager or the Green Roof Technical Team.

MIX PERENNIAL PLUG PLANTING SELECTION

(including wildflowers, herbs and grasses etc) **- Available as 5-6cm units. Recommended substrate depth of 80mm**

Botanical Name	Height (mm)	Blossom	Exposure (sun or shade)	Shallow Substrate Option (60mm depth)
Achillea millefolium	350	White	☼	
Achillea tomentosa	150	Yellow	✹	
Allium schoeneprasum	300	Lilac	☼	✓
Allium sphaerocephalon	400	Purple	☼	
Allium moly	250	Yellow	☼	
Alyssum saxatile	150	Yellow	☼	
Antennaria dioica	150	Reddish	☼	
Armeria maritima	150	Red	☼	
Campanula poscharskyana	150	Blue	☼	
Campanula rotundifolia	200	Blue	✹	
Cerastium tomentosum	200	White	☼	
Dianthus alpinus	100	Pink	☼	
Dianthus deltoides	150	Red	☼	✓
Dianthus carthusian	450	Red	☼	
Dianthus caesius	150	Pink	☼	
Dianthus plumarius	250	Pink	☼	
Euphorbia cyparissias	250	Yellow	✹	
Euph.myrsinitis	150	Yellow	☼	
Fragaria virids	100	Opaque	☼	
Gypsophylla repens	100	Pink	☼	
Geranium macrorrhizum	300	Pink	☼	
Geranium sanguineum	200	Lilac	☼	
Geranium x cantabrigiense	250	Pink / White	☼	
Heianthemum num.	100	Yellow	☼	
Hyssopus officinalis	400	Blue	✹	
Inula ensifolia	400	Yellow	☼	
Iris pumila	300	Blue	☼	
Jovibarba hirta	100	Yellow	☼	
Lavandula angustifolia	400	Blue	☼	
Lychnis alpina	200	Pink	☼	
Linum perenne	300	Blue	☼	
Muscari	250	Blue	☼	✓
Nepeta fasseni	250	Blue	☼	
Origanum vulgaris	150	Pink	☼	
Petrorhagia saxifraga	150	Pink	✹	✓
Potentilla aurea	150	Yellow	☼	
Potentilla verena	50	Yellow	☼	✓
Prunella vulgaris	100	Violet	✹	
Saponaria ocymoides	100	Pink	☼	
Sanguisorba minor	100	White	☼	
Scabiosa canescens	350	Blue	☼	
Satureja montana	200	Lilac	☼	
Saxifraga aizoon	100	White	☼	
Saxifraga arendsii	100	Red / Pink	☼	
Saxifraga umbrosa	100	White	☼	
Sempervivum	100	Pink	☼	✓
Silene maritima	150	White	☼	
Teucrium chamaedrys	200	Pink	✹	✓
Thymus serpyllum	150	Pink	☼	✓
Thymus vulgaris	250	Pink	☼	
Verbascum phoenicum	700	Blue	☼	
Verbascum nigrum	700	Yellow	☼	
Veronica teucrium	180	Blue	✹	

UK PROVENANCE NATIVE SPECIES PLUG PLANTS

The introduction of the BREEAM and Sustainable Homes codes has lead to a significant change in the requirement for the supply of vegetation to be incorporated into green roofs. Whereas sedum species have been widely used in green roofs for many years, the incorporation of native species varieties, which include grasses, herbs and wildflowers, provides a fresh challenge for the specifier.

To keep pace with changing market demand, we have worked with an established UK grower of wildflowers to make available a range of native species vegetation, grown from UK provenance seed stock, all of which will flourish in traditional substrate-based green roof systems. This provides a broad palette from which the project ecologist may ask us to select or alternatively may wish to select for themselves, to secure the credits needed to meet the scheme requirement.

BREEAM AND SUSTAINABLE HOMES CODES

In considering how green roofs will support both BREEAM and Sustainable Homes code projects, a number of credits can be secured in the Land Use and Ecology section by improving the ecological value of the site. This is achieved by increasing the number of locally significant species as specified by a registered ecologist found on the site after construction. The calculation is dependant upon the number of species included and the green area of the roof.

KEY FEATURES

- Broad palette for ecologically focused green roofs
- UK provenance plants
- Greater depth of substrate enables a broader range of plant species to be incorporated on the roof
- Increased rainwater attenuation capacity compared to XF301 vegetation blanket installations
- Cost effective on large roofs

SPECIES SELECTION

Bauder Plant Community Selection Service

Our Green Roof Technical Team provides a service whereby we will select the type of plant community suited for the biodiversity action plan for the roof. Generally, there are four categories that we look to provide; grassland, chalk soil, wildflower meadow and coastal tolerant plants. If any species is not available we will provide alternatives from the growers stock.

Client Selection

The client may self-select the plants required from our large range of UK provenance plug plants. These plants are grown as standard supply stock and are available on confirmation of quantity. This list indicates the regular varieties offered, and if any are not available, due to previous high demand, we will suggest alternatives prior to delivery.

Custom Growing of Plug Plants

On larger developments, where specific requirements for an exact vegetation mix is required we are able to propagate the plants to suit the project. This service requires notice of a full season to enable the specified plants to reach sufficient early stage growth, furthermore a deposit is required at the time of placing the order and additional charges will arise should the order be modified or cancelled prior to delivery

This bespoke service is arranged with your area Technical Manager or the Green Roof Technical Team.

UK NATIVE SPECIES PLUG PLANTS SELECTION

Botanical Name	Height (mm)	Blossom	Exposure (sun or shade)	Plugs	Bare Root Stock
Achillea millefolium	250	White	☼◑	✓	
Anthyllis vulneraria	50	Yellow	☼	✓	
Armeria maritima	120	Pink	☼	✓	
Bellis perennis	30	White / Yellow	☼◑	✓	
Briza media	30	N/A (Grass)	☼		✓
Campanula rotundifolia	120	Blue	☼	✓	
Campanula glomerata	150	Blue	☼	✓	
Carex flacca	150	Blue foliage	☼◑	✓	
Daucus carota ssp maritimus	150	White	☼	✓	
Festuca ovina	300	N/A (Grass)	☼◑		✓
Festuca rubra ssp ruba	300	N/A (Grass)	☼◑	✓	
Fragaria vesca	50	White	☼●	✓	
Galium verum	150	Yellow	☼◑	✓	
Geranium robertinum	50 - 200	Blue / Pink	☼●	✓	
Helianthemum nummularium	80	Purple	☼◑	✓	
Hypericum perforatum	150	Yellow	☼◑	✓	
Hypochaeris radicata	150	Yellow	☼	✓	
Leontodon autumnalis	80	Yellow	☼◑	✓	
Leontodon hispidus	80	Yellow	☼	✓	
Leucanthemum vulgare	200	White / Yellow	☼	✓	
Linaria vulgaris	150	Yellow	☼◑	✓	
Lotus corniculatus	50	Yellow	☼	✓	
Origanum vulgare	150	Mauve	☼◑	✓	
Plantago coronopus	80	Brown	☼	✓	
Plantago lanceolata	150	White	☼◑	✓	
Primula veris	120	Yellow	☼◑	✓	
Prunella vulgaris	50	Purple	☼◑	✓	
Ranunculus bulbosus	200	Yellow	☼	✓	
Sanguisorba minor	150	Pink	☼	✓	
Scabiosa columbaria	250	Blue	☼	✓	
Sedum acre	60	Yellow	☼	✓	
Sedum album	100	White	☼	✓	
Silene latifolia ssp. alba	200	White	☼	✓	
Silene maritima	120	White	☼	✓	
Silene vulgaris	200	White	☼	✓	
Thymus polytrichus	40	Mauve	☼◑	✓	
Viola riviniana	50	Purple	☼●	✓	
Viola tricolor	50	Purple / Yellow	☼	✓	

All plants are grown in peat-free compost

Please note that Bauder Ltd cannot guarantee the supply of the exact mix of vegetation ordered.

KS PLUS SEED MIXTURE

The Bauder KS PLUS seed mix is a carefully balanced blend of 27 stonecrop, wildflower and herb species, which provide a healthy plant community that will give good ground cover in a broad range of green roof applications. The seeds are mixed with fine bulking aggregate, seed adhesive, organic nutrients and mycorrhizal fungi to encourage water and nutrient uptake by the plant.

The mix of species has been developed to ensure that the stonecrops will provide a good level of ground cover, which will both stabilise the growing medium and give shelter to the herbs and wildflowers to grow through and give the appearance of a wild grass and flower meadow.

SPECIES LIST BAUDER-SEED MIXTURE KS-PLUS

Botanical Name	Blossom	Exposure (sun or shade)	Origin
Achillea millefolium	White	☼◑	H
Anthemis tinctoria	Yellow	☼	H
Campanula rotundifolia	Purple	☼●	H
Dianthus carthusianorum	Pink	☼●	H
Dianthus deltoides	Pink	☼◑	H
Fragaria vesca	White	☼●	H
Geranium sanguineum	Pink / Purple	☼◑	H
Hieracium pilosella	Yellow	☼●	H
Leucanthemum vulgare	White / Yellow	☼◑	H
Linum perenne	Blue	☼◑	H
Muscari comosum	Violet	☼	H
Origanum vulgare	Pink	☼◑	H
Papaver rhoeas	Red	☼	H
Petrorhagia saxifraga	White / Pink	☼	H
Potentilla argentea	Yellow	☼◑	H
Salvia pratensis	White / Pink	☼◑	H
Sedum acre	Yellow	☼◑	S
Sedum album	White	☼◑	S
Sedum ellacombianum/ (selskianum hort.)	Yellow	☼◑	S
Sedum hispanicum	White / Pink	☼	S
Sedum montanum	Yellow	☼	S
Sedum sexangulare	Yellow	☼	S
Sedum spurium	Pink	☼	S
Teucrium chamaedrys	Purple / Pink	☼	H
Thymus pulegioides	Lilac	☼	H
Verbascum nigrum	Yellow	☼◑	H
Veronica spicata	Blue	☼◑	H

Other Components:
Mycorrhizal fungi, carrier, nutrients, bonding compound

H = Herbaceous
S = Stonecrop

INSTALLATION AND MAINTENANCE

Key to the success of any green roof installation is the care taken of the vegetation at the time of installation and immediately thereafter to ensure that it establishes in its new location and will require only minimal maintenance to keep it in good condition in the future.

Whilst every installation will have a marginally different requirement, dependent upon a broad range of factors, the following information is intended to provide a general insight into what will be needed in most situations. For further information please see the green roof section of our website, bauder.co.uk, for our guides on Bauder Installation, Maintenance and Watering appropriate to the vegetation and system.

BAUDER VEGETATION BLANKETS (XF301, XF300 & XF118)

Harvesting and Delivery to Site

The Bauder vegetation blankets are harvested and transported to site within 24 hours and so deliveries to a building project only occur on Tuesday-Friday.

On-site Requirements

A water supply at roof top level is required during the installation of any vegetation blanket. Once an area of installation is completed the vegetation blanket is heavily watered to ensure that the plants and substrate are saturated before moving on to the next area.

The installation pattern is quite straightforward and will be devised by the Bauder Approved Contractor to suit the roof shape, orientation and pitch. Upon completion of the installation, Bauder organic slow release fertiliser is applied and watered-in to assist the plants' establishment and providing them with nutrients to promote growth.

Vegetation Barriers

Vegetation barriers are created and installed by using 20 - 40mm round washed pebbles at the perimeters, upstands and abutments and provides protection against wind uplift at the edges of the blanket as well as rapid surface drainage during heavy rainfall.

XF301 Combination Sedum Blanket

The XF301 Sedum Blanket already incorporates the depth of substrate required in to which the plants are established.

XF300 Sedum Blanket and XF118 Wildflower Blanket

These vegetation blankets are installed over a depth of substrate which will be levelled and watered to the point of saturation before the blankets are positioned. If large areas are to be installed then watering and installation is done in sections of as much area as can be completed within 4 hours.

Post Installation Watering Requirements

The vegetation blankets will require a post-installation irrigation period of 4 weeks for sedums and 10 weeks for wildflowers where the blankets should not be allowed to dry out. The amount of watering the plants will require depends upon the location of the building, the roof type and degree of pitch, local climate and exposure levels and the type of plants in the vegetation blanket.

It may also be necessary to irrigate for longer than this if installation is followed by a warm, dry spell of weather. To encourage the plants to survive without topical irrigation and harden them ready to survive the winter it is important to start cutting back watering from early September. The maintenance requirement in the years following installation will depend upon the weather experienced through the winter and early spring of each year and should follow our standard extensive green roof maintenance guidelines, excepting where weather conditions have caused significant damage to the vegetation.

▲ Rolls being harvested and prepared for delivery.

▲ Long length rolls being craned into position and installed.

▲ Bauder SS40 Drainage and Edge Trim

BAUDER PLUG PLANTS

Delivery to Site

The plant trays will be delivered either shrink-wrapped on pallets or sealed in cardboard boxes which should either be placed in a cool area out of direct sunlight for overnight storage or opened, the plug trays spread around and watered and left overnight to acclimatise.

In exceptional weather we are unable to make available the plugs for delivery until conditions improve. We are only able to advise three days before delivery if such a problem occurs.

We recommend that plug plants are installed in the periods from mid-March to the end of May and September to October. If it is necessary to carry out an installation outside of these periods, please contact Bauder Technical Services for advice before proceeding with the works.

On-site Requirements

A water supply at roof top level is required during the installation of plug plants. Once an area of installation is completed the area is heavily watered to ensure that the plants and substrate are saturated before moving on to the next area.

The plug plants in their trays are saturated prior to the commencement of planting out. Plugs are placed in groups of 5-13 of the same species, dependent upon the overall roof size, at the density per m^2 as specified. The completed area is watered to saturation point before moving on to the next section.

Upon completion of the installation Bauder organic slow release fertiliser is applied at a rate of $80g/m^2$ and watered in.

Vegetation Barriers

Vegetation barriers are created and installed by using 20-40mm round washed pebbles at the perimeters, upstands and abutments and provide protection against wind uplift at the perimeter as well as rapid surface drainage during heavy rainfall.

Post Installation Watering Requirements

After completion of the installation it will be necessary to keep the substrate and plants damp for a period of at least 4 weeks immediately afterwards for traditional plugs and 10 weeks for native species plugs, and it may be necessary to irrigate for longer than this if installation is followed by a warm, dry spell of weather. To encourage the plants to survive without topical irrigation and harden them ready to survive the winter it is important to start cutting back watering from early September.

The anticipated period of establishment to provide good vegetated cover is at least two full years. The maintenance requirement over this period will depend to a large extent upon the weather experienced through the winter and early spring of each year and should follow our standard extensive and biodiverse green roof maintenance guidelines, excepting where weather conditions have caused significant damage to the vegetation.

KS PLUS SEED MIXTURE

The seeds are pre-mixed with nutrients, fertiliser and a tackifying carrier which bulks out the volume to aid installation whilst also providing the ideal nutritional background to support initial establishment.

Substrate Requirements

The seeds require sufficient depth of Bauder extensive substrate to support the roots of the plants once they are fully established. This is a lightweight growing medium that is manufactured to FLL standards which is then top-dressed with Bauder Seed Bed Substrate, which has a finer consistency and higher level of organic matter to enable the seeds to germinate.

The substrate is watered sufficiently, almost to saturatation, before the seed mix is broadcast on the roof.

Sowing Rate

The seed mix has a coverage rate of 1Kg to 10m^2 of roof area and is provided in either 2Kg or 5Kg bags. The seeds will only be sown in fair weather, as strong winds will disperse the seeds before they reach the substrate.

Even coverage is gained by sowing 50% of the mix longitudinally down the roof, and then over-sown at 90° with the remainder of the seed mix.

Best results are achieved from spring and autumn sowings; however the mix can be sown throughout the year.

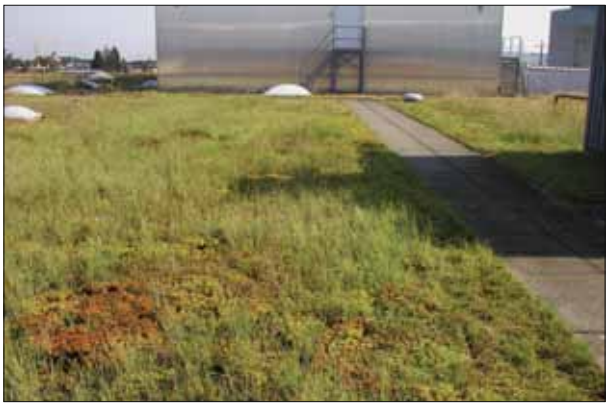
Establishment

Due to the components incorporated within the seed mix there is no requirement for establishment maintenance. It is advisable to ensure that the roof surface is not trafficked other than for essential roof maintenance for the first 12 months after sowing. Bare patches can been over-sown if considered necessary, but will develop vegetative cover over time in any case. The anticipated period of establishment to provide a good vegetated cover is at least two years.

▲ After about 8 weeks

▲ At 12 - 16 weeks

▲ The second growing season



▲ After a few years

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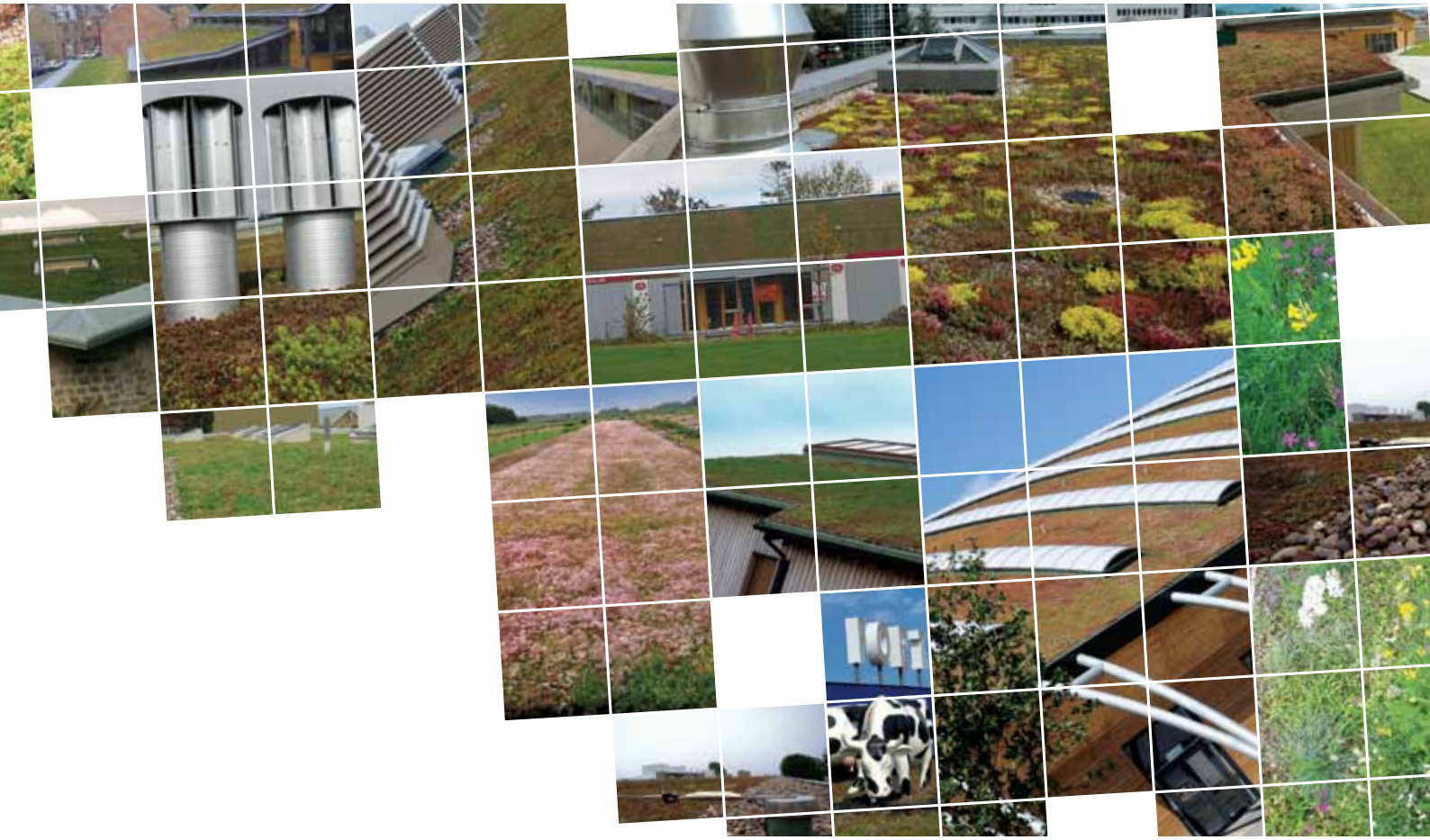

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