



PLANNING GUIDE

# System Solutions for Extensive Green Roofs

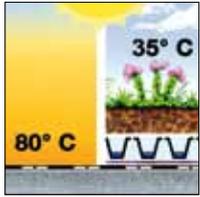
Life on Roofs



# Green Oases for Our Cityscapes

The environmental, urban development and engineering advantages of green roofs:

## Protection of the Roof Membrane



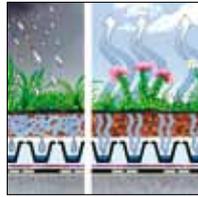
- Protects the roof membrane from UV radiation, heat, cold and hail

## New Habitat



- Avoids sealing and creates new habitat for plants and animals

## Rainwater Retention



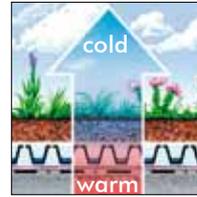
- Reduces run-off

## Dust Binding



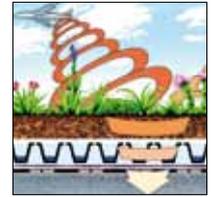
- Enhances the micro-climate by filtering out dust and smog particles

## Reduction of Energy Costs



- Thermal protection and reduction in heating and cooling costs

## Noise Protection



- Enhances sound insulation

## Features

Unlike intensive green roofs, extensive green roofs require little upkeep or maintenance.

The features at a glance:

- **Minimum maintenance:**
  - Inspection and maintenance once or twice per year
  - Water and nutrient supply mostly by natural means
- **Plant communities close to nature:**
  - Undemanding
  - Extensive
  - Self-regenerating
- **Low loads and build-up heights:**
  - Mainly substrates with layer depths of up to about 120 mm
  - Loads about 50–150 kg/m<sup>2</sup>
- **Low-cost:**
  - For set-up and maintenance

## Principles

ZinCo extensive green roofs are installed in accordance with current standards and with system.

Our six principles at a glance:

- The System Build-up is tailored to suit each roof.
- The System Build-up ensures permanent drainage, even under load and with a low pitch.
- The System Build-up provides for a good water/air balance.
- The System Build-up is adapted to suit the required type of vegetation.
- The System Build-up keeps maintenance and upkeep to a minimum.
- The System Build-up provides for a long green roof life.

## Biodiversity



- The picture shows build-ups with a uniform height. The range of species in the roof habitat can be expanded by varying the substrate depth or type, by installing shingle, sand or gravel surfaces and/or by introducing deadwood or stones. This also contributes to increased biodiversity. The most important thing is to ensure that this is permitted from a roof structural point of view.



All the information regarding vegetation technology is related to moderate continental climate and needs to be adapted in case of any other climate.

# More Options with ZinCo



System Build-up "Rockery Type Plants" 4



System Build-up  
"Rockery Type Plants" on 0°-Roofs 6



System Build-up  
"Rockery Type Plants" on Inverted Roofs 7



System Build-up "Sedum Carpet" 8



System Build-up "Industrial Green Roofs" 10



System Build-up "Extreme Light Weight" 11



ZinCo Fallnet® – non-roof penetrating  
fall arrest system 12



System Build-up "SolarVert®" 13



Details and Accessory Programme 14



European Technical Assessment 15



➔ Please see our Planning Guide "Systems for Pitched Green Roofs" for information on pitched and steep pitched green roofs.

# System Build-up “Rockery Type Plants”



“Rockery Type Plants” allows for an extensive green roof with sophisticated design and individual character. The “Rockery Type Plants” substrate is applied with a minimum of 70 mm in depth.

“Rockery Type Plants” vegetation consists of a wide variety of species which results in a long blooming period and allows for different accents throughout the vegetation period. Sedum species and other perennials are primarily used as a ground cover. Drought resistant perennials add flowering accents and height to the design,



*Dianthus carthusianorum* for example reaches up to 400 mm of height. The build-up is realized by manually planting plug plants. Thus the desired result

can be predetermined. Furthermore the colour spectrum is significantly more differentiated in comparison to “Sedum Carpet”.





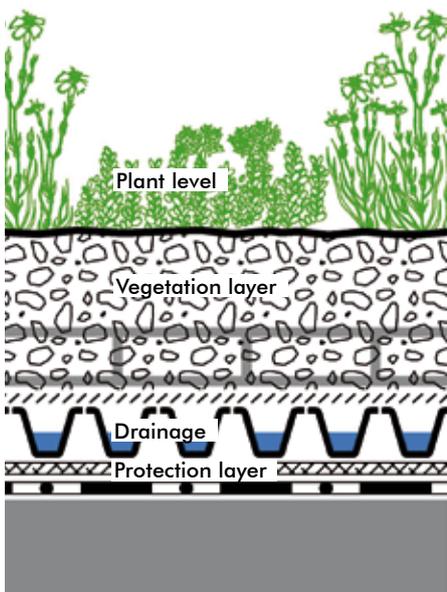
### Plant Suggestions "Rockery Type Plants"

| Botanical Name   | Common Name           | Height (mm) | Blossom    | Blossom Period (month) |
|--|-----------------------|-------------|------------|------------------------|
| <b>Accent plants (groups of 3,5, or 7)</b>                       |                       |             |            |                        |
| <i>Dianthus carthusianorum</i>                                   | Clusterhead           | 400         | red        | 6–9                    |
| <i>Festuca Cinerea-Hybride</i>                                   | Blue fescue           | 250–300     | brown      | 6–7                    |
| <i>Gypsophila repens</i><br>e.g. 'Rosa Schönheit'                | Baby's breath         | 100–150     | rose       | 5–7                    |
| <i>Helianthemum nummularium</i>                                  | Sun rose              | 50–100      | yellow     | 5–7                    |
| <i>Koeleria glauca</i>   | Large blue hair grass | 450–500     | bluish     | 6–7                    |
| <i>Petrorhagia saxifraga</i>                                     | Tunic flower          | 100–200     | rose-white | 6–9                    |
| <i>Saponaria ocymoides</i>                                       | Rock soapwort         | 150–200     | rose       | 5–7                    |
| <i>Satureja montana</i><br>ssp. <i>illyrica</i>                  | Winter savory         | 100–150     | violet     | 8–9                    |
| <i>Saxifraga paniculata</i>                                      | Livelong saxifrage    | 200–250     | white      | 6–7                    |
| <i>Sempervivum-Hybriden</i>                                      | Houseleek hybrids     | 100–200     | red/rose   | 7–8                    |
| <b>Filler Plants (minimum of four different Sedum varieties)</b> |                       |             |            |                        |
| <i>Cerastium arvense</i><br>'Compactum'                          | Field chickweed       | 50–100      | white      | 5–6                    |
| <i>Hieracium pilosella</i>                                       | Mouseear hawkweed     | 150–200     | yellow     | 5–7                    |
| <i>Potentilla neumanniana</i>                                    | Alpine cinquefoil     | 100–150     | yellow     | 3–4                    |
| <i>Prunella grandiflora</i>                                      | Large self-heat       | 200         | violet     | 6–8                    |
| <i>Thymus doerfleri</i><br>'Bressingham Seedling'                | Bressingham thyme     | 60–80       | rose       | 5–7                    |
| <i>Thymus serpyllum</i>  | Wild thyme            | 50          | violet     | 5–9                    |

Additional Sedum varieties from the plant community "Sedum Carpet" on page 9.



| Weight kg/m <sup>2</sup> |                 |
|--------------------------|-----------------|
| dry                      | water-saturated |
| 70                       | 98              |
| 2                        | 10              |
| 72                       | 108             |



Plant level as per plant suggestions "Rockery Type Plants"

System Substrate "Rockery Type Plants"

Safety Device "Fallnet®", if required (attention to load requirements)

Filter Sheet SF

Floradrain® FD 25-E

Protection Mat SSM 45

Root Barrier WSF 40, if waterproofing is not root-resistant

|                           |                           |
|---------------------------|---------------------------|
| Build-up height:          | ca. 100 mm                |
| Weight, saturated:        | ca. 110 kg/m <sup>2</sup> |
| Water retention capacity: | ca. 36 l/m <sup>2</sup>   |



System Build-ups with European Technical Assessment. Details on Page 15.

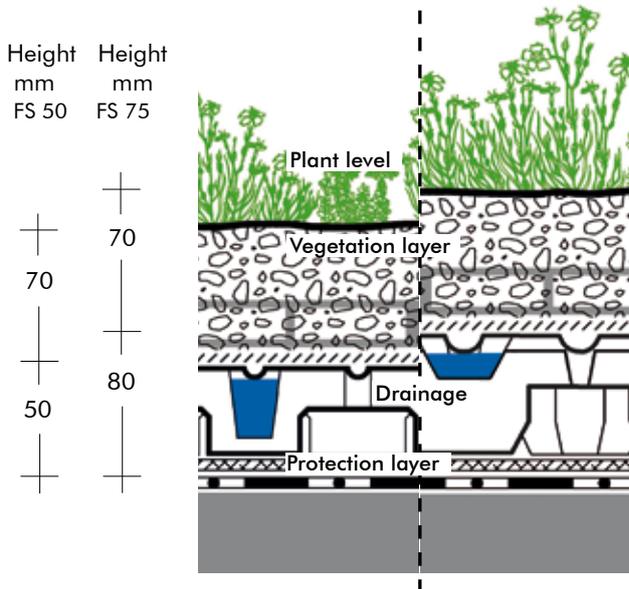
# System Build-up "Rockery Type Plants" on 0°-Roofs

On 0°-roofs where deeper puddles might remain, the standard System Build-up "Rockery Type Plants" is to be modified.

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.



| Weight<br>kg/m <sup>2</sup> |                 | Height<br>mm<br>FS 50 | Height<br>mm<br>FS 75 |
|-----------------------------|-----------------|-----------------------|-----------------------|
| dry                         | water-saturated |                       |                       |
| 70                          | 98              | 70                    | 70                    |
| 2                           | 7               | 50                    | 80                    |
| 72                          | 105             |                       |                       |



- Plant level "Rockery Type Plants"
- System Substrate "Rockery Type Plants"
- Safety Device "Fallnet®", if required (attention to load requirements)
- Filter Sheet SF
- Floraset® FS 50 or FS 75
- Protection Mat TSM 32
- Root Barrier WSF 40, if waterproofing is not root-resistant (beneath the thermal insulation layer).

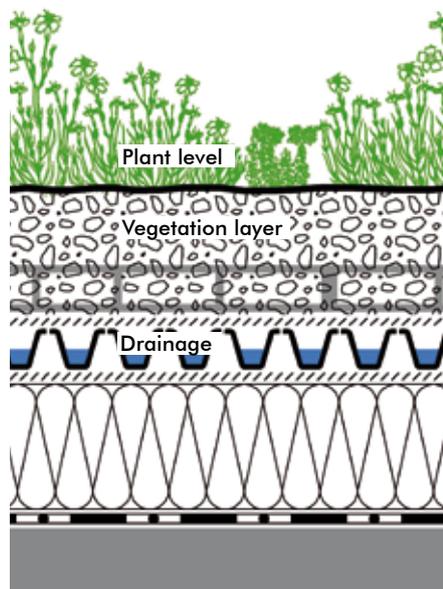
Build-up height: ca. 120 resp. 150 mm  
 Weight, saturated: ca. 105 kg/m<sup>2</sup>  
 Water retention capacity: ca. 33 l/m<sup>2</sup>



# System Build-up "Rockery Type Plants" on Inverted Roofs



| Weight kg/m <sup>2</sup> |                 | Height mm |
|--------------------------|-----------------|-----------|
| dry                      | water-saturated |           |
| 80                       | 112             | 80        |
| 2                        | 6               | 30        |
| 82                       | 118             |           |



**Build-up height:** ca. 110 mm  
**Weight, saturated:** ca. 120 kg/m<sup>2</sup>  
**Water retention capacity:** ca. 36 l/m<sup>2</sup>

Plant level "Rockery Type Plants"

System Substrate "Rockery Type Plants"

Safety Device "Fallnet®", if required (attention to load requirements)

Filter Sheet SF

Floradrain® FD 25-E

Separation Membrane TGV 21

Roof construction with XPS thermal insulation

Root Barrier WSF 40, if waterproofing is not root-resistant (beneath the thermal insulation layer).



System Build-ups with European Technical Assessment. Details on Page 15.



With inverted roofs, layers that prevent the diffusion of damp must not be installed above the XPS thermal insulation boards. Therefore, the water retaining protection mat must be replaced by the diffusion permitting Separation Membrane TGV 21. In the case, that root barriers are necessary they have to be placed below the insulation boards directly onto the waterproofing. A deeper substrate layer compensates for the water retention capacity of the protection mat.

# System Build-up "Sedum Carpet"



"Sedum Carpet" is a shallow, ground-covering extensive green roof type. In moderate climates, it gets along with approx. 60 mm of "Sedum Carpet" System Substrate.

"Sedum Carpet" is applied, especially if both, the load often bearing capacity of the roof and the expenses for maintenance, are restrictive.

Proven sedum species, in combination with the appropriate system build-up, guarantee a long-lasting low maintenance green roof. The plant community "Sedum Carpet" contains various low-growing sedum species. The main bloo-



ming time is in early summer, with yellow or red and white flowers dominating at different times. Throughout the year, "Sedum Carpet" is represented in various shades of green. Red shades, particulary

in autumn, are a pleasant change in the visual appearance. "Sedum Carpet" is installed either by sedum cuttings or plug plants.





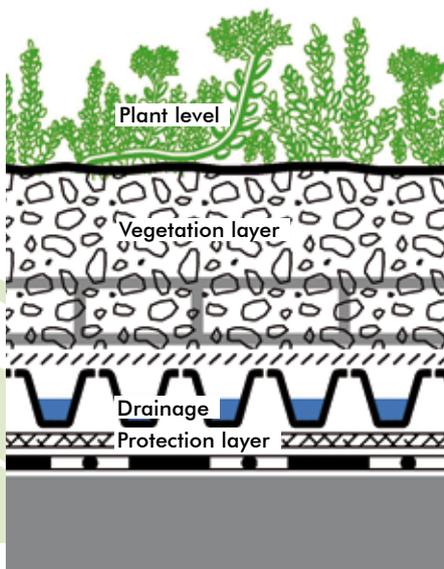
### Plant Suggestions "Sedum Carpet"

Plants in small groups (groups of 3, 5 or 7)

| Botanical Name  | Common Name                | Height (mm) | Blossom Colour | Blossom Period (month) |
|---|----------------------------|-------------|----------------|------------------------|
| <i>Sedum album</i> varieties<br>e.g. 'Coral Carpet'<br>'Murale'   | White stonecrop varieties  | 50–100      | white          | 6–8                    |
|   |                            | 50–100      | white          | 6–8                    |
|   |                            | 50–100      | pale-rose      | 6                      |
| <i>Sedum cauticum</i>   | Nettle-leaved goosefoot    | 100–150     | rose           | 8–9                    |
| <i>Sedum floriferum</i><br>'Weihenstep. Gold'   | Gold sedum                 | 100–150     | yellow         | 6–7                    |
| <i>Sedum hybridum</i><br>'Immergrünchen'  | Hybrid stonecrop           | 100–150     | yellow         | 7–8                    |
| <i>Sedum reflexum</i>   | Crooked yellow stonecrop   | 200–250     | yellow         | 6–7                    |
| <i>Sedum sexangulare</i>  | Tasteless yellow stonecrop | 50–100      | yellow         | 6–7                    |
| <i>Sedum spurium</i><br>in varieties.<br>e.g. 'Album Superbum'<br>'Fuldaglut'<br>'Roseum Superbum'<br>'Splendens'<br>'Variegatum' | Dragon`s blood             | 100–150     | white**        | 7–8                    |
|   |                            | 100–150     |                | 7–8                    |
|   |                            | 100–150     |                | 7–8                    |
|   |                            | 100–150     |                | 7–8                    |
|   |                            | 100–150     |                | 7–8                    |

\*\* infrequent blooming

| Weight kg/m <sup>2</sup> |                 | Height mm |
|--------------------------|-----------------|-----------|
| dry                      | water-saturated |           |
| 67                       | 84              | 60        |
| 2                        | 10              | 30        |
| 69                       | 94              |           |



Mixture of Sedum Cuttings according to plant suggestions "Sedum Carpet"

System Substrate "Sedum Carpet"

Safety Device "Fallnet®", if required (attention to load requirements)

Filter Sheet SF

Floradrain® FD 25-E

Protection Mat SSM 45

Root Barrier WSF 40, if waterproofing is not root-resistant

|                           |                          |
|---------------------------|--------------------------|
| Build-up height:          | ca. 90 mm                |
| Weight, saturated:        | ca. 95 kg/m <sup>2</sup> |
| Water retention capacity: | ca. 25 l/m <sup>2</sup>  |



System Build-ups with European Technical Assessment. Details on Page 15.

# System Build-up "Industrial Green Roofs"

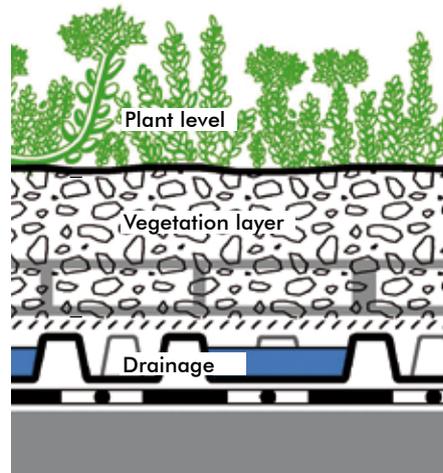
The bigger the roof area, the higher the costs. You can avoid this by omitting certain layers. However, this could be dangerous as certain functions that are important for the long-term proper performance of the green roof are no longer available.

ZinCo, therefore, has combined a number of functional layers in one product. Fixodrain® XD 20 can be installed without an additional protection layer, due to its extremely large contact surface and bonding over a large area. The

filter sheet is laminated directly onto it and it is installed in one pass. The elements are attached to each other by means of studs down the long side and the filter sheet overlaps along both the long and the top sides.



| Weight<br>kg/m <sup>2</sup> |                 | Height<br>mm |
|-----------------------------|-----------------|--------------|
| dry                         | water-saturated |              |
| 67                          | 84              | 60           |
| 1                           | 4               | 20           |
| 68                          | 88              |              |



Build-up height: ca. 80 mm  
 Weight, saturated: ca. 90 kg/m<sup>2</sup>  
 Water retention capacity: ca. 20 l/m<sup>2</sup>

Hydroseeding or Sedum Cuttings as per "Sedum Carpet" plant suggestions

System Substrate "Sedum Carpet"

Safety Device "Fallnet®", if required (attention to load requirements)

Fixodrain® XD 20

Root Barrier WSF 40 and Filter Sheet PV, if waterproofing is not root-resistant



System Build-ups with European Technical Assessment. Details on page 15.



# System Build-up "Extreme Light Weight" up to a Roof Pitch of 5°

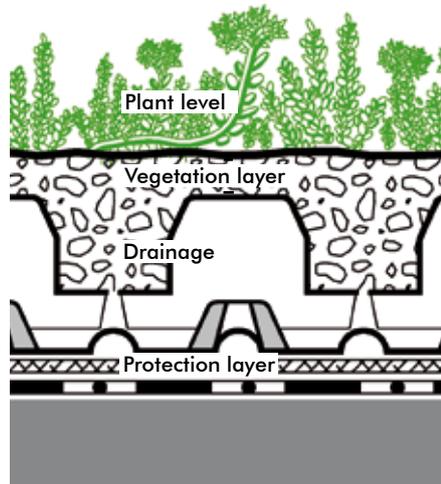


For some roof areas, even the Standard Build-up "Sedum Carpet" is too heavy. The solution is a system build-up with Floraset® FS 75. Less substrate is required as it is not applied equally but mainly fills the gaps between the high studs of the element. Although they start gro-

wing mainly in those "planting pots" the Sedum plants still form a dense ground cover which is supported by mosses over the course of time. The build-up weight is approx. 60 kg/m<sup>2</sup>. In areas with little annual precipitation and also on pitched roofs either additional substrate which

effects weight and build-up height is required or irrigation is to be provided.

| Weight kg/m <sup>2</sup> |                 | Height mm |
|--------------------------|-----------------|-----------|
| dry                      | water-saturated |           |
| 37                       | 55              | 65        |
| 2                        | 5               | 30        |
| 39                       | 60              |           |



**Build-up height:** ca. 100 mm  
**Weight, saturated:** ca. 60 kg/m<sup>2</sup>  
**Water retention capacity:** ca. 21 l/m<sup>2</sup>

Plug Plants FB 50 "Sedum Carpet"

System Substrate  
 "Rockery Type Plants Light"

Floraset® FS 75

Protection Mat TSM 32  
 Root Barrier WSF 40,  
 if waterproofing is not root-resistant

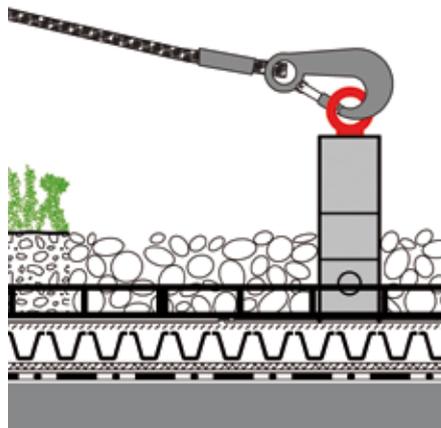
# ZinCo Fallnet® – non-roof penetrating fall arrest system

Suitable equipment must be available in order to ensure safe working conditions on flat roofs. Single anchor points are possible as are rail solutions and railings. Any decision when choosing a system should not be made solely in consideration of cost but must also consider the type and scope of the works that are to be carried out on the roof.

All ZinCo fall arrest systems are anchored to the roof by the weight of the green roof build-up, therefore, roof membrane penetration is not necessary.

The Fallnet systems can be integrated into any ZinCo system build-up, provided there are sufficient load reserves available. We will be pleased to draw up a plan specifically for your building.

For further information, please see [www.zinco-greenroof.com](http://www.zinco-greenroof.com)



Fallnet® Anchorage point

Grid with Fallnet® base plate



Every Fallnet® SR is delivered with an identification label securely attached at the anchor eye. On this label you will find information about the product type, standard testing method, date of manufacture and serial number. If required, this information allows to document, even after decades, the contractor and the planning for this protect.

The horizontally installed rail allows for the use of the whole radius surrounding the gliding runner, which is an ideal and efficient application on narrow roofs.

ZinCo Railing Solutions – attractive, functional and installed on the roof without penetration of the waterproofing.

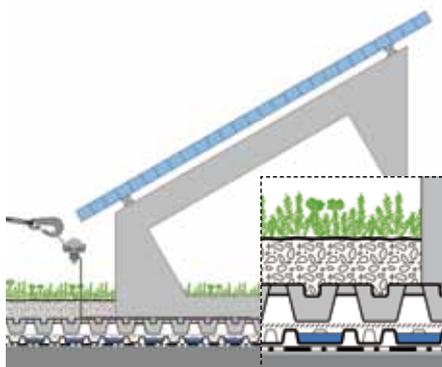
# System Build-up "SolarVert®"



Either a solar energy system or a green roof? That was the past! With the system build-up SolarVert® (Fixodrain® XD 20, ZinCo Solar Base® and basic frame), the combination of solar panels and green roof achieve even greater efficiency. And, there is no need to penetrate the roof membrane as the load required to keep the system permanently stable is provided by the green roof itself. The solar bases can be placed wherever they are required on the Fixodrain® layer.

The development of the solar base has enabled ZinCo to add yet another benefit to the list of advantages of a green roof: the integration of solar energy use into the green roof build-up. With the ZinCo solar base which is integrated into the SolarVert® system build-up, the performance of the green roof as an ecological compensation area is fully preserved.

*For further information, please see [www.zinco-greenroof.com](http://www.zinco-greenroof.com)*



Solar Panel

Solar Base Frame SGR 25/30/45

Plug Plants FB 50 "Sedum Carpet" or Sedum Cuttings  
System Substrate "Sedum Carpet",  
Depth depends on the superimposed load required

ZinCo Solar Base SB 200

Fixodrain® XD 20

Root Barrier WSF 40 and Filter Sheet PV, if waterproofing is not root-resistant

# Accessories and Details Programmes

## Perimeters

In line with the "German Guidelines for Roofs with Waterproofing", an upstand height of at least 100 mm above the surface covering is required at the roof perimeter. The parapet should have a covering that slopes towards the roof. The protection mat and, where required the root barrier, are drawn upwards and secured.

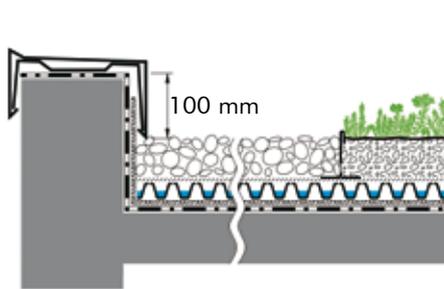
Increased loads must be applied to loosely laid roof waterproofing sheets around the

roof perimeter and corner areas where there is high wind suction (high building, exposed location ...). This is very often provided by means of sufficiently wide and heavy edge strips consisting of concrete slabs or grass pavers.

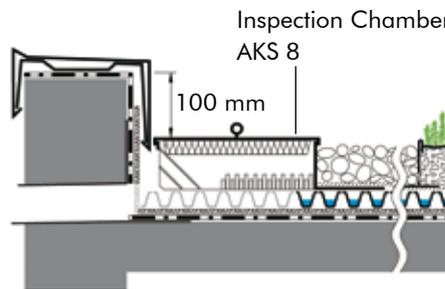
If in projects with high wind loads the perimeter and corner areas of the roof are to be part of the green roof, the vegetation cover must be closed immediately. EcoSedum® is ideal here. These pre-

greened grid elements are securely fixed to each other by an interlocking plug connection system. They are sufficiently permeable when greened so that wind suction forces cannot find purchase.

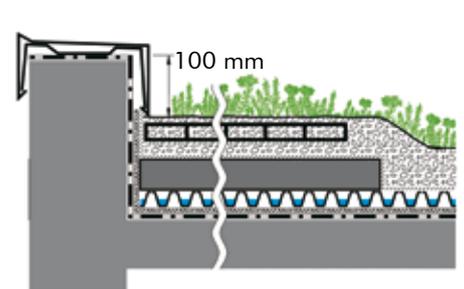
Pre-cultivated EcoSedum® elements can be used both in combination with concrete slabs (loosely laid waterproofing) and on their own (adhered or mechanically fixed waterproofing layer).



Standard perimeter solution

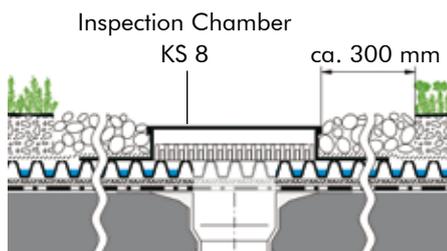


Draining flat roofs by means of water spouts integrated into the parapet



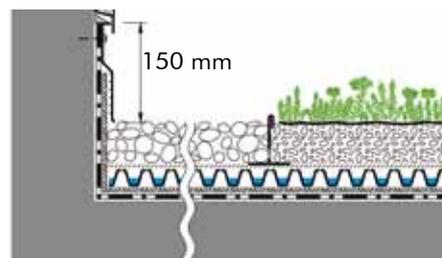
Perimeter solution for high wind loads with pavers and EcoSedum® (loose waterproofing)

## Roof Drains and Inspection Chambers

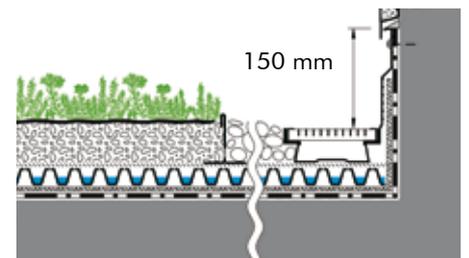


Usually, the drainage of flat roofs is achieved through roof drains. Their quantity as well as their dimensioning is to be determined in accordance with European and German Standard DIN EN 12056-3 and DIN 1986. Inspection chambers make sure the roof drains remain accessible and therefore can be cleaned easily, if necessary.

## Wall Connection



The connection to walls needs to be waterproof. Therefore the protection mat, the waterproofing and the root barrier are taken up at least 150 mm above the finished surface of the green roof build-up and fixed with a protection profile. In front of facades the installation of additional drainage channels is



recommended in order to lead rainwater directly into the drainage layer. If only little water is expected, a simple gravel strip is sufficient.



# ZinCo Green Roofing Systems now with European Technical Assessment!



In 2013 ZinCo received European Technical Approval ETA with the number 13/0668 for a wide range of proven green roof systems. Since June 2018, the European Technical Approval has been replaced by the European Technical Assessment.

On the one hand, this is a prerequisite for unrestricted access to the European market and its contracting states and, on the other hand, it reassures architects, contractors and owners that the relevant systems and products have passed the mandatory proof procedures and are in accordance with the assessment requirements.

At the moment, the following two build-ups in the EXTENSIVE application range have European technical assessment:

|                         | Extensive green roof<br>"Sedum Carpet"           | Extensive green roof<br>"Rockery Type Plants"  |
|-------------------------|--|--|
| Root Barrier (optional) | (Root Barrier WSB 100-PO)                        | (Root Barrier WSB 100-PO)                      |
| Protection Mat          | Protection Mat TSM 32 /<br>Protection Mat SSM 45 | Protection Mat TSM 32<br>Protection Mat SSM 45 |
| Drainage Element        | Floradrain FD 25-E<br>Fixodrain® XD 20           | Floradrain FD 25-E                             |
| Filter sheet            | Filter Sheet SF                                  | Filter Sheet SF                                |
| Substrate layer         | System Substrate<br>Sedum Carpet                 | System Substrate<br>Rockery Type Plants        |

The number of European-approved products and systems will be expanded gradually.



# Ecological Protection Layers with System!

This Planning Guide aims to give you a general overview of the technology involved in the various extensive green roof options.

Our technical experts will be pleased to advise you on specific solutions for your own individual building projects: from the planning phase right through to creating your specification texts.

Challenge us!



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