PLANNING GUIDE

System Solutions for Green Roofs and Landscaped Podium Decks

Life on Roofs

Why Have a Green Roof?

Beyond their attractive visual nature, Green Roofs offer many undisputable benefits, both ecological and economical, provided they are built with the right system.

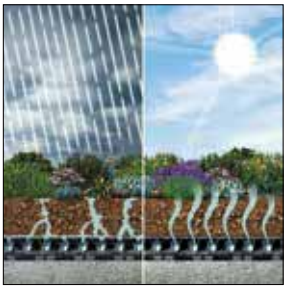
Improve the Microclimate

Green Roofs cool and humidify the surrounding air. Thus they contribute to improving the microclimate in urban centres. This cooling effect significantly increases the performance of air-conditioning systems, reducing carbon emissions.

Bind Dust and Toxic Particles

Green Roof vegetation helps to filter out dust and smog particles. Nitrates and other harmful materials are absorbed by the plants out of the air and rainfall and bound within the substrate.

Increase Rainwater Retention



A Green Roof can reduce water run-off by 50–90 %; any water flows from the roof with a delay. Outlets, pipes and drains can be reduced in capacity, thereby saving construction costs. Sewer costs can be reduced in some areas.

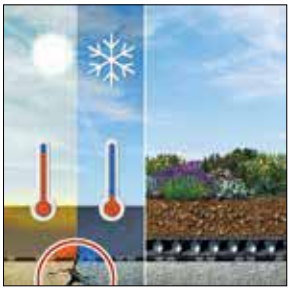
Improve Noise Protection

Planted areas are natural sound insulators and absorb more sound than hard surfaces. Green Roofs reduce reflective sound by up to 3 dB and improve sound insulation by up to 8 dB. This is very effective for buildings near airports, noisy nightclubs and factories.

Reduce Energy Costs

A Green Roof has the ability to buffer temperature extremes and improve the buildings energy performance.

Protect the Waterproofing



A Green Roof protects the waterproofing from climate extremes, UV exposure and mechanical damage. This greatly increases the life expectancy of the waterproofing and results in reduced maintenance and replacement costs.

Offer a Natural Habitat

Landscaped roofs compensate for green spaces, which are lost to building development. They provide natural habitats for wildlife and bring nature back into the cities.

Provide Additional Space

Green Roofs offer additional space for numerous uses. Whether you want a relaxing garden, a playground or a golf course, it all can be achieved as part of the existing footprint.

Contents

Please find detailed information on many of these topics in our planning guides at:
https://zinco-greenroof.co.uk/downloads

Types of Green Roofs

There are two basic types of Green Roofs, namely extensive and intensive. In between, of course, there are design and constructional variations (simple intensive greening).

Extensive Green Roof

Extensive landscaped roofs are an ecological alternative to conventional surface protection or ballast layers such as gravel and pavers. They are lightweight and have a shallow Build-up height. For extensive green roofs we use proven plant communities, that can cope with the conditions on the roof (sun, wind, drought, etc.) by nature. After establishment of the vegetation, the maintenance is limited to one or two inspections a year.

Extensive Green Roofs

Low maintenance green roof instead of a gravel surface

- minimal maintenance required, 1–2 inspections per year
- supply of water and nutrients mostly by natural processes
- adapted plant communities, undemanding and self-regenerating
- build-up height 100–150 mm
- weight 115–155 kg/m²

Intensive Green Roof

Intensive Green Roofs can most easily be compared to building a garden on a roof. They are usually multifunctional and accessible. They require more weight and a deeper System Build-up. The maintenance is regular and depends on the landscape design and the chosen plant material. Depending on the substrate depth, anything is possible from lawns, perennials, shrubs, trees including other landscape options such as ponds, pergolas and patios.

Semi-Intensive Green Roofs

Designed green roof for slightly higher demands

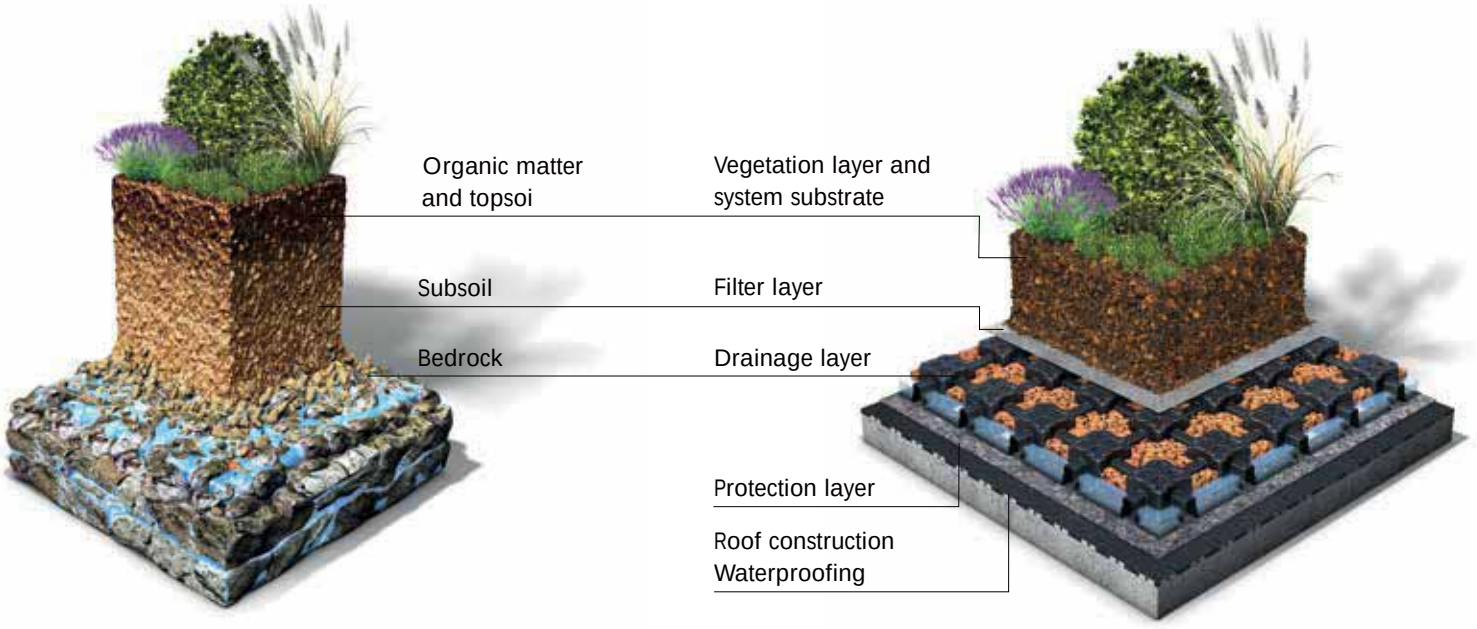
- medium care requirements
- periodic irrigation
- grass-herb vegetation to shrubs
- build-up height 130–250 mm
- weight 150–300 kg/m²

Intensive Green Roofs

Well-tended gardens on utilised flat roofs

- high maintenance requirements
- regular watering required
- lawn or perennials to shrubs and trees
- build-up height 150–2000 mm
- weight 200–3000 kg/m²

Replicating Nature on Roofs



ZinCo Green Roof system build-ups are modelled on nature.

In contrast to natural soil, where plants can penetrate to great depths with their roots and are adequately supplied with water and nutrients, they are virtually “cut off” from these cycles on the roof. Our systems for green roofs use coordinated components to compensate for the lack of a connection to the ground creating a permanent habitat for many different forms of vegetation on roofs and podium decks.

System Build-up “Sedum Carpet”

The “Sedum Carpet” is a standard build-up for extensive green roofs. It is a shallow and lightweight green roof type with an attractive “back-to-nature” appearance, that requires little maintenance. Floradrain® FD 25-E is the appropriate drainage and water storage element for this system. It has the necessary compressive strength, a low profile height, little weight and is walkable. Proven sedum species, in combination with the adapted system substrate and system build-up, guarantee a durable green roof.

European Technical Assessment
“Kits for Green Roofs”
CE ETA-13/0668

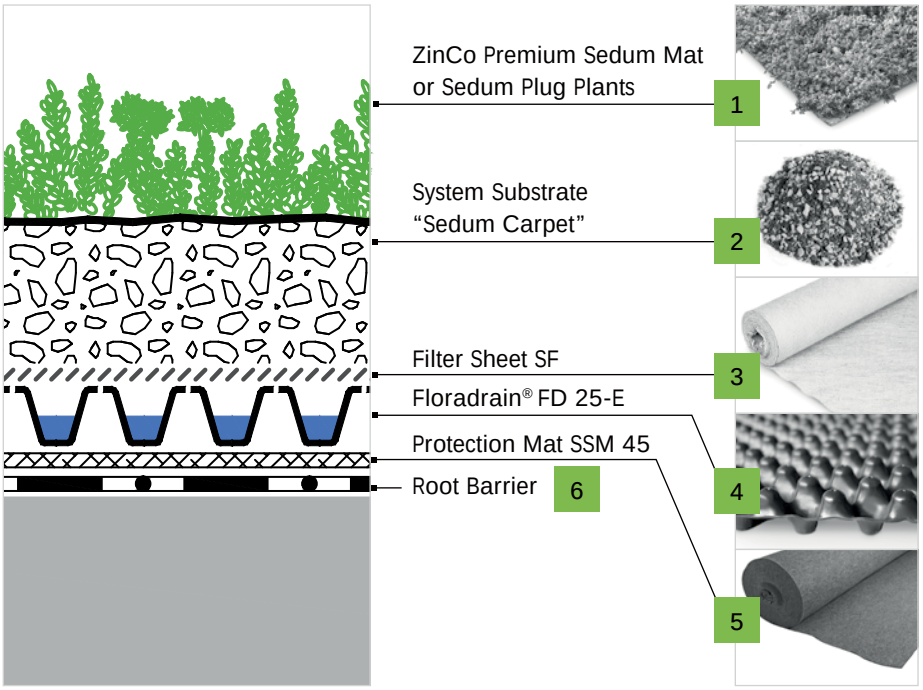
System build-ups with
European Technical Assessment
Details at www.zinco-greenroof.co.uk

Features

- Ecological protecion layer instead of gravel covering
- Requires minimum maintenance
- For roofs without severe ponding and with a slight slope of up to 8°

Design options

- Proven system build-up especially for roofs with low design demands
- Sedum species come in a great variety of different colours and shapes
- Planting with precultivated sedum mats or plug plants



Technical Data

Build-up height:	ca. 110 mm
Roof pitch:	up to 8°
Weight, saturated:	ca. 122 kg/m²
Water storage capacity:	ca. 30 l/m²

Q37 System Specifications:
www.zinco-greenroof.co.uk/system_specifications

Installation Instructions:
www.zinco-greenroof.co.uk/installation_instructions

1 Vegetation: Precultivated Sedum Mats for immediate ground covering including a minimum of eight varieties of sedum in a wide range of colours. Alternatively, sedum plug plants for ground covering within ca. 1 year depending on the number and size of plug plants used.

2 System Substrate “Sedum Carpet“: Special ZinCo blend of aggregates to provide a system substrate suitable for extensive green roofs in single- or multilayered construction. Available in Bulk Bags, 25 l bags and loose on lorry.

Water permeability mod. K: 60–400 mm/min
Water storage per 10 mm substrate height: ca. 3 l/m²

3 Filter Sheet SF

Item No.	Dimensions	Unit
2100	ca. 2.00 m × 100.00 m	200 m²-roll
2102	ca. 1.00 m × 100.00 m	100 m²-roll

Penetration force acc. to EN ISO 12236: ca. 1100 N
Flow rate (H50) acc. to EN ISO 11058: ca. 70 l/(m²·s) (≙ 0.0l7 m/s)
Notes on installation: Filter Sheet SF requires an overlap of at least 200 mm.

4

	Item No.	Dimensions	Unit
Floradrain® FD 25-E	3028	ca. 1.00 m × 2.00 m	2 m²-board
Floradrain® FD 25-R (Roll)	3023	ca. 1.00 m × 15.00 m	15 m²-roll
Floradrain® FD 25-RV (Roll with filter sheet attached)	3022	ca. 1.00 m × 15.00 m	15 m²-roll

Water storage capacity: ca. 3 l/m²
Filling volume: ca. 10 l/m²
Max. compressive strength (without filling): ca. 270 kN/m²

5 Protection Mat SSM 45

Item No.	Dimensions	Unit
2045	ca. 2.00 m × 50.00 m	100 m²-roll

Water storage capacity: ca. 5 l/m²
Penetration force acc. to EN ISO 12236: > 2000 N
Notes on installation: Protection Mat SSM 45 has to be installed with an overlap of min. 100 mm. At the roof edge it has to be taken up at least to the finished surface.

6 Root Barrier: If the waterproofing is not root resistant, the Root Barrier WSF 40 is required as a bottom layer of the system build-up. If the system build-up is to be in compliance with the ETA standard, the Root Barrier WSB 100-PO must be used instead.

System Build-up “Rockery Type Plants”

Extensive green roofs call for plant communities that can easily deal with sun, wind and drought. The system build-up “Rockery Type Plants” leads to an extensive green roof with sophisticated design and individual character. The substrate has a minimum depth of 80 mm and vegetation consists of sedum species and various perennials which provide a long blooming period and set different accents throughout the vegetation period.

European Technical Assessment
"Kits for Green Roofs"
CE ETA-13/0668

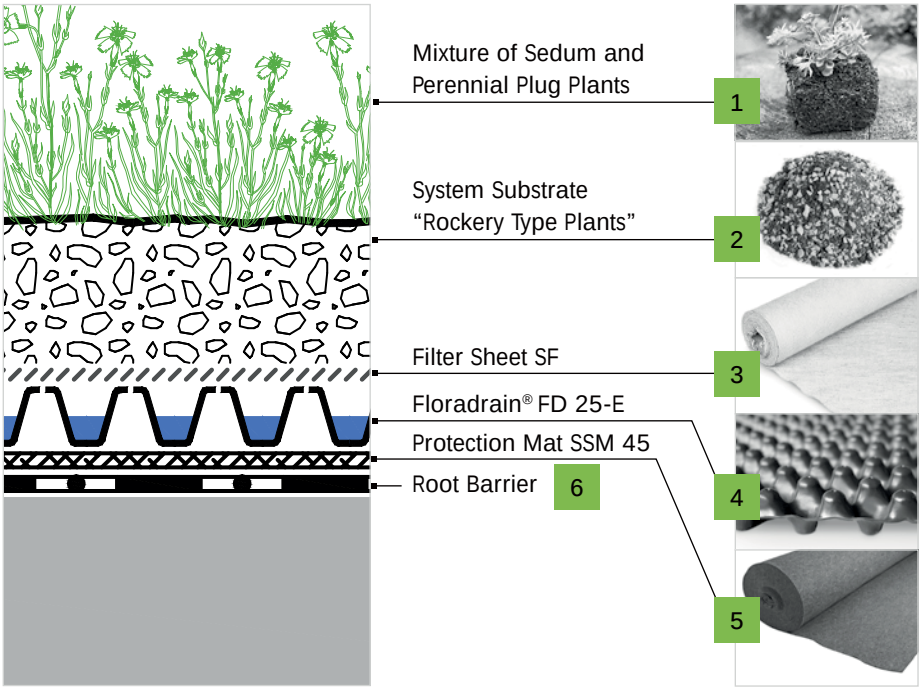
System build-ups with European Technical Assessment Details at www.zinco-greenroof.co.uk

Features

- Extensive green roof build-up with a large plant diversity as an ecological protection layer
- Requires minimum maintenance
- For roofs without standing water and with a slight slope of up to 8°

Design options

- Plug planting combining sedum species with a variety of perennials
- Allows planting according to individual landscape designs
- Combinations with walkways and patios are possible
- ZinCo seed mixtures for attractive back-to-nature appearance available as an option



Technical Data

Build-up height:	ca. 110 mm
Roof pitch:	up to 8°
Weight, saturated:	ca. 122 kg/m²
Water storage capacity:	ca. 40 l/m²

Q37 System Specifications:
www.zinco-greenroof.co.uk/system_specifications

Installation Instructions:
www.zinco-greenroof.co.uk/installation_instructions

1 Vegetation: Sedum species in combination with an individual selection of perennials according to ZinCo plant list “Rockery Type Plants“. Vegetation is established with plug plants to allow for an individual character of the green roof and/or planting according to landscape drawings.

2 System Substrate “Rockery Type Plants“: Special ZinCo blend of aggregates to provide a system substrate particularly suitable for extensive green roofs with plant species of the ZinCo plant selection “Rockery Type Plants”. Also suitable for extensive green roofs with ZinCo seed mixtures. Available in Bulk Bags, 25 l bags and loose on lorry.

Water permeability mod. K: 0.6–70 mm/min
Water storage per 10 mm substrate height: ca. 4 l/m²

3 Filter Sheet SF

Item No.	Dimensions	Unit
2100	ca. 2.00 m × 100.00 m	200 m²-roll
2102	ca. 1.00 m × 100.00 m	100 m²-roll

Penetration force acc. to EN ISO 12236: ca. 1100 N
Flow rate (H50) acc. to EN ISO 11058: ca. 70 l/(m²·s) (≙ 0.07 m/s)
Notes on installation: Filter Sheet SF requires an overlap of at least 200 mm.

4

	Item No.	Dimensions	Unit
Floradrain® FD 25-E	3028	ca. 1.00 m × 2.00 m	2 m²-board
Floradrain® FD 25-R (Roll)	3023	ca. 1.00 m × 15.00 m	15 m²-roll
Floradrain® FD 25-RV (Roll with filter sheet attached)	3022	ca. 1.00 m × 15.00 m	15 m²-roll

Water storage capacity: ca. 3 l/m²
Filling volume: ca. 10 l/m²
Max. compressive strength (without filling): ca. 270 kN/m²

5 Protection Mat SSM 45

Item No.	Dimensions	Unit
2045	ca. 2.00 m × 50.00 m	100 m²-roll

Water storage capacity: ca. 5 l/m²
Penetration force acc. to EN ISO 12236: > 2000 N
Notes on installation: Protection Mat SSM 45 has to be installed with an overlap of min. 100 mm. At the roof edge it has to be taken up at least to the finished surface.

6 Root Barrier: If the waterproofing is not root resistant, the Root Barrier WSF 40 is required as a bottom layer of the system build-up. If the system build-up is to be in compliance with the ETA standard, the Root Barrier WSB 100-PO must be used instead.

System Build-up “Lightweight Green Roof” on 0°-Roofs

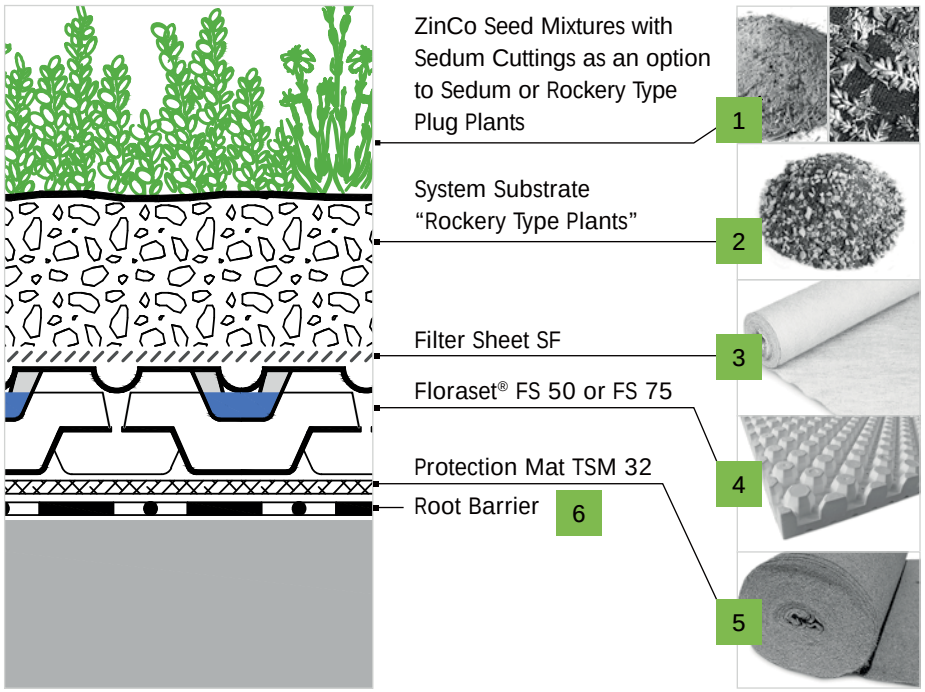
On 0°-roofs where deeper puddles might remain the standard extensive system build-up needs to be modified to avoid the danger of drowning the plants. By installing higher Floraset® elements (50 or 75 mm) the necessary distance to the water level is ensured. The green roof build-up will be somewhat higher but not heavier as these elements are made of extruded polystyrene hard foam and therefore have a negligible weight. The Protection Mat TSM 32 with its lower retention capacity is sufficient, as water from the puddles is made available to the plants.

Features

- Suitable for 0° degree roofs with standing water
- Light-weight system build-up as Floraset® elements are made of expanded polystyrene
- Extensive green roof with low maintenance requirements

Design options

- Build-up can also be used for roofs up to 10° pitch
- Allows for different types of extensive greening such as “Sedum Carpet” or “Rockery Type Plants”
- ZinCo seed mixtures for drought resistant grasses combined with sedum cuttings for a back-to-nature appearance



Technical Data

Build-up height:	ca. 130 mm resp. 160 mm
Roof pitch:	0°
Weight, saturated:	ca. 119 kg/m²
Water storage capacity:	ca. 38 l/m²

Q37 System Specifications:
www.zinco-greenroof.co.uk/system_specifications

Installation Instructions:
www.zinco-greenroof.co.uk/installation_instructions

1 Vegetation: Extensive green roof vegetation with sedum species (“Sedum Carpet”) or with a combination of sedum species and perennials (“Rockery Type Plants”). As a planting option ZinCo seed mixtures are available to be combined with sedum cuttings to achieve a back-to-nature appearance with a great variety of sedum species and drought resistant grasses.

2 System Substrate “Rockery Type Plants“: Special ZinCo blend of aggregates to provide a system substrate particularly suitable for extensive green roofs with ZinCo seed mixtures as well as extensive green roofs with sedum species in combination with perennials. Available in Bulk Bags, 25 l bags and loose on lorry.

Water permeability mod. K: 0.6–70 mm/min
Water storage per 10 mm substrate height: ca. 4 l/m²

3 Filter Sheet SF

Item No.	Dimensions	Unit
2100	ca. 2.00 m × 100.00 m	200 m²-roll
2102	ca. 1.00 m × 100.00 m	100 m²-roll

Penetration force acc. to EN ISO 12236: ca. 1100 N
Flow rate (H50) acc. to EN ISO 11058: ca. 70 l/(m²·s) (≙ 0.07 m/s)
Notes on installation: Filter Sheet SF requires an overlap of at least 200 mm.

4

	Item No.	Dimensions	Unit
Floraset® FS 50	3052	ca. 1.00 m × 1.00 m	1 m²-board
Floraset® FS 75	3076	ca. 1.00 m × 1.00 m	1 m²-board

Water storage capacity (large studs facing downwards): ca. 3 l/m² (FS 50 and FS 75)
Compressive strength at 10 % compression: ca. 45 kN/m² (FS 50) / ca. 55 kN/m² (FS 75)

5 Protection Mat TSM 32

Item No.	Dimensions	Unit
2032	ca. 2.00 m × 50.00 m	100 m²-roll

Water storage capacity: ca. 3 l/m², lower water storage capacity is sufficient, as water from the puddles is made available to the plants.
Penetration force acc. to EN ISO 12236: > 2000 N
Notes on installation: Protection Mat TSM 32 has to be installed with an overlap of min. 100 mm. At the roof edge it has to be taken up at least to the finished surface.

6 Root Barrier: If the waterproofing is not root resistant, the Root Barrier WSF 40 is required as a bottom layer of the system build-up. If the system build-up is to be in compliance with the ETA standard, the Root Barrier WSB 100-PO must be used instead.

System Build-up on Inverted Roofs

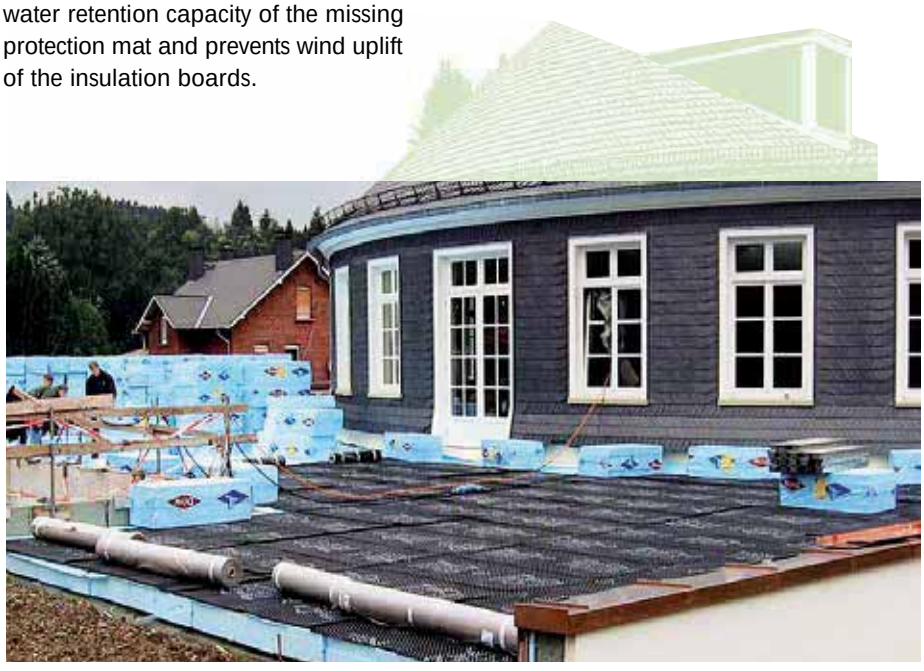
The characteristic of an inverted roof is that the insulation is above the waterproofing. The XPS insulation used on this type of roof is impervious to water, but not to water vapour. To avoid forming a vapour barrier above the XPS by placing a green roof build-up on top, the non-vapourpermeable standard protection mat must be replaced by the vapourpermeable separation membrane TGV 21 allowing for diffusion. A deeper substrate layer compensates for the water retention capacity of the missing protection mat and prevents wind uplift of the insulation boards.

European Technical Assessment
"Kits for Green Roofs"
CE ETA-13/0668

System build-ups with European Technical Assessment Details at www.zinco-greenroof.co.uk

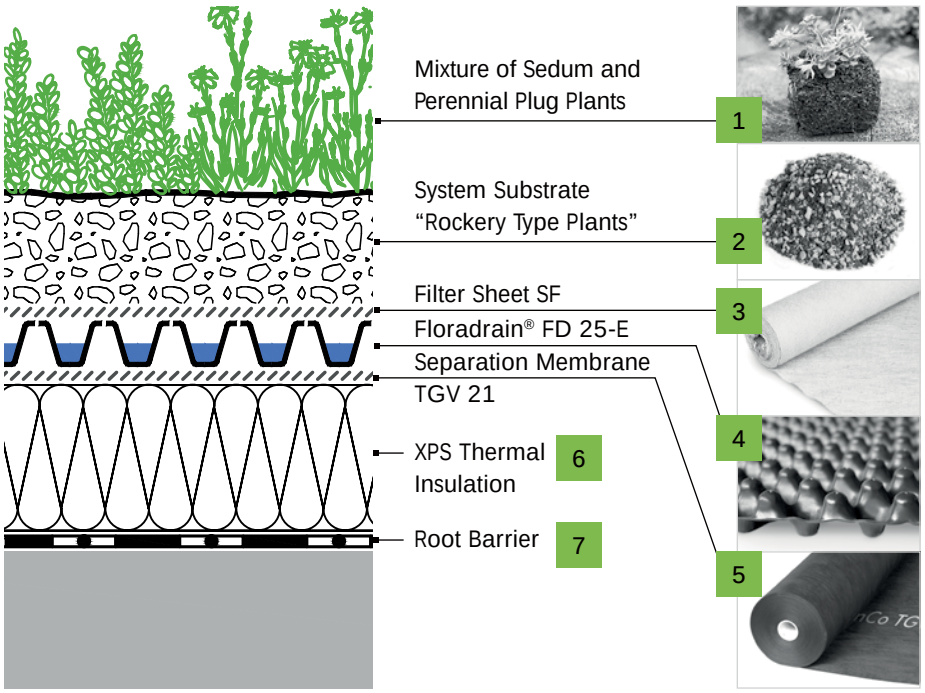
Features

- Extensive green roof build-up for inverted roofs allowing for diffusion and vaporisation
- Requires minimum maintenance
- For roofs without standing water and with a slight slope up to 8°



Design options

- Plug planting with sedum species in combination with a great variety of perennials. Allows for planting schemes with individual character
- Combinations with walkways and patios are possible



Technical Data

Build-up height:	ca. 110 mm
Roof pitch:	up to 8°
Weight, saturated:	ca. 120 kg/m²
Water storage capacity:	ca. 36 l/m²

Q37 System Specifications:
www.zinco-greenroof.co.uk/system_specifications

Installation Instructions:
www.zinco-greenroof.co.uk/installation_instructions

1 Vegetation: Sedum species in combination with an individual selection of perennials according to ZinCo plant list “Rockery Type Plants“. Vegetation is established with plug plants to allow for an individual character of the green roof and/or planting according to landscape drawings.

2 System Substrate “Rockery Type Plants“: Special ZinCo blend of aggregates to provide a system substrate particularly suitable for extensive green roofs with plant species of the ZinCo plant selection “Rockery Type Plants”. Available in Bulk Bags, 25 l bags and loose on lorry.

Water permeability mod. K: 0.6–70 mm/min
Water storage per 10 mm substrate height: ca. 4 l/m²

3 Filter Sheet SF

Item No.	Dimensions	Unit
2100	ca. 2.00 m × 100.00 m	200 m²-roll
2102	ca. 1.00 m × 100.00 m	100 m²-roll

Penetration force acc. to EN ISO 12236: ca. 1100 N
Flow rate (H50) acc. to EN ISO 11058: ca. 70 l/(m²·s) (≙ 0.07 m/s)
Notes on installation: Filter Sheet SF requires an overlap of at least 200 mm.

4

	Item No.	Dimensions	Unit
Floradrain® FD 25-E	3028	ca. 1.00 m × 2.00 m	2 m²-board
Floradrain® FD 25-R (Roll)	3023	ca. 1.00 m × 15.00 m	15 m²-roll
Floradrain® FD 25-RV (Roll with filter sheet attached)	3022	ca. 1.00 m × 15.00 m	15 m²-roll

Water storage capacity: ca. 3 l/m²
Filling volume: ca. 10 l/m²
Max. compressive strength (without filling): ca. 270 kN/m²

5 Separation Membrane TGV 21

Item No.	Dimensions	Unit
2180	ca. 1.60 m × 250.00 m	400 m²-roll
2185	ca. 1.60 m × 50.00 m	80 m²-roll

Effective opening width: Dw = 0.06 mm
Water vapour permeability of air layer thickness according to German Standard DIN 52 615: sd < 0.01 m
Notes on installation: Separation Membrane TGV 21 has to be installed with an overlap of min. 100 mm. At the roof edge it has to be taken up at least to the finished surface.

7 Root Barrier: If the waterproofing is not root resistant, the Root Barrier WSF 40 is required as a bottom layer of the system build-up. If the system build-up is to be in compliance with the ETA standard, the Root Barrier WSB 100-PO must be used instead.

Notes on installation: If a root barrier is required, it has to be placed below the XPS insulation directly onto the waterproofing.

Biodiversity Roofs

In areas where nature has been destroyed by construction works and the ground is sealed, green roofs can partially compensate for lost green areas and can provide replacement habitats for flora and fauna. Above all, natural, low-maintenance extensive green roofs are important refuges for flora and fauna.

Wild bees, butterflies and ground beetles find food and shelter there. However, the development of biodiversity depends to a great extent on how the habitats that are provided for the flora and fauna on a roof are structured. Pure sedum green roofs that are frequently installed in conjunction with very shallow substrate depths are not suitable for exploiting this potential. Indeed, the biotope function of greened roof areas can be specifically fostered with very little work using various design features and applying basic biodiversity principles during the planning and implementation stages.

Biodiversity module

Modulating the substrate surface

Varying the substrate depth creates different habitats that will extend the range of species available in the planting areas.

Introducing deadwood

Dead branches and tree trunks are a particularly valuable structural element. Deadwood is used as a habitat by moss, lichens, fungi, beetles, flies, midges, ants and wild bees, among others.

Temporary water bodies

Using borders and sheeting, areas can be created to retain stormwater on the roof for an extended period of time. It improves the amount of water available, e.g. for insects and birds.

Sand pockets and coarse gravel beds

Plant-free areas are an important enrichment of the biotope and are used by insects and other roof inhabitants as a hideaway, breeding ground and a sun trap.

Plant selection, e.g. forage plants

If areas with a deeper substrate are available (e.g. by creating hilly mounds), forage plants can be used for insects and birds or even a wider range of indigenous plants.

Nesting aids

The use of nesting aids specifically fosters insect colonisation.

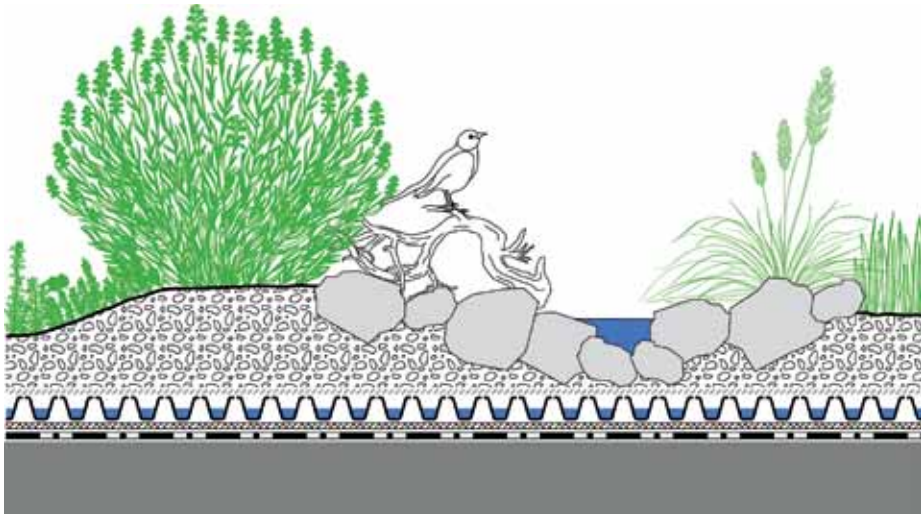
The number of biodiversity modules to be used can be freely chosen. As can be seen with the example of the IGA visitor centre in Berlin as shown below, this can be taken into consideration as early as the planning stage and individual modules can be fitted retrospectively.

Creating a biodiversity green roof on the IGA visitor centre

A biodiversity roof is installed on the IGA 2017 visitor centre in Berlin.

The system build-up "Rockery Type Plants" provides the foundation, this is the drainage element Fixodrain® XD 20.

Installed system substrate "Rockery Type Plants".



System build-up “Rockery Type Plants” with the drainage element Floradrain® FD 25-E as a possible basis for a biodiversity green roof.

Landscape mounds allow for a greater range of plants.

Temporary water areas created using drainage pipes and sheeting.

The mounded areas are planted with forage plants, for example, for wild bees.

System Build-up “Pitched Green Roofs”

From a pitch of 10° onwards, the green roof system build-up differs significantly from those below 10°. Shear forces increase with the roof slope and have to be transfered into stable beams. The substrate layer has to be protected against erosion. Plant selection and planting methods are to be adjusted to the relevant slope and exposure. The waterproofing should be root-resistant and a protection mat with high water storage is needed. Floraset® FS 75, a multi-functional drainage element of expanded polystyrene is the perfect element for pitched green roofs.

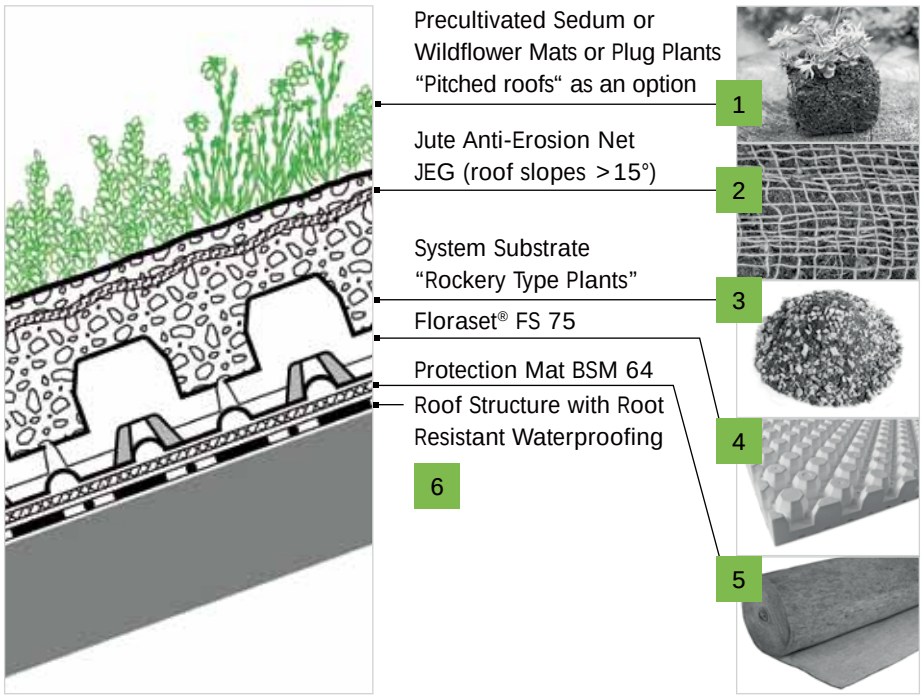
Although this system build-up requires only little maintenance, upkeep and maintenance aspects have to be taken into account at an early stage of project planning.

Features

- Proven system build-up suitable for roofs with slopes between 10° and 25°
- Floraset® elements retain the substrate and prevent it from sliding off
- The elements transfer shear forces into the roof construction; eaves and shear barriers have to be in compliance with the structural design

Design options

- Skylights can be installed as access for maintenance personnel
- Special ZinCo pitched roof accessories provide for a visual attractive roof edge design
- Additional erosion control is provided by the coarse-meshed jute net JEG for roof pitches >15° or in case of strong wind exposure



Technical Data

Build-up height:	ca. 140–150 mm
Roof pitch:	from 10 to 25 °
Weight, saturated:	ca. 130–145 kg/m²
Water storage capacity:	ca. 40–44 l/m²

Q37 System Specifications:
www.zinco-greenroof.co.uk/system_specifications

Installation Instructions:
www.zinco-greenroof.co.uk/installation_instructions

1 Vegetation: Precultivated Sedum or Wildflower Mats for immediate ground covering and safe protection against erosion. As an option: plug planting of a mixture of sedum species in combination with an individual selection of perennials according to plant list “Pitched Green Roofs“. With plug planting the number of plants per sqm has to be slightly increased compared to flat roofs to provide a faster covering and better protection against erosion.

2 Jute Anti-Erosion Net JEG

Item No.	Dimensions	Unit
2856	ca. 70.00 m × 1.22 m	85.4 m² bale

Weight: 500 g/m²
Mesh size: 30–40 mm
Notes on installation: Install on roofs with slopes exceeding 15°.

2 System Substrate “Rockery Type Plants“: Special ZinCo blend of aggregates to provide a system substrate particularly suitable for pitched green roofs with a plant mixture according to the ZinCo plant list “Pitched Green Roofs”. Due to faster water runoff, the subtrate layer on a pitched roof has to be slightly increased compared to flat roofs. Substrate available in Bulk Bags, 25 l bags and loose on lorry.

Water permeability mod. K: 0.6–70 mm/min
Water storage per 10 mm substrate height: ca. 4 l/m²

4 Floraset® FS 75

Item No.	Dimensions	Unit
3076	ca. 1.00 m × 1.00 m	1 m²-board

Filling volume with studs facing upwards: ca. 20 l/m²
Compressive strength at 10 % compression: ca. 55 kN/m²

5 Protection Mat BSM 64

Item No.	Dimensions	Unit
2064	ca. 2.00 m × 25.00 m	50 m²-roll

Water storage capacity: ca. 7 l/m²
Notes on installation: Protection Mat BSM 64 has to be installed with an overlap of min. 100 mm.
At the roof edge it has to be taken up at least to the finished surface.

6 Root Resistant Waterproofing: For the installation of pitched green roofs a root-resistant waterproofing is essential as it is practically impossible to install additional root barriers on pitched roofs.

Note: For attractive roof edge designs and the installation of additional shear barriers which might be necessary, please refer to accessories list on pages 42/43.

System Build-up “Steep Pitched Green Roofs”

For Green Roofs with slopes from 20° up to 35°, ZinCo Georaster® elements provide for a safe installation. These elements are made of recycled polyethylene (HD-PE) and interlock without requiring tools, creating a stable structure. This structure is safely accessible and can be infilled with system substrate. It allows for plenty of space for the plant root systems to establish and develop. Due to the faster water-run off and varying exposure to the sun, suitable plants have to be selected.

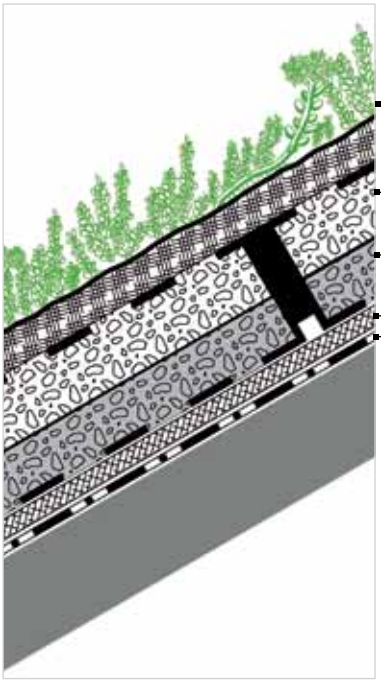
To avoid gaps in the vegetation coverage which might lead to erosion, an irrigation should be planned for, even if it is only needed in times of drought. A transfer of existing shear forces into stable eaves and into additional shear barriers is absolutely necessary on steep pitched roofs. For this, ZinCo offers a variety of accessories used in combination with the Georaster® elements.

Features

- Georaster® elements transfer shear forces into the eaves or into additional shear barriers
- Steep pitched roofs require periodic maintenance. Depending on the building location, pitch and exposure, an additional irrigation may be required.
- Vegetation might develop differently on the north and the south side

Design options

- Planting with precultivated sedum mats or plug plants
- Georaster® can also be installed under reinforced lawns, footway constructions or in slope protection
- Special solutions for roof pitches above 35° can be designed by the ZinCo technical department.

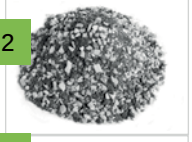


Precultivated Sedum Mats
or Dense Plug Planting
“Steep Pitched Roofs“

1

System Substrate
“Heather with Lavender”

2



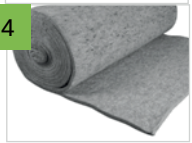
Georaster® elements

3

Protection Mat WSM 150

Roof Structure with Root
Resistant Waterproofing

4



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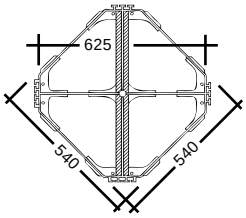


Technical Data

Build-up height:	ca. 120 mm
Roof pitch:	from 20° to 35°
Weight, saturated (without plants):	ca. 155 kg/m²
Water storage capacity (slope-dependent):	ca. 64 l/m²

Q37 System Specifications:
www.zinco-greenroof.co.uk/
system_specifications

Installation Instructions:
www.zinco-greenroof.co.uk/
installation_instructions

1 Vegetation: Precultivated Sedum Mats for immediate ground covering and safe protection against erosion. As an option, dense plug planting of sedum species combined with an individual selection of perennials according to plant list “Steep Pitched Green Roofs“. With plug planting the number of plants per sqm has to be increased considerably compared to flat roofs to provide a faster covering and better protection against erosion. For roofs with slopes exceeding 30°, only precultivated sedum mats should be used.

2 System Substrate “Heather with Lavender“: Special ZinCo blend of aggregates to provide a system substrate particularly suitable for steep pitched green roofs with a plant mixture according to the ZinCo plant list “Steep Pitched Green Roofs”. Due to faster water runoff, the subtrate layer on a pitched roof has to be slightly increased compared to flat roofs. Substrate available in Bulk Bags, 25 l bags and loose on lorry.

Water permeability mod. K: 0.3–30 mm/min
Water storage per 10 mm substrate height: ca. 5 l/m²

3 Georaster® elements

Item No.	Dimensions	Unit
3400	ca. 0.54 m × 0.54 m	Piece

Grid dimension: ca. 625 mm
Compressive strength: max. 8 kN/m in shear direction

4 Protection Mat WSM 150

Item No.	Dimensions	Unit
2015	ca. 1.00 m × 15.00 m	15 m²-roll

Water storage capacity: ca. 12 l/m²
Penetration force acc. to EN ISO 12236: > 2300 N
Notes on installation: Protection Mat WSM 150 has to be installed with an overlap of min. 100 mm.
At the roof edge it has to be taken up at least to the finished surface.

5 Root Resistant Waterproofing: For the installation of steep pitched green roofs a root-resistant waterproofing is abolutely essential as it is practically impossible to install additional root barriers on steep pitched roofs.

Note: For attractive roof edge designs and the installation of additional shear barriers which might be necessary, please refer to accessories list on pages 42/43.

System Build-up “Heather with Lavender”

“Heather with Lavender” is the ideal build-up for simple intensive green roofs with medium maintenance requirements. The corresponding plant community contains ground covering plants, blooming perennials as well as fragrant herbs such as thyme, oregano and lavender and allows for atttractive individual designs. The multifuncional water retention and drainage element Floradrain® FD 40-E is the core piece of this build-up and is characterised by its high drainage capacity.

European Technical Assessment
"Kits for Green Roofs"
CE ETA-13/0668

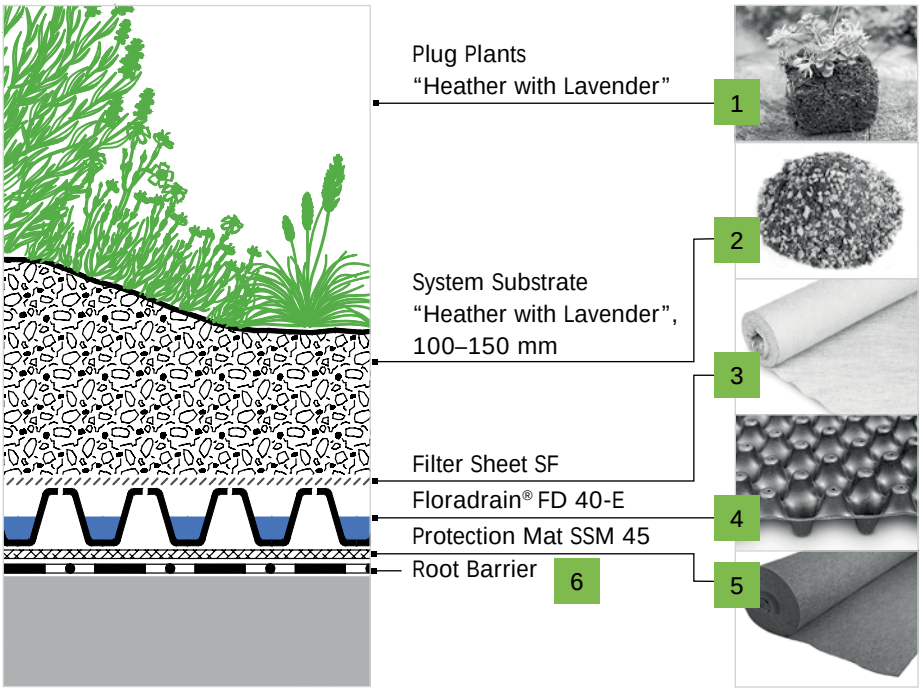
System build-ups with European Technical Assessment Details at www.zinco-greenroof.co.uk

Features

- For flat roofs and roofs with a slope of up to 8°. Also suitable for roofs without slope, provided residual ponding is less than 40 mm to keep the substrate clear of the water beneath
- Despite the drought resistant vegetation, additional irrigation might be necessary

Design options

- Combinations with walkways and patios are possible
- By shaping the substrate layer, a variety of landscapes can be created
- Floradrain® FD 40-E is also suitable for intensive roof gardens



Technical Data

Average build-up height:	ca. 160 mm
Average roof pitch:	up to 8°
Average weight, saturated:	ca. 195 kg/m²
Average water storage capacity:	ca. 70 l/m²

Q37 System Specifications:
www.zinco-greenroof.co.uk/system_specifications

Installation Instructions:
www.zinco-greenroof.co.uk/installation_instructions

1 Vegetation: Mainly drought-resistant species according to plant list “Heather with Lavender“ including ground covering plants, blooming perennials as well as fragrant herbs. Vegetation is established with plug plants to allow for an individual character of the green roof and planting according to landscape designs. Precultivated plug plants available at perennial nurseries.

2 System Substrate “Heather with Lavender“: Special ZinCo blend of aggregates to provide a system substrate particularly suitable for the ZinCo plant selection “Heather with Lavender“. Suitable substrate depths 100–150 mm. Substrate available in Bulk Bags, 25 l bags and loose on lorry.

Water permeability mod. K: 0.3–30 mm/min
Water storage per 10 mm substrate height: ca. 5 l/m²

3 Filter Sheet SF

Item No.	Dimensions	Unit
2100	ca. 2.00 m × 100.00 m	200 m²-roll
2102	ca. 1.00 m × 100.00 m	100 m²-roll

Penetration force acc. to EN ISO 12236: ca. 1100 N
Flow rate (H50) acc. to EN ISO 11058: ca. 70 l/(m²·s) (≙ 0.07 m/s)
Notes on installation: Filter Sheet SF requires an overlap of at least 200 mm.

4

	Item No.	Dimensions	Unit
Floradrain® FD 40-E	3041	ca. 0.96 m × 2.08 m	2 m²-board
Floradrain® FD 40-RV (Roll with filter sheet attached)	3042	ca. 0.94 m × 10.70 m	10 m²-roll

Water storage capacity: ca. 5 l/m²
Filling volume: ca. 17 l/m²
Compressive strength at 10 % compression without filling: ca. 170 kN/m²
Compressive strength at 10 % compression with filling: ca. 250 kN/m²

5 Protection Mat SSM 45

Item No.	Dimensions	Unit
2045	ca. 2.00 m × 50.00 m	100 m²-roll

Water storage capacity: ca. 5 l/m²
Penetration force acc. to EN ISO 12236: > 2000 N
Notes on installation: Protection Mat SSM 45 has to be installed with an overlap of min. 100 mm.
At the roof edge it has to be taken up at least to the finished surface.

5 Root Barrier: If the waterproofing is not root resistant, the Root Barrier WSB 100-PO is required as a bottom layer of the system build-up.

System Build-up “Wildflower”

“Wildflower” is the ideal build-up for a visually appealing semi-intensive green roof with medium maintenance requirements. Precultivated wildflower mats normally used for planting provide an attractive mixture of wildflowers, herbs and flowering perennials and a prolonged flowering period from April to September. The flowering height can range from 30 to100 cm depending on the substrate depth and the maintenance cycle. The wildflower vegetation attracts a wide range of pollinating insects and birds providing great ecological benefit.

European Technical Assessment
"Kits for Green Roofs"
CE ETA-13/0668

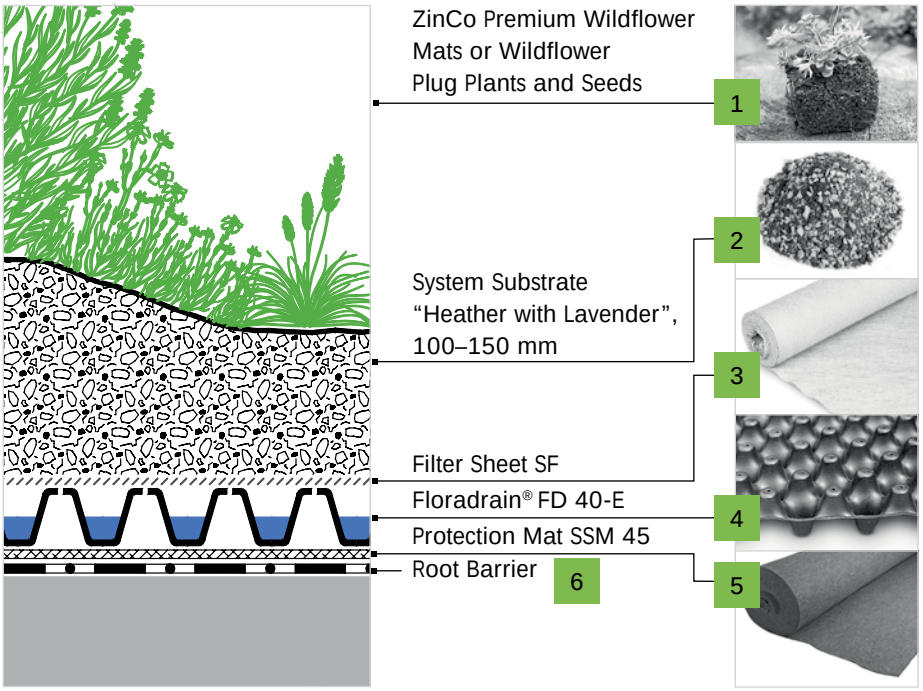
System build-ups with European Technical Assessment Details at www.zinco-greenroof.co.uk

Features

- High drainage capacity due to the use of the multifuncional drainage element Floradrain® FD 40-E
- For flat roofs and roofs with a slope of up to 8°
- Additional irrigation might be necessary in dry periods

Design options

- Combinations with walkways and patios are possible
- The vegetation layer can be applied using precultivated wildflower mats, or plug plants and seeds for more individual design



Technical Data

Average build-up height:	ca. 170 mm
Average roof pitch:	up to 8°
Average weight, saturated:	ca. 200 kg/m²
Average water storage capacity:	ca. 73 l/m²

Q37 System Specifications:
www.zinco-greenroof.co.uk/system_specifications

Installation Instructions:
www.zinco-greenroof.co.uk/installation_instructions

1 Vegetation: Precultivated Wildflower Mats for immediate ground covering including a biodiverse and colourful mixture of wildflowers, herbs and flowering perennials with a prolonged flowering period from April to September. For more individual design plug plants or seeds both available at perennial nurseries can be used for planting.

2 System Substrate “Heather with Lavender“: Special ZinCo blend of aggregates to provide a system substrate particularly suitable for the ZinCo Premium Wildflower Mats. Suitable substrate depths 100–150mm. Substrate available in Bulk Bags, 25 l bags and loose on lorry.

Water permeability mod. K: 0.3–30 mm/min

Water storage per 10 mm substrate height: ca. 5 l/m²

3 Filter Sheet SF

Item No.	Dimensions	Unit
2100	ca. 2.00 m × 100.00 m	200 m²-roll
2102	ca. 1.00 m × 100.00 m	100 m²-roll

Penetration force acc. to EN ISO 12236: ca. 1100 N

Flow rate (H50) acc. to EN ISO 11058: ca. 70 l/(m²·s) (≙ 0.07 m/s)

Notes on installation: Filter Sheet SF requires an overlap of at least 200 mm.

4 Floradrain® FD 40-E / Floradrain® FD 40-RV (Roll with filter sheet attached)

Item No.	Dimensions	Unit
3041	ca. 0.96 m × 2.08 m	2 m²-board
3042	ca. 0.94 m × 10.70 m	10 m²-roll

Water storage capacity: ca. 5 l/m²

Filling volume: ca. 17 l/m²

Compressive strength at 10 % compression without filling: ca. 170 kN/m²

Compressive strength at 10 % compression with filling: ca. 250 kN/m²

5 Protection Mat SSM 45

Item No.	Dimensions	Unit
2045	ca. 2.00 m × 50.00 m	100 m²-roll

Water storage capacity: ca. 5 l/m²

Penetration force acc. to EN ISO 12236: > 2000 N

Notes on installation: Protection Mat SSM 45 has to be installed with an overlap of min. 100 mm. At the roof edge it has to be taken up at least to the finished surface.

5 Root Barrier: If the waterproofing is not root resistant, the Root Barrier WSB 100-PO is required as a bottom layer of the system build-up.

System Build-up “Roof Garden”

The “Roof Garden” is a multifunctional green roof system build-up with high water retention capacity. It is suitable for lawns, perennial plants, and with deeper system substrate, for shrubs and trees. Hard landscapes such as walkways, playgrounds or driveways can also be integrated. Floradrain® FD 60 neo as the core piece of the build-up provides a large water reservoir underneath the system substrate which reaches the plants by capillary action and evaporation. This reduces the need for additional watering.

European Technical Assessment
"Kits for Green Roofs"
CE ETA-13/0668

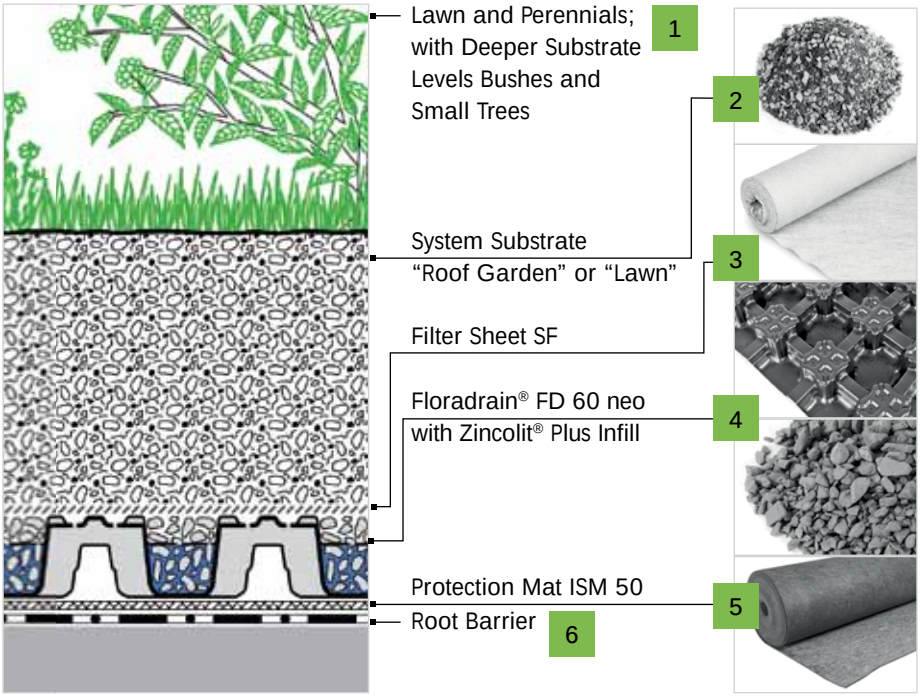
System build-ups with European Technical Assessment Details at www.zinco-greenroof.co.uk

Features

- On 0° roofs, roof dam irrigation can be installed by using ZinCo roof dam up elements above the roof outlets. This provides additional water storage of up to 50 mm in the space beneath the drainage element.

Design options

- Build-up allows for a great variety of soft and hard landscaping, even water features are possible
- Floradrain® FD 60 neo can be filled with concrete as a sub-construction for driveways or footings without penetrating the waterproofing or interrupting the drainage



Technical Data

Build-up height:	from ca. 270 mm
Weight, saturated (incl. dam-up):	from ca. 370 kg/m²
Water storage capacity:	from ca. 136 l/m²

Q37 System Specifications:
www.zinco-greenroof.co.uk/system_specifications

Installation Instructions:
www.zinco-greenroof.co.uk/installation_instructions

1 Vegetation: Lawn and perennials and, with deeper substrate levels, bushes and small trees. Vegetation is established with precultivated plants available at perennial and tree nurseries.

2 System Substrate “Roof Garden“ or “Lawn“: Special ZinCo blend of aggregates particularly suitable for intensive green roofs with demanding perennials, bushes and trees. Substrate depths from min. 200 mm up to 350 mm. If substrate heights of more than 350 mm are required (e.g. for trees) Zincolit® Plus is used as a sub-substrate. Substrates “Roof Garden“ and “Lawn“ as well as Zincolit® Plus are available in Bulk Bags, 25 l bags and loose on lorry.

System Substrate	Water permeability mod. K: 0.3–30 mm/min Water storage per 10 mm substrate height: ca. 5 l/m²
Zincolit® Plus	Water permeability mod. K: 60–400 mm/min Water storage per 10 mm substrate height: ca. 3 l/m²

3 Filter Sheet SF

Item No.	Dimensions	Unit
2100	ca. 2.00 m × 100.00 m	200 m²-roll
2102	ca. 1.00 m × 100.00 m	100 m²-roll

Penetration force acc. to EN ISO 12236: ca. 1100 N
Flow rate (H50) acc. to EN ISO 11058: ca. 70 l/(m²·s) (≙ 0.07 m/s)
Notes on installation: Filter Sheet SF requires an overlap of at least 200 mm.

4 Floradrain® FD 60 neo

Item No.	Dimensions	Unit
3062	ca. 2.30 m × 1.03 m (net 2.25 m × 1.00 m)	2.30 m²-board

Water storage capacity with Zincolit® Plus infill: ca. 13 l/m²
Filling volume: ca. 27 l/m²
Compressive strength at 10 % compression (EN ISO 25619-2) without filling: ca. 40 kN/m²
Compressive strength at 10 % compression filled with stone chippings up to the upper edge: ca. 190 kN/m²

5 Protection Mat ISM 50

Item No.	Dimensions	Unit
2050	ca. 2.00 m × 25.00 m	50 m²-roll

Water storage capacity: ca. 4 l/m²
Penetration force acc. to EN ISO 12236: > 3500 N
Notes on installation: Protection Mat ISM 50 has to be installed with an overlap of min. 100 mm.
At the roof edge it has to be taken up at least to the finished surface.

6 Root Barrier: If the waterproofing is not root resistant, the Root Barrier WSB 100-PO is required as a bottom layer of the system build-up.

System Build-up “Roof Garden” with Aquafleece® Irrigation

This system build-up is specially suitable for roofs with low load reserve and/or low build-up height. It allows for intensive greening with lawn or perennials despite low substrate heights of 150–250 mm. By creating mounds of up to 400 mm it is also possible to plant shrubs.

This build-up integrates an irrigation system providing water to the plants from below by capillary action. For this, special dripperlines are fastened to the Aquafleece® AF 300 below the substrate at intervals of 50 cm using a hook & loop tape. Water is supplied via the dripperlines by the Irrigation Manager BM 2000, as required.

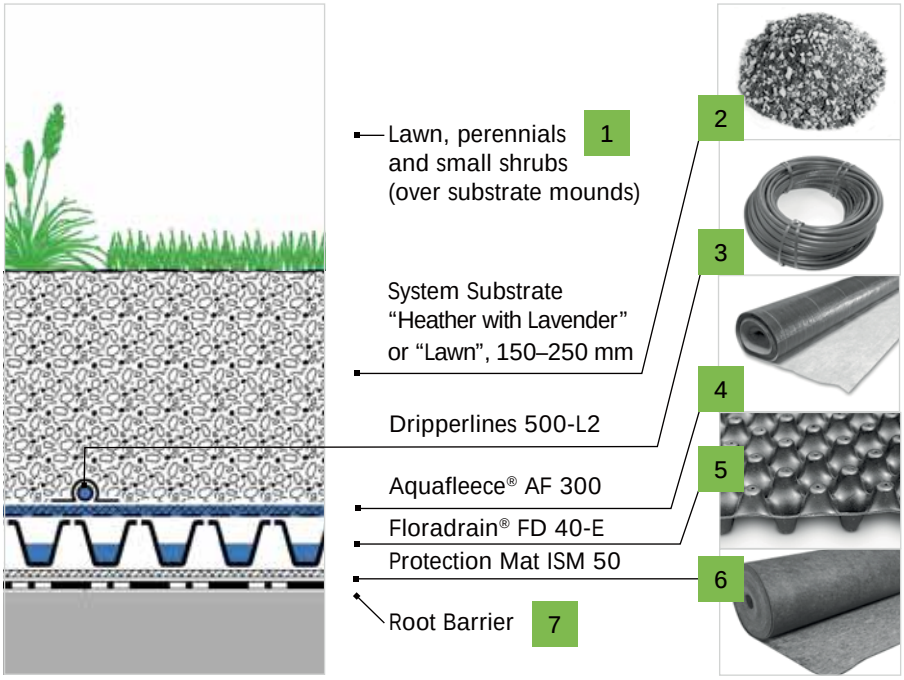
Loss of water by evaporation is reduced and water consumption is optimised as the water is evenly distributed through the Aquafleece® AF 300 and supplied to the plants from below.

Features

- For 0° roofs up to light-pitched roofs (up to approx. 8°)
- Especially suitable for roofs with low load reserve and/or a low build-up height
- Integrated capillary irrigation system through special dripperlines optimises water consumption

Design options

- Allows for intensive greening with individual design features and a wide range of plant species even on roofs with low load reserve or low build-up height
- Creating substrate mounds up to 400 mm also allows for planting shrubs



Technical Data

Average build-up height:	ca. 200 mm
Roof pitch:	from 0° up to 8°
Average weight, saturated:	ca. 230 kg/m²
Average water storage capacity:	ca. 80 l/m²

Q37 System Specifications:
www.zinco-greenroof.co.uk/system_specifications

Installation Instructions:
www.zinco-greenroof.co.uk/installation_instructions

1 Vegetation: Lawn and perennials. Modulating mounds of up to 40 mm, shrubs are also possible. The lawn shall preferably be sown directly in a seedbed. Pre-cultivated lawn turf must necessarily be pre-grown on slightly humous sandy soil. Perennials and shrubs as precultivated plants available in perennial nurseries.

2 System Substrate “Heather with Lavender“: Special ZinCo blend of aggregates to provide a system substrate particularly suitable for semi-intensive or intensive green roofs. Suitable substrate depths 150–250 mm. Substrate available in Bulk Bags, 25 l bags and loose on lorry.

Water permeability mod. K: 0.3–30 mm/min
Water storage per 10 mm substrate height: ca. 5 l/m²

3 Dripperline 500-L2

Item No.	Dimensions	Unit
935000	Ø ca. 16 mm	100 m-roll

Dripper spacing: ca. 500 mm
Dripper flow rate: ca. 2 l/h
Pressure compensation: 0.4 to 3.0 bar

Notes on installation: The dripperlines are installed and fixed on the Aquafleece AF 300 at intervals of 500 mm using a hook & loop tape.

4 Aquafleece® AF 300

Item No.	Dimensions	Unit
2120	ca. 2.10 m × 50.00 m	105 m²-roll

Water absorption capacity (filter sheet): ca. 3–4 l/m²
Flow rate (woven fabric): ca. 20 l/(m²·s)

5 Floradrain® FD 40-E

Item No.	Dimensions	Unit
3041	ca. 0.96 m × 2.08 m	2 m²-board

Water storage capacity: ca. 5 l/m²
Filling volume: ca. 17 l/m²
Compressive strength at 10 % compression without filling: ca. 170 kN/m²
Compressive strength at 10 % compression with filling: ca. 250 kN/m²

6 Protection Mat ISM 50

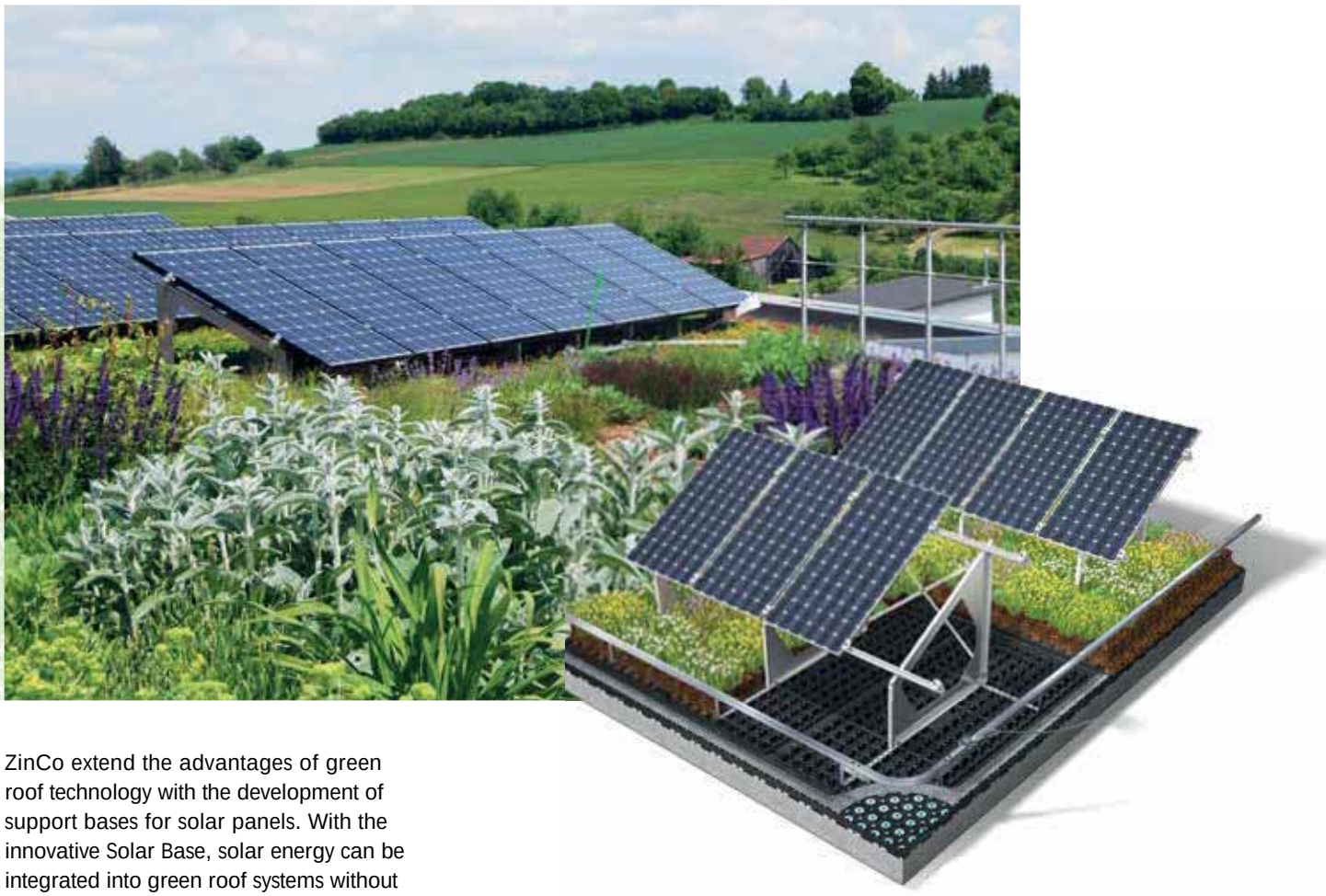
Item No.	Dimensions	Unit
2050	ca. 2.00 m × 25.00 m	50 m²-roll

Water storage capacity: ca. 4 l/m²
Penetration force acc. to EN ISO 12236: > 3500 N

Notes on installation: Protection Mat ISM 50 has to be installed with an overlap of min. 100 mm. At the roof edge it has to be taken up at least to the finished surface.

7 Root Barrier: If the waterproofing is not root resistant, the Root Barrier WSB 100-PO is required as a bottom layer of the system build-up.

System Build-up ”SolarVert”



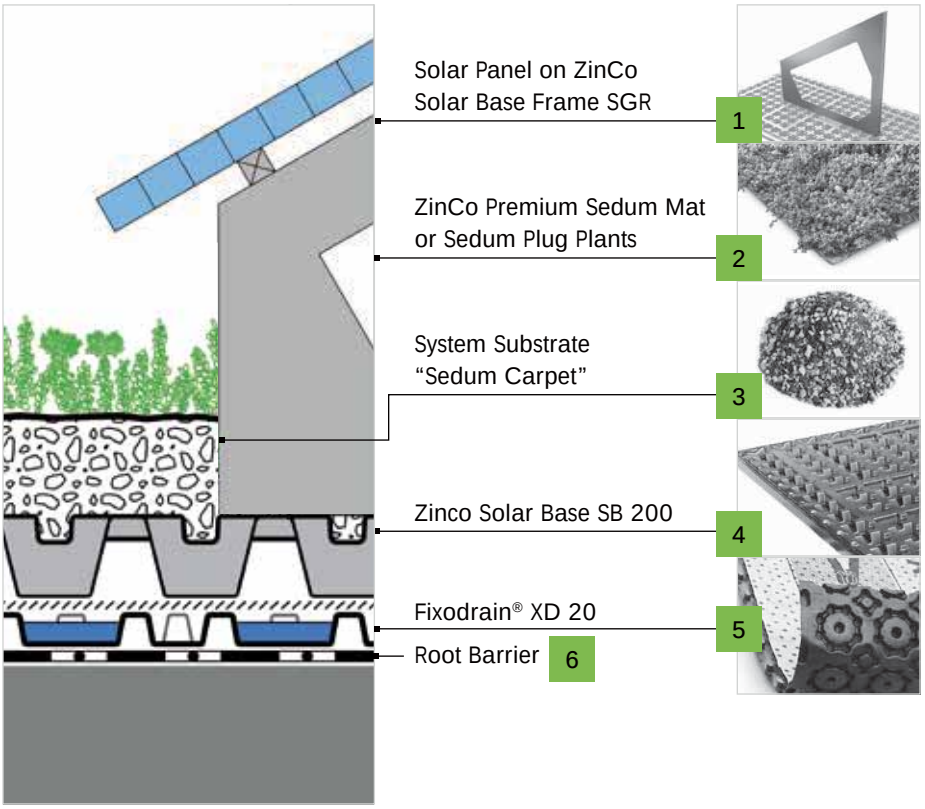
ZinCo extend the advantages of green roof technology with the development of support bases for solar panels. With the innovative Solar Base, solar energy can be integrated into green roof systems without penetrating the roof membrane and with the green roof build-up providing the necessary load to keep the structure in place. This “SolarVert“ system makes use of synergy effects, as the efficiency of solar panels is significantly improved if combined with a green roof.
The inclusion of solar power can be seen as another valuable ecological benefit and will contribute towards compliance with building regulations, environmental standards and assessments.

Features

- Installation without roof penetration
- Even load distribution, no high point loads
- Lightweight components easy to transport
- Pre-assembled base plate for quick an easy installation of support frame

Design options

- The “SolarVert” build-up has been designed for the classical southern exposure with a maximal energy yield during the midday period
- Vertical systems and systems with an east-west orientation aiming at a more evenly distributed yield during the day and avoiding excessive power peaks are available as an option



Technical Data

Build-up height:	from ca. 140 mm
Roof pitch:	up to ca. 5°
Weight dry/saturated:	from ca. 112/142 kg/m²*
Water storage capacity:	from ca. 30 l/m²

* Please note: The dry weight of the build-up is decisive for the required superimposed load, while the water-saturated weight affects the design of the roof construction. The required superimposed load and the resulting weight of the system build-up need to be determined depending on the location and building geometry according to the structural calculation.

Q37 System Specifications:
www.zinco-greenroof.co.uk/system_specifications

Installation Instructions:
www.zinco-greenroof.co.uk/installation_instructions

1 Solar Panel on ZinCo Solar Base Frame SGR: Solar panels, available from specialised solar manufacturers, are mounted on ZinCo Solar Base Frame SGR made of aluminium and manufactured in one piece to match ZinCo Solar Base SB 200. Frame available with inclinations between 5° and 45°, in 5° increments.

	Item No.	Length	Front Height	Rear Height	Unit
Solar Base Frame SGR with different inclinations	9700 ...	950 mm	350 mm	430–1300 mm	Piece

2 Vegetation: Precultivated Sedum Mats for immediate ground covering including a minimum eight varieties of sedum in a wide range of colours. Alternatively, sedum plug plants for ground covering within ca. 1 year depending on the number and size of plug plants used.

3 System Substrate “Sedum Carpet“: Special ZinCo blend of aggregates to provide a system substrate suitable for extensive green roofs in single- or multilayered construction. Available in Bulk Bags, 25 l bags and loose on lorry.

Water permeability mod. K: 60–400 mm/min
Water storage per 10 mm substrate height: ca. 3 l/m²

4 ZinCo Solar Base SB 200: Sub-structure assembly for the installation of PV or thermal solar panels. Complete assembly made of recycled hard plastic with an aluminium profile on the bottom side of the plastic element.

	Item No.	Dimensions	Unit
Solar Base SB 200	3460	ca. 1.00 m × 2.00 m	Piece
Solar Base SB 200-4 for east-west-installation	3465	ca. 1.00 m × 2.00 m	Piece

Filling volume: ca. 16 l/m²
Compressive strength at 10 % compression: ca. 250 kN/m²
In-plane water flow capacity (EN ISO 12958): roof slope 2 %: ca. 2.4 l/(s·m)

5 Fixodrain® XD 20

Item No.	Dimensions	Unit
3021	ca. 1.00 m × 20.00 m	20 m²-roll

Compressive strength at 10 % compression: ca. 50 kN/m²
Water storage capacity: ca. 3 l/m²
Vertical water flow to element level according to Standard EN ISO 11058: ca. 70 l/s

6 Root Barrier: If the waterproofing is not root resistant, the Root Barrier WSB 100-PO is required as a bottom layer of the system build-up.

Safety Systems on Green Roofs

Accident prevention saves lives! Therefore, regulations prescribe safety measures for working on roofs. ZinCo offers a maximum of safety to people and buildings through their wide range of innovative Fallnet® solutions including both individual and collective fall protection systems. All systems are non-penetrating and based on the idea of using the actual green roof build-up as necessary ballast. Individual fall protection systems include the Fallnet® SR Fixing Device consisting of interlocking grid elements and a centralised fixing point made of stainless steel. It can be adapted to nearly any construction requirement and geometry.

The Fallnet® SR Rail option is more comfortable and ideal for large roof areas. This rail solution is planned individually to suit project specific requirements. It covers the complete danger zone with a horizontally mobile fixing point, the so called runner. In terms of collective fall protection systems, ZinCo offers the maintenance guardrail Fallnet® ASG suitable for temporary maintenance work on roofs. As an option for landscaped roofs intended for access, ZinCo offers the attractive and funcional balustrade railing systems SG 40 using the penetration-free ZinCo Guardrail base GB as a substructure.

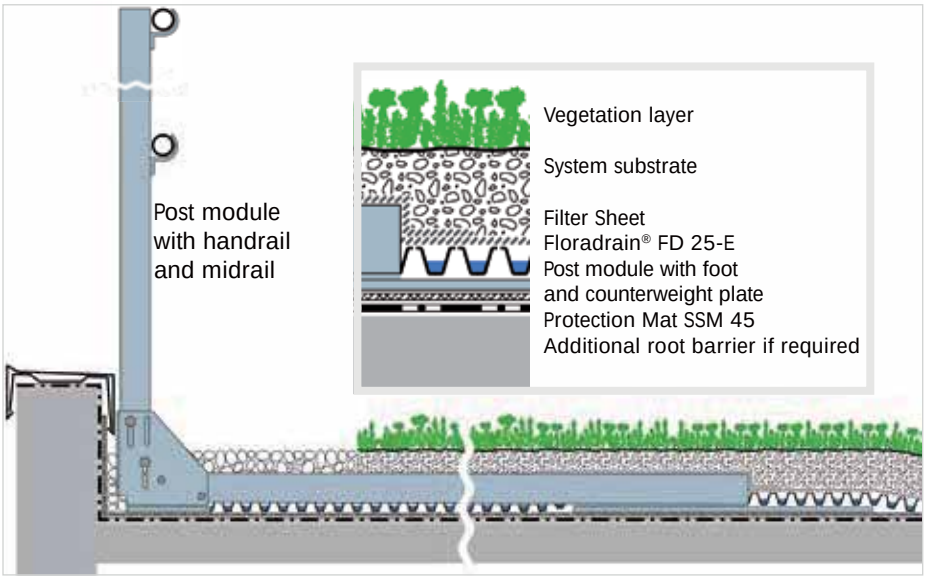
Features

- ZinCo fall protection systems do not penetrate the roof and allow for quick and easy installation
- Independent of substructure and neutral with regards to building physiscs

Design options

- Fallnet® ASG can be installed at 90° angle or at a visually unobtrusive 67.5° angle
- ZinCo Guardrail base can be used to mount any design of balustrade railing such as steel or glass balustrades etc., provided the flange system is compatible.

Application example for Fallnet® ASG maintenance guardrail:



Technical Data

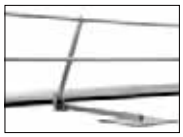
for Fallnet® ASG maintenance guardrail

Dimensions:	ca. 1.75 m × 1.2 m × 0.6 m
Max. roof pitch:	up to 5°
Ballast required:	up to 2°: min. 80 kg/m² up to 5°: min. 100 kg/m²

Q37 System Specifications:
www.zinco-greenroof.co.uk/system_specifications

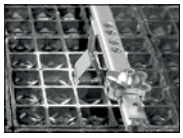
Installation Instructions:
www.zinco-greenroof.co.uk/installation_instructions

For safety at work



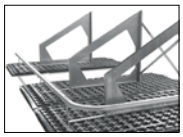
Fallnet® ASG Maintenance Guardrail

Edge protection system according to EN 13374 class A used as a collective fall prevention system during maintenance works on roofs with an upstand and an inclination of up to 5°. The installation takes place without roof penetrations with load applied over the entire surface. The Maintenance Guardrail can be installed either vertically or with an inclination of 67.5°. Maximum post spacing: 2.6 m.



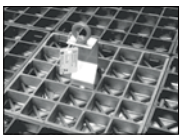
Fallnet® SR Rail

Rail system with horizontally gliding fixing point (“Runner”) to be installed with grid elements, rail supports, rail components and superimposed load. Fixing device for individual fall protection without roof penetration, tested and certified according to European Standard EN 795, 2012 Types D + E.



Fallnet® SB 200-Rail

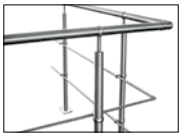
Rail system with horizontally gliding fixing point (“Runner”) to be installed in combination with the ZinCo Solar Base SB 200, Solar Base Frame SGR or ZinCo Guardrail Base GB / GB Corner fixing device for individual fall protection without roof penetration, tested and certified according to European Standard EN 795:2012, Types D + E.



Fallnet® SR

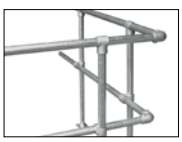
Single point fixing device for fall protection without roof penetration, tested and certified according to European Standard EN 795:2012 Type E. It consists of single grid elements which are plugged together to a unit and ballasted with a superimposed load (e.g. ZinCo System Substrate, gravel or comparable bulk material). The fixing point with ring eye is situated centrally in the unit. Please contact us to receive your project specific Fallnet® SR planning.

For recreational areas and emergency escape routes



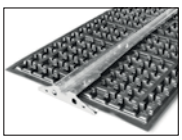
Railing System SG 40-E made of stainless steel

Elegantly shaped balustrade railing, made of stainless steel, harmonized with the ZinCo Guardrail Base GB, for installation without any roof penetration and drilling. For project specific solutions please contact us for further information.



Railing System SG 40-S made of galvanized steel

Functional and stable balustrade railing made of galvanized steel, harmonized with the ZinCo Guardrail Base GB / GB Corner for installation without any roof penetration and drilling. The Railing System can be adjusted to suit the individual project. It consists of several individual components. Depending on the project, components other than those listed may be required.



Construction Base for Railing Systems

Construction Base for Railing Systems without any roof penetration made of profiled ABS (Acrylonitrile Butadiene Styrene) plastic with integrated aluminium profiles on the underside and post support profile on the upper side of the base. Can be used with all posts with a suitable fixing flange (spacing between holes 100 × 75 mm).

System Build-up ”Stormwater Management Roof”

The need for flood control by stormwater management on roofs and podiums is becoming more and more important as changing weather conditions such as severe local rain events can lead to an entire stormwater drainage system becoming overloaded.

The ZinCo “Stormwater Management Roof“ build-up provides additional retention space and is able to retain a large proportion of stormwater in case of heavy rain events. The retained stormwater will only be released into the drainage system over a pre-defined period of time (e.g. 24 hours).

For this, a retention flow controller is required over the roof drains allowing to adjust the dam-up height and the discharge rate of the retained stormwater.

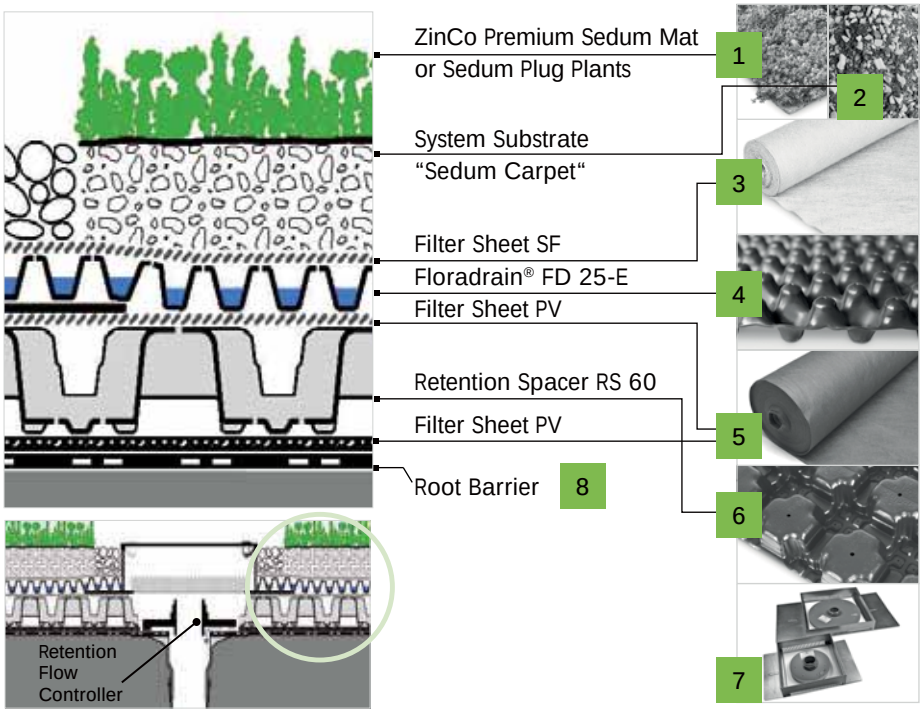
The retention spacer one of the core pieces of the blue roof build-up is available in different designs and heights. For extensive and semi-intensive green roofs, the transport friendly ZinCo RS 60 retention spacer is the right option to choose. To create blue podiums combining soft and hard landscaping on top, ZinCo offers heavy duty retention spacers RSX which are available in different heights to comply with individual installation requirements.

Features

- Retention spacers are the core pieces of the build-up providing additional stormwater storage volume
- Flow Controllers allow for a delayed drainage of the excess rainwater
- A 0° pitch roof structure is required for this build-up

Design options

- This blue roof build-up allows for the installation of a great variety of extensive and intensive green roof systems on top. Even hard landscaping is possible. As the ZinCo Retention Spacers come in different designs and heights, they can be chosen according to project-specific landscaping and water management requirements



Technical Data

for “Stormwater Management Roof” with “Sedum Carpet”

Build-up height:	ca. 170 mm
Weight, saturated: (including plants)	ca. 175 kg/m² *
Water storage capacity:	ca. 80 l/m² *

* At maximum retention height of 60 mm

Q37 System Specifications:
www.zinco-greenroof.co.uk/system_specifications

Installation Instructions:
www.zinco-greenroof.co.uk/installation_instructions

1–4 For detailed information about the components of the system build-up “Sedum Carpet” (Sedum vegetation, System Substrate “Sedum Carpet”, Filter Sheet and Floradrain® FD 25-E) please refer to page 7 of this system guide.

5 Filter Sheet PV	Item No.	Dimensions	Unit
	2131	ca. 2.00 m × 50.00 m	100 m²-roll
	Penetration force acc. to EN ISO 12236: ca. 4300 N Tensile strength (200 mm) according to EN ISO 10319 lengthwise/crosswise: ca. 23.0 kN/m		
	Notes on installation: The Filter Sheet PV used as a protection layer needs to be installed with an overlap of approx. 100 mm. At all roof edges, roof penetrations etc. the lower PV Filter is drawn upwards at least to the upper edge of the build-up.		

6a Retention Spacer RS 60	Item No.	Dimensions	Unit
	3408	ca. 2.30 m × 1.03 m (net 2.25 m × 1.00 m)	2.25 m²-board
	Maximum retention volume/height: ca. 55 l/m² / ca. 60 mm Compressive strength at 10 % compression according to EN ISO 25619-2: ca. 40 kPa		

6b Retention Spacer RSX for hard landscaping (blue podiums)	Item No.	Dimensions	Height	Unit
RSX 70	3407	ca. 0.6 × 0.6 m	70 mm	0.36 m² board
RSX 120	3412	ca. 0.6 × 0.6 m	120 mm	0.36 m² board
RSX 170	3417	ca. 0.6 × 0.6 m	170 mm	0.36 m² board
	Maximum retention volume: RSX 70: 66 l/m², RSX 120: 114 l/m², RSX 170: 141 l/m² Compressive strength according to EN ISO 17151: up to 50 t/m²			

7 Retention Flow Controller and Inspection Chamber	Item No.	Includes	Unit
Set RDS 48	4002	Retention Flow Controller RD 48 and inspection chamber KS 10/57	Set
Set RDS 28	4000	Retention Flow Controller RD 28 and inspection chamber 10/40	Set
	Retention Flow Controller: Diameter flow controller: ca. 480 mm (RD 48) and ca. 280 mm (RD 28) Adjustable height overflow: ca. 30 mm – 100 mm Adjustable flow rate with initial attenuation height of 55 mm: from ca. 0.025 l/s up to ca. 0.60 l/s		

8 Root Barrier: If the waterproofing is not root resistant, the Root Barrier WSF 40 is required as a bottom layer of the system build-up.

System Build-up “Sponge City Roof”

The system build-up “Sponge City Roof” allows for near-natural stormwater management. It combines the advantages of an insect-friendly, biodiverse extensive green roof with an additional water storage and a temporary retention volume with flow-controlled roof drain.

The lower part of the water accumulation volume is made available to the plants through the Wicking Mat DV 40 by capillary action.

In the upper part of the water accumulation volume stormwater is built up to a predetermined depth and drains at a desired rate.
The vegetation develops dynamically depending on the precipitation distribution throughout the year. It will require maintenance according to its needs. Additional irrigation may be necessary in summer during long periods of drought.

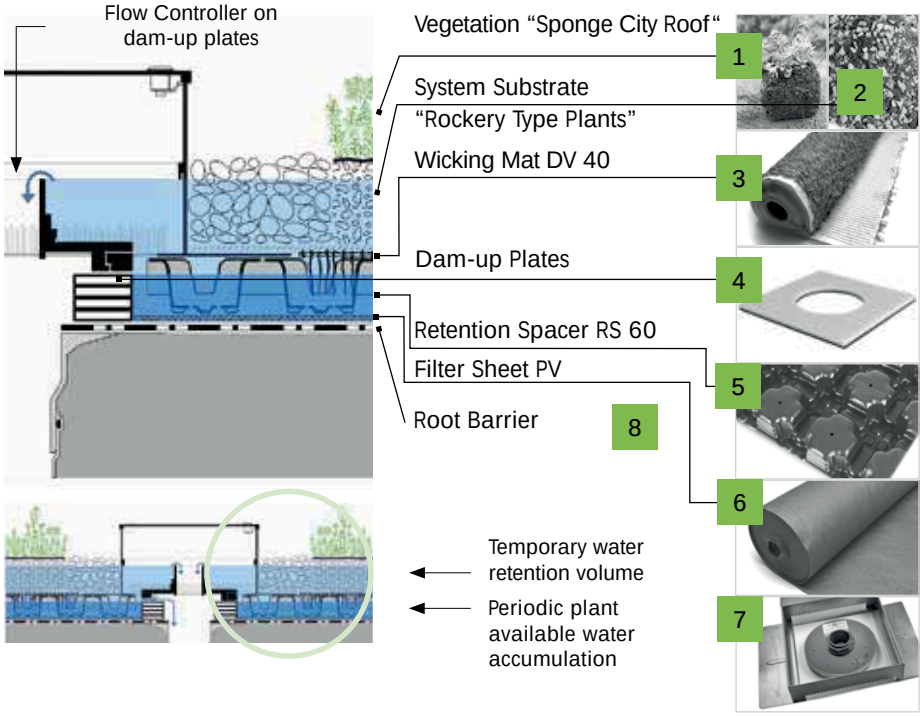
We recommend having the final and also the development care and maintenance regime carried out by specialists.

Features

- Near-natural stormwater management
- A roof surface without inclination is a precondition for this system build-up
- Depending on the region, the accumulated water shall be drained during the winter months

Design options

- Allows for greater diversity in plant design, favouring invertebrate biodiversity on the roof
- Dynamic development of the vegetation depending on the annual precipitation distribution
- Rainwater retention capacity, runoff flow and accumulation volume are adjusted to the specific requirements of each project



Technical Data

System Build-up “Sponge City Roof” with Retention Spacer RS 60

Build-up height:	ca. 160 mm
Weight, saturated (incl. dam-up):	ca. 210 kg/m²*
Water storage capacity:	ca. 107 l/m²*

*including max. periodically plant-available water accumulation (4 plates of 13 mm each) and max. temporary retention volume up to 20 mm below substrate surface.

Q37 System Specifications:
www.zinco-greenroof.co.uk/system_specifications

Installation Instructions:
www.zinco-greenroof.co.uk/installation_instructions

1 Vegetation: Precultivated plug plants or precultivated mats according to plant list “Sponge City Roof”. Precultivated plug plants available at perennial nurseries.

2 System Substrate “Rockery Type Plants“: Special ZinCo blend of aggregates to provide a system substrate particularly suitable for extensive green roofs with combinations of sedum species and perennials. Available in Bulk Bags, 25 l bags and loose on lorry.

Water permeability mod. K: 0,6–70 mm/min
Water storage per 10 mm substrate height: ca. 4 l/m²

3 Wicking Mat DV 40

Item No.	Dimensions	Unit
2160	ca. 2.00 m × 25.00 m	50 m²-roll
2165	ca. 2.00 m × 10.00 m	20 m²-roll

Water distributing polyester fleece with capillary-effective fibres on one side. Fibre length: ca. 40 mm

Notes on installation: Wicking mat DV 40 needs to be installed with an overlap of 100 mm. For this reason, the mat comes with a 100 mm wide strip without fibres allowing for neat installation in overlapping areas.

4 Dam-up plates AS 13

Dam-up plates to create a water dam-up in combination with the Retention Flow Controller RS 28.
A maximum of 5 plates can be stacked.

Total plate height: 13 mm — Dimensions: 28 × 28 cm

5 Retention Spacer RS 60

Item No.	Dimensions	Unit
3408	ca. 2.30 m × 1.03 m (net 2.25 m × 1.00 m)	2.25 m²-board

Maximum retention volume/height: ca. 55 l/m² / ca. 60 mm
Compressive strength at 10 % compression according to EN ISO 25619-2: ca. 40 kPa

6 Filter Sheet PV

Item No.	Dimensions	Unit
2131	ca. 2.00 m × 50.00 m	100 m²-roll

Penetration force acc. to EN ISO 12236: ca. 4300 N
Tensile strength (200 mm) according to EN ISO 10319 lengthwise/crosswise: ca. 23.0 kN/m

Notes on installation: The Filter Sheet PV used as a protection layer needs to be installed with an overlap of approx. 100 mm. At all roof edges, roof penetrations etc. the lower PV Filter is drawn upwards at least to the upper edge of the build-up.

7 Retention Flow Controller Set RDS 28

Item No.	Consisting of:	Unit
4000	Retention Flow Controller RD 28 and Inspection chamber KS 10/40	Set

Retention Flow Controller:
Diameter flow-control device: ca. 280 mm
Adjustable height overflow: ca. 30 mm – 100 mm
Adjustable flow rate with initial attenuation height of 55 mm:
from ca. 0.025 l/s up to ca. 0.60 l/s

8 Root Barrier: If the waterproofing is not root resistant, the Root Barrier WSF 40 is required as a bottom layer of the system build-up.

System Build-up “Walkways and Driveways on Podiums”

Long lasting and functioning hard landscapes on rooftops and podium decks require well-engineered systems. These assure the continuance of the roof function (e.g. continuous waterproofing and drainage capacity) and allow for horizontal forces generated by accelerating, braking and steering. If hard and soft landscaping are combined, not only drainage and compressive strength are important, but also the water retention capacity. Stabilodrain® SD 30, the core piece of this build-up, meets all requirements and ensures durable functionality.

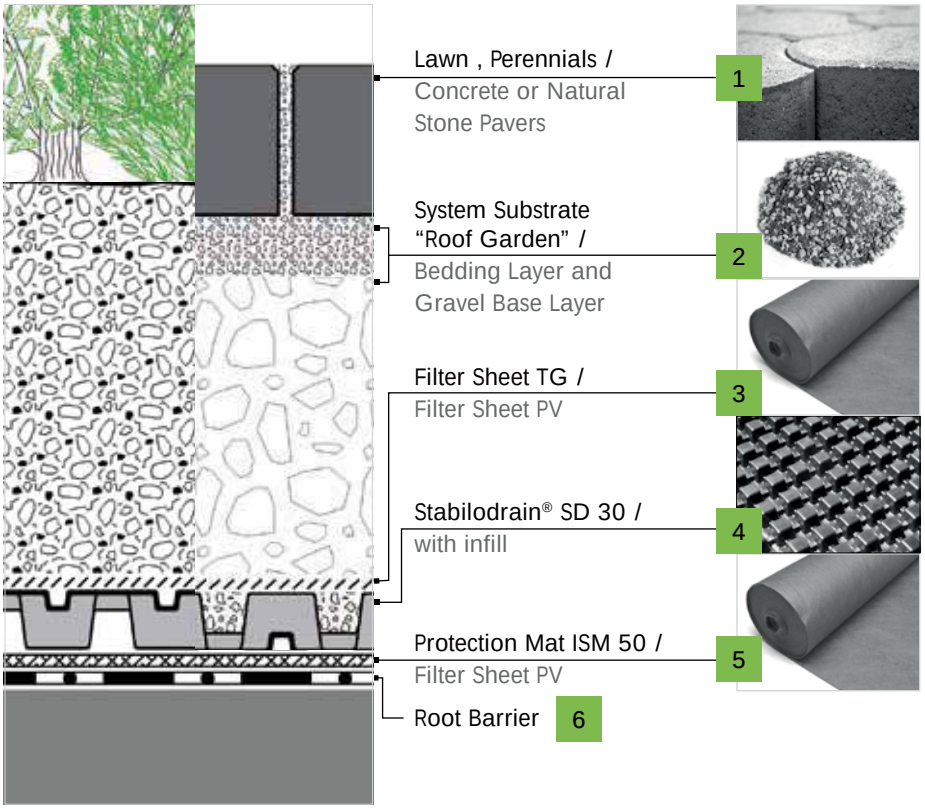
Depending on the installation, it allows for drainage of water (diffusion holes facing downwards) or for drainage combined with water retention (diffusion holes facing upwards).

Features

- Stabilodrain® SD 30 is an extremely stable, high pressure resistant drainage element that is quick and easy to install with its lateral, specially shaped connecting profiles.
- The element is trafficable with wheel loaders, even without infill

Design options

- Using Stabilodrain® SD 30 almost any hard or soft landscape design that is possible on the ground can be installed on a roof or podium deck
- Stabilodrain® SD 30 can also be used on inverted roofs



Technical Data

for hard landscaping

Build-up height: from ca. 310 mm

Build-up weight: from ca. 600 kg/m²

Q37 System Specifications:
www.zinco-greenroof.co.uk/
system_specifications

Installation Instructions:
www.zinco-greenroof.co.uk/
installation_instructions

Build-up for hard landscaping

1 Concrete or natural stone pavers: Concrete or natural stone pavers are chosen according to the anticipated load demand and should meet the requirements of relevant standards. A greater paver depth results in a greater support surface and in a reduction of a possible distorsion of the bedding material underneath. With driveways on roofs, it is therefore crucial to plan sufficient load distribution, either through the paving surface or through an adequate base layer.

2 Bedding and gravel base layer: Materials for base layers should ensure excellent compactibility and stability. Bedding material can come in different grain sizes, but has to harmonise with the joint material to prevent it from being washed out. The ZinCo Technical Department provides assistance with designing the appropriate build-up. Please contact us for more information.

3 + 5 Filter Sheet PV

Item No.	Dimensions	Unit
2131	ca. 2.00 m × 50.00 m	100 m²-roll

Penetration force acc. to EN ISO 12236: ca. 4300 N

Tensile strength (200 mm) according to EN ISO 10319 lengthwise/crosswise: ca. 23.0 kN/m

Notes on installation: The Filter Sheet PV needs to be installed with an overlap of approx. 200 mm (position 3: filter layer) and 100 mm (position 5: protection layer). At all roof edges, roof penetrations etc. the Filter Sheet PV (position 5) used as protection layer must be drawn upwards at least to the upper edge of the build-up.

4 Stabilodrain® SD 30

Item No.	Dimensions	Unit
3330	ca. 0.94 m × 2.00 m (net 2.25 m × 1.00 m)	1.88 m²-board

with diffusion holes facing downwards for hard landscaping

with diffusion holes facing upwards for soft landscaping

Compressive strength at 10 % compression: ca. 500 kN/m²

In-plane water flow capacity (EN ISO 12958), slope 2 %, studs facing downwards: ca. 1.42 l/(s·m)

The build-up for soft landscaping is comparable to the Roof Garden build-up on page 20/21. For specifications of Filter Sheet, Protection Mat ISM 50 and Root Barrier WSB 100-PO please refer to the page mentioned. The drainage element Floradrain® FD 60 neo is replaced by Stabilodrain® SD 30 (specifications above).

System Build-up “Driveways on Podiums”

Driveways on roofs and podiums require both a load-bearing system build-up and an adequate strength in roof construction. Moreover, vehicular traffic on a roof deck induces very significant horizontal forces and torsional movements through steering, breaking, and accelerating, that must be absorbed.

There are two options of system build-ups for cars. If the waterproofing and the final surface have the same slope, Elastodrain® EL 202 installed without a base layer is the appropriate solution. In case of different slopes, Protectodrain® PD 250 layed in a gravel base layer is the right choice.

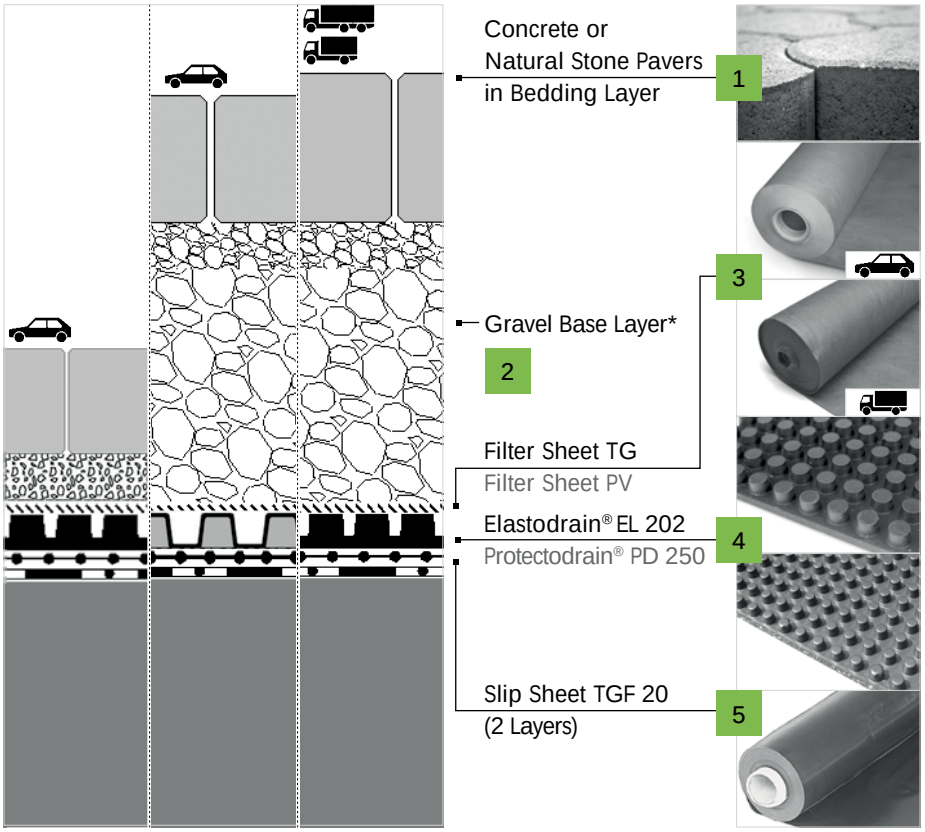
If podium structures have to bear exceptionally heavy loads the thickness of the pavers or concrete slabs must enable a horizontal absorption of forces. For wheel loads exceeding 1 ton, a load distributing base layer has to be designed. Here again the Elastodrain® EL 202 is the perfect drainage element ensuring that the waterproofing is protected against the enormous stresses caused. In addition, all build-ups require two layers of slip sheet to keep the horizontal forces issued by steering, breaking, and accelerating away from the waterproofing level.

Features

- Elastodrain® EL 202 has a very high compressive strength and distributes load evenly into the substructure
- Elastodrain®/Protectodrain® protect the waterproofing during construction works from mechanical damages
- Elastodrain®/Protectodrain® ensure long lasting drainage, hence they prevent frost damages

Design options

- Build-ups provide a solid base for creative surface designs. Mainly for use under driveways, fire brigade access or parking areas.
- Elastodrain® EL 202 allows low height build-ups with bedding layer only for car traffic and higher build-ups including gravel base layer for lorry traffic.



Technical Data

Build-up with Elastodrain®

For cars:

Build-up height:	from ca. 150 mm
Build-up weight:	from ca. 302 kg/m²

For lorries:

Build-up height:	from ca. 320 mm
Build-up weight:	from ca. 623 kg/m²

Q37 System Specifications:
www.zinco-greenroof.co.uk/system_specifications

Installation Instructions:
www.zinco-greenroof.co.uk/installation_instructions

* For recommendations on gravel base layers please contact us.

3a Filter Sheet TG

Item No.	Dimensions	Unit
2192	ca. 2.00 m × 100.00 m	200 m²-roll
2193	ca. 1.00 m × 100.00 m	100 m²-roll

Penetration force acc. to EN ISO 12236: ca. 2000 N
Flow rate (H50) acc. to EN ISO 11058: ca. 40 l/(m²·s) (≙ 0.04 m/s)
Notes on installation: Filter Sheet TG requires an overlap of at least 200 mm.

3b Filter Sheet PV

Item No.	Dimensions	Unit
2131	ca. 2.00 m × 50.00 m	100 m²-roll

Penetration force acc. to EN ISO 12236: ca. 4300 N
Tensile strength (200 mm) according to EN ISO 10319 lengthwise/crosswise: ca. 23.0 kN/m
Notes on installation: Filter Sheet PV requires an overlap of at least 200 mm.

4a

	Item No.	Dimensions	Unit
Elastodrain® EL 202	3220	ca. 1.00 m × 1.00 m	1 m²-board
EL 202 Connector 2-holes	3221		Bag of 100 pieces

Compressive strength at 10 % compression (EN ISO 25619-2): ca. 400 kN/m²
In-plane water flow capacity (EN ISO 12958) with roof slope 2 %: ca. 0.47 l/(s·m)

4b

	Item No.	Dimensions	Unit
Protectodrain® PD 250	3250	ca. 1.00 m × 2.00 m	2 m²-board
PD 250-Connector	3251		Bag of 200 pieces

Compressive strength at 10 % compression (EN ISO 25619-2): ca. 460 kN/m²
In-plane water flow capacity (EN ISO 12958) with roof slope 2 %: ca. 1.5 l/(s·m)

5 Slip Sheet TGF 20

Item No.	Dimensions	Unit
1020	ca. 8.00 m × 25.00 m	200 m²-roll
1022	ca. 3.00 m × 33.50 m	100.5 m²-roll

Coefficient of sliding friction: 0.29
Notes on installation: Slip Sheet TGF 20 requires an overlap of at least 200 mm

System Build-up “Raised Paving and Decking”

Some roofs do not have the load bearing capacity to carry the load of the base layer, bedding material and surface layer usually required for hard landscaping. In this instance the ZinCo Elefeet® are able to bear the load, and as a result of its minimal weight, only the weight of the surface has to be taken into consideration. Surface water can be drained quickly and easily through the open joints and into the lower cavity; in addition, this open subspace provides good aeration.

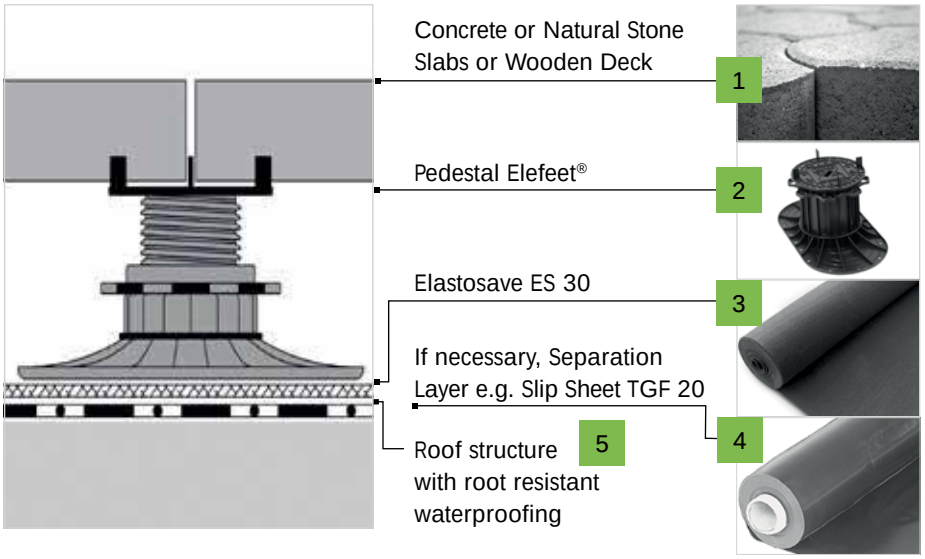
If higher Elefeet® are used, water pipes, cables, or water hoses can be accomodated and used, for example, to irrigate adjacent intensive green areas. Each Elefeet® is vertically adjustable by turning the swivel. Even after installation, a single slab can be lifted to adjust the relevant Elefeet®.

Features

- Vertically adjustable to level out unevenness
- Very lightweight build-up – basically just the weight of the pavers
- Usable on roofs without any slope due to large drainage cavity
- Open joints free from pollution and weeds

Design options

- Continuous elevations with easy vertical adjustments possible from 20 mm height to approx. 500 mm.
- Special support rail system available as accessory to create stable substructures if no closed framing is available



Technical Data

Build-up height:	from ca. 70 mm* up to ca. 500 mm
Roof pitch:	from 0 % up to 2 %
Build-up weight:	from ca. 100 kg/m²

Q37 System Specifications:
www.zinco-greenroof.co.uk/system_specifications

Installation Instructions:
www.zinco-greenroof.co.uk/installation_instructions

1 Concrete or natural stone slabs, min 40 mm thick. If approved by the manufacturer in some cases slabs of 600 × 600 mm and a thickness of 20 mm are possible. Alternatively, wooden decks on supporting structure.

2 ZinCo Elefeet® Pedestals, available in various heights with 3 mm joint spacers included.

	Item No.	Height	Unit
E 27	9660	ca. 27–39 mm	Piece
E 38	9661	ca. 38–60 mm	Piece
E 60	9662	ca. 60–106 mm	Piece
E 106	9663	ca. 106–196 mm	Piece

Load bearing capacity: 600 kg in the centre of each support, 300 kg in the quarter corner

2a Extension Piece: Accessory to increase the Elefeet® pedestal and the total build-up height. It is possible to use several extension pieces for one pedestal up to a maximum height of approx. 500 mm.

	Item No.	Height	Unit
A 12	9664	12 mm	Piece
A 22	9665	22 mm	Piece
A 67	9666	67 mm	Piece

3 Elastosave ES 30: High quality protection and anti-slip-mat made of recycling rubber pieces. Suitable for the protection of waterproofing under stilted terrace surfaces.

Item No.	Dimensions	Unit
2094	ca. 1.50 m × 8.00 m	12 m²-roll

Temperature resistance: −30 °C up to +80 °C
Friction coefficient (dry): ca. 0.99
Notes on installation: Elastosave ES 30 requires an overlap of at least 50 mm.

4 Slip Sheet TGF 20, if necessary

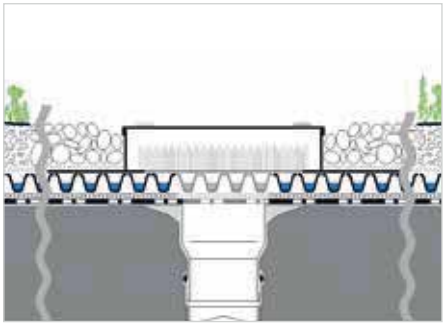
Item No.	Dimensions	Unit
1020	ca. 8.00 m × 25.00 m	200 m²-roll
1022	ca. 3.00 m × 33.50 m	100.5 m²-roll

Coefficient of sliding friction: 0.30
Notes on installation: Slip Sheet TGF 20 requires an overlap of at least 200 mm.

Installation Details and Accessories

Please find below a small variety of installation details and accessories. For more CAD details please refer to: https://zinco-greenroof.co.uk/cad

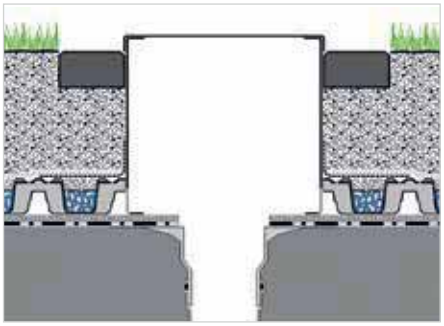
Inspection Chambers



Extensive green roof build-up with Inspection Chamber KS 6/30 installed within the vegetated area.

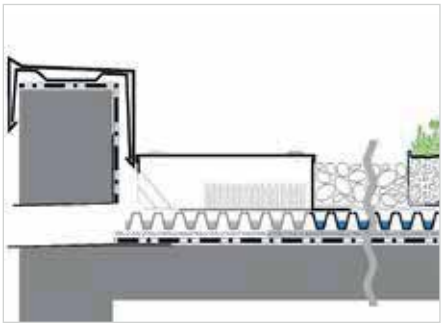
Inspection Chamber KS 6/30

Inspection Chamber KS 30/30-E



Intensive green roof build-up with Inspection Chamber KS 30/30-E installed within the vegetated area.

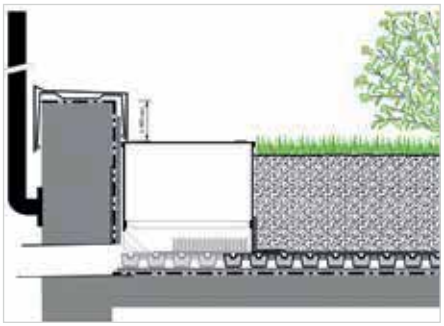
Inspection Chambers at Roof Edges



Extensive green roof build-up with Inspection Chamber AKS 8/30 installed at parapet roof edge with water spout.

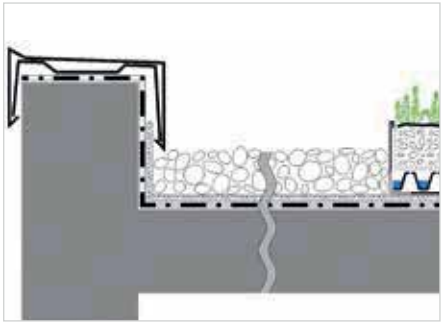
Inspection Chamber AKS 8/30

KSA 20/30 Extension Piece

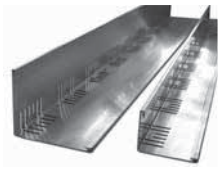


Intensive green roof with Inspection Chamber AKS 8 in combination with KSA 20/30 Extension Piece. Installed at a low parapet roof edge with water spout. Roof secured with balustrade railing.

Gravel Retainers and Eaves Profiles

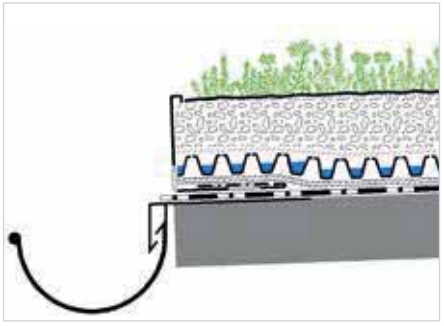


Extensive green roof build-up with Gravel Retainer KL 80/100 dividing vegetation from gravel strip.



Gravel Retainer KL 80/100

Eaves Profile DP 120

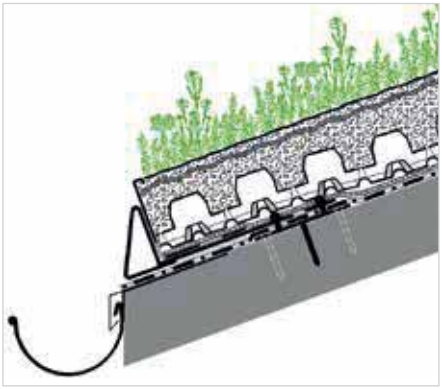


Extensive green roof build-up with Eaves Profile DP 120 serving as roof edge.

Installation Details and Accessories

Details and accessories for roof edge designs and shear barriers for use in pitched and steep pitched green roof build-ups:

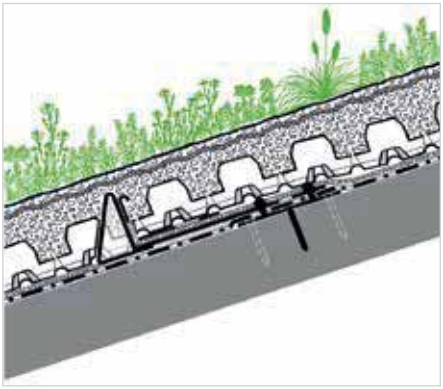
Pitched Roofs



Roof Edge with Shearfix LF 300 support bracket in combination with TRP 140 Eaves Profile.

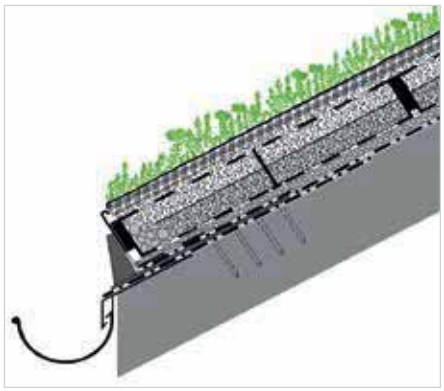
Shear Fix LF 300

Eaves Profile
TRP 80 or TRP 140



Shear barrier consisting of Shearfix LF 300 support bracket in combination with TRP 80 Eaves Profile.

Steep Pitched Roofs

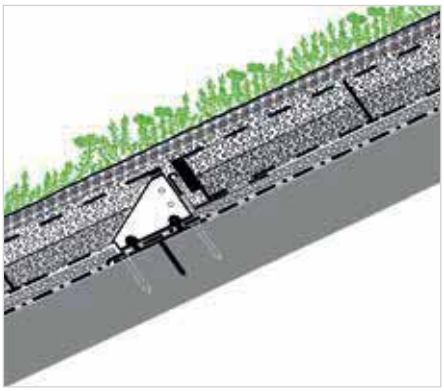


Roof edge with TSH 100 support bracket in combination with TRP 140 Eaves Profile.

Shear Fix LF 600

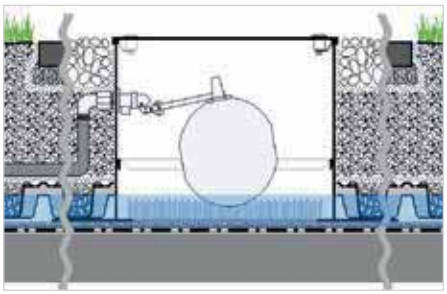
Eaves Profile
TRP 80 or TRP 140

Support Bracket TSH 100



Shear barrier with Shear Fix LF 600 in combination with TRP 80 Eaves Profile.

Details and Accessories for Roof Garden Build-ups with Floradrain® FD 60 neo

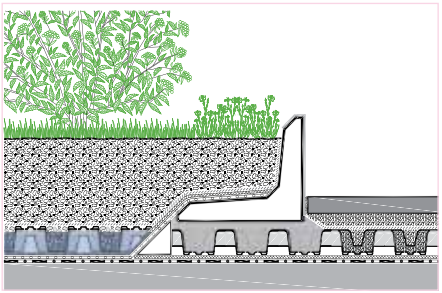


Intensive green roof build-up with Floradrain® FD 60 neo with dam-up irrigation on 0° roof and ZinCo Irrigation Unit KB 30.

Irrigation Unit KB 30

Concrete curbs

Dam-up element
stainless steel



Concrete curbs in concrete foundations filled into the Floradrain® FD 60 neo element to separate hard and soft landscaping without interrupting the drainage.

What ZinCo can do for you

ZinCo provide a comprehensive package of environmentally sound Green Roof Systems and customized project support, based on:

- 40+ years of experience in Green Roofs
- Tested and proven Green Roof Systems
- Exceeding quality standards & permanent innovation through research and development
- Compliance with relevant international standards
- Experts in structural engineering, landscape architecture, horticulture, material and soil science, …
- Support from planning to completion (design, specifications, CAD, consultancy, on-site)
- An international network of partners
- Comprehensive warranties

To date, ZinCo Green Roof solutions have inspired planners and contractors throughout the world, providing them with the necessary flexibility to accommodate a wide range of designs and building needs.

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