



Intensive Green Roofs with System



Engineered Green Roof Systems

The “Roof Garden“ green roof system build-up - almost - anything possible.



The “Roof Garden“ green roof system, is a multifunctional green roof build-up with high water storage. It is suitable for lawns, perennial plants, and with deeper system substrate, for shrubs and

trees. Integration with hard landscapes, for example, walkways, terraces, driveways or play areas, etc., is also possible.

You can use Floradrain® FD 60 elements to create a substructure for driveways or foundations. It is the heart of the green roof system, as it is used as shuttering for concrete without penetrating the roof membrane or impeding water drainage.

The drainage capacity meets the requirements of German Standard DIN 4095.



On zero degree roofs, a roof dam irrigation system can be installed which stores 40 mm of water. This makes for lush plant growth on relatively thin substrate layers.



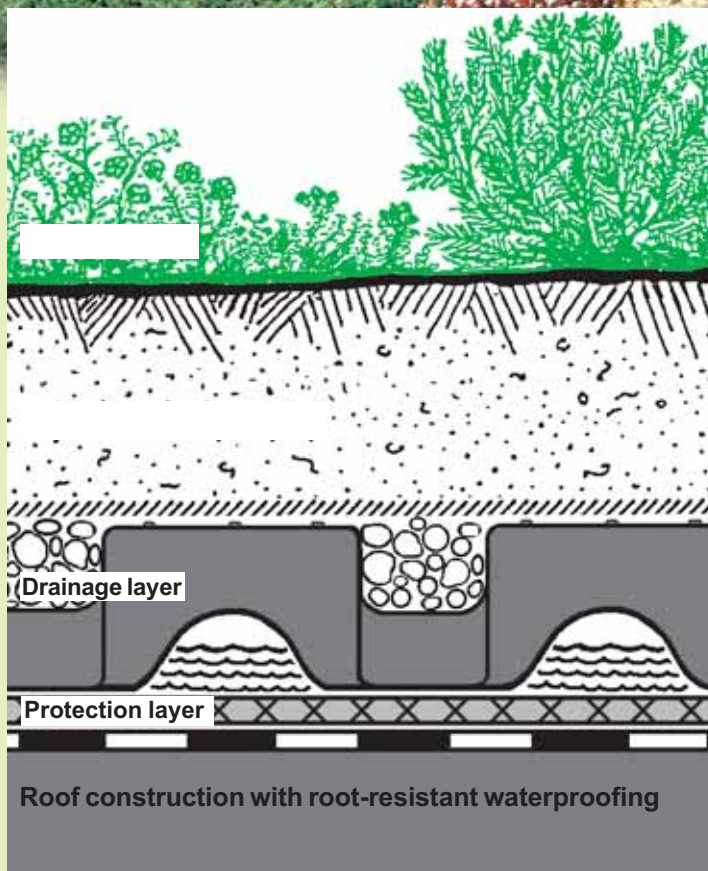
The Roof Garden build-up allows for the realisation of a variety of design concepts, even waterfeatures. Shown here is a “natural pond“, surrounded by boulders.



makes



Weight kg/m ²		Height mm
dry	water-saturated	
≥ 200	≥ 300	≥ 200
32	42	70
232	342	



Lawns, perennial plants, and with deeper substrate, also shrubs and small trees

“Roof Garden” system substrate and “Lawn” respectively

Filter Sheet SF

FLORADRAIN® FD 60 filled with Zincolit (27 l/m²)

Isolation / Protection Mat ISM 50

Roof construction with root-resistant waterproofing

Note:
If non root-resistant waterproofing is used, WSB 80 PO root barrier is required!

Build-up height:	from approx. 270 mm
Weight, saturated:	from approx. 340 kg/m²
Water retention capacity:	from approx. 110 l/m²

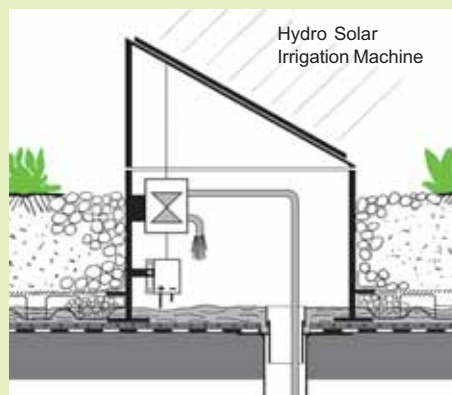
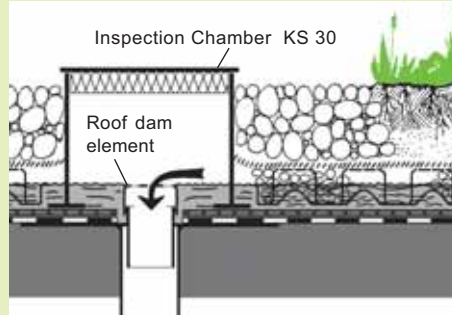
ZinCo Details: Sophisticated and sound Infinite design possibilities for unlimited

Roof dam irrigation

In roof gardens it is useful to conserve as much rainwater as possible to reduce the need for additional watering.

The spacious channels forming the underside of the Floradrain® FD 60 allow for water storage of 40 mm in depth.

The water is stored across the roof area and reaches the plants by capillary action and evaporation. Water storage is easily achieved by installing roof dam elements above the roof outlets. A roof laid at 0° fall is required to include this system, along with a suitable membrane for such use.



Inspection chambers make it possible to examine and maintain the roof dam elements at any time. With automatic irrigation machines, for example the float-controlled "B 32" or the larger "B 52", a minimum water storage can be maintained even in periods of drought.

Apart from float-controlled systems, ZinCo "Hydro Solar" electronically controlled machines obtain their energy directly from solar panels. Drinking water, as well as "recycled" grey water, can be used for irrigation.

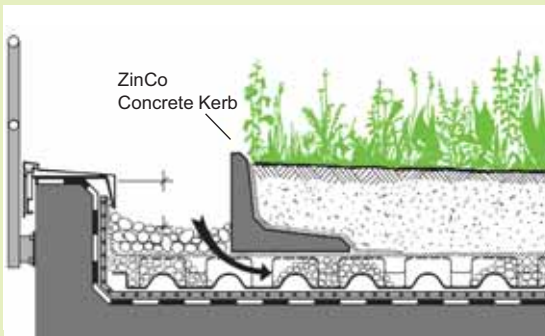


Low profile intensive green roofs

Even with low perimeter upstands, intensive green roofs with higher build-ups can be installed.

Concrete L-kerbs or stainless steel profiles, set in from the low perimeter, border the plant area and allow for a greater depth of substrate.

Thus, they ensure continuous and effective drainage beneath the plant beds and the roof edge.



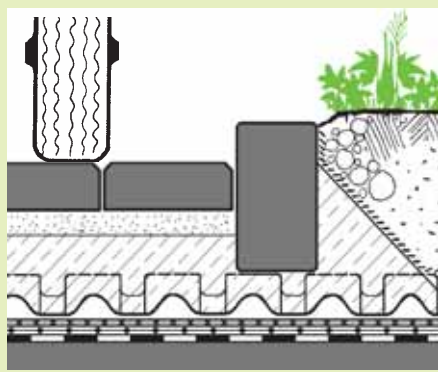
creativity.



Driveways with Floradrain® FD 60

With the correct depth of reinforced concrete (min. specification C 25/30) it is possible to construct vehicle roadways over the Floradrain® FD 60. This allows for access roads for fire engines, lorries, etc., on top of underground garage roofs without impeding the drainage.

The load distributing concrete slabs, formed by infilling the Floradrain® elements, must be poured into areas no greater than 2.5 m x 2.5 m, when left exposed to the weather, and 5 m x 5 m, if protected by covering layers only. Generally, when protective concrete or concrete slabs are used above the



waterproofing, the expansion joints or gaps are incorporated into the perimeter areas to protect the waterproofed upstand. Additionally,

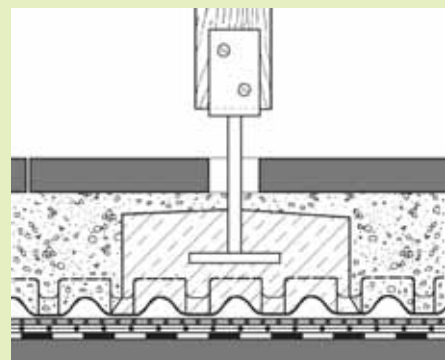
the traffic surface build-up must be isolated from the waterproofing, either by two separation layers, or one separation layer and a protection layer. The traffic area must also be restrained within fixed borders to limit the forces imposed by traffic movement.

The traffic surface itself, for example, can be made of interlocking concrete pavers with a concrete plaster surface, but can also be made of concrete settings combined with turf. Numerous combinations of road surfaces and soft landscaped areas are possible.

Foundations for supporting structures

Floradrain FD® 60 can also be used locally as a formwork; enabling foundations for various furnishings without penetration of the roof

membrane. The channel system on the underside of the elements ensures the unimpeded drainage of excess water.



In order to prevent sintering, the release of carbonates must be avoided by using the correct composition and surface treatment of the concrete and by choosing proper aggregates.



The green roof system build-up with “Elasto” turns underground garage decks into park

Generally, the “Roof Garden“ system can also be applied on underground garage decks, including the possibility of using dam irrigation.

Due to the accessibility and load bearing capacity of garage decks, it is practical to use a stable system build up: this allows the use of wheel loaders to spread the substrate.

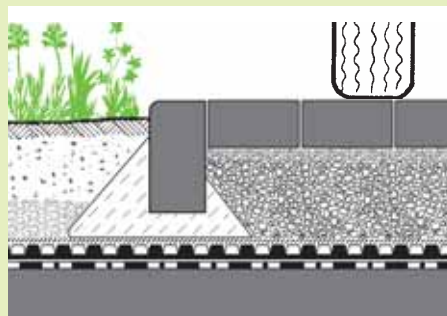
Elastodrain studded sheet, manufactured of solid recycled rubber, are installed over the entire roof surface to protect the waterproofing from mechanical stress during the construction and maintenance

period. After being covered with the stable Filter Sheet TG, the Elastodrain also ensures the safe drainage of excess water. Together with “Zincolit“ and the different “ZinCo system substrates“, this build-up offers a variety of possibilities for planting and design.



Walkways and Driveways

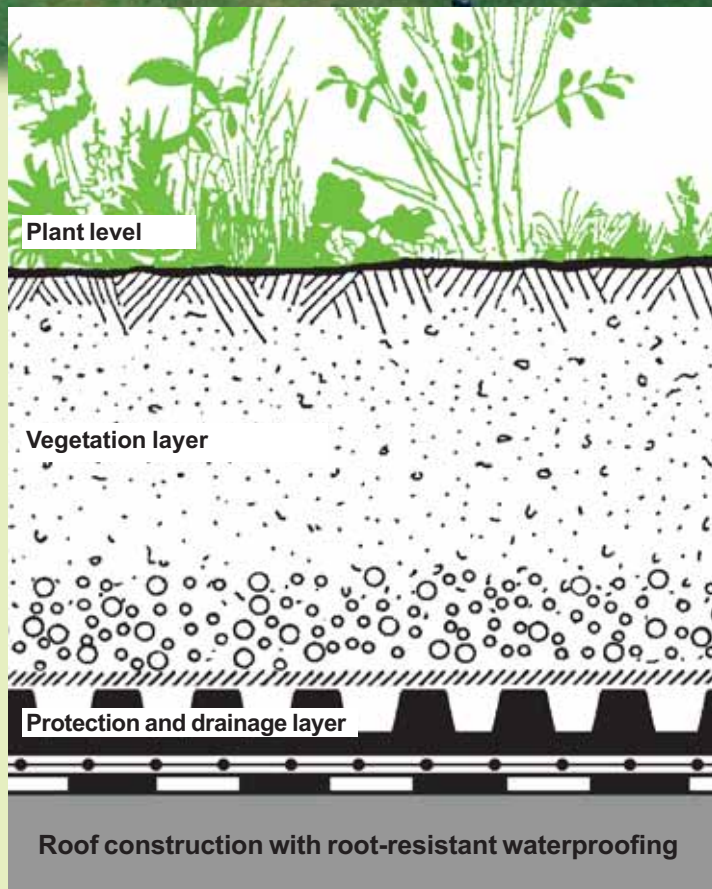
Elastodrain EL 200 and especially Elastodrain EL 202 with twice the number of knobs are useful as sub-structure for a variety of walkways and driveways. Numerous possibilities exist and include anything from car parks and fire access roads to reinforced lawn and stone paving.



“drain” landscapes.



Weight kg/m ²		Height mm
dry	water-saturated	
≥ 160	≥ 240	≥ 160
82	104	80
14	14	20
256	358	



Lawn, perennials; on deeper substrate layers also shrubs and small trees

“Roof Garden” system substrate and “Lawn” respectively (max. to 350 mm - on deeper embankments additional “Zincolit Plus” system substrate)

Zincolit Plus

Filter Sheet TG

ELASTODRAIN EL 200

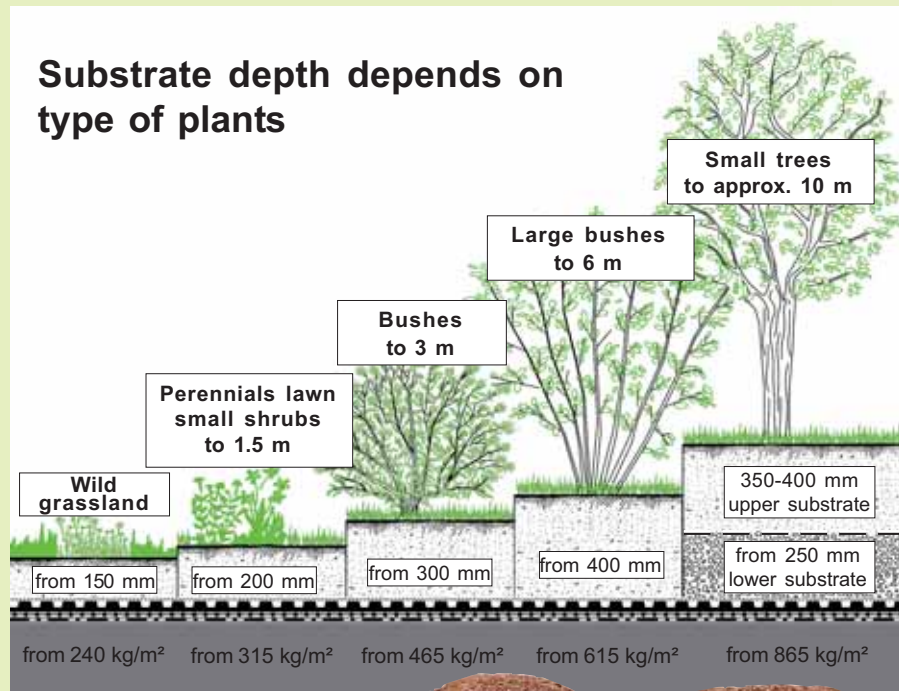
Separation and Slip Sheet TGF 20

Note:
If non root-resistant waterproofing is used, WSB 80 PO root barrier is required!

Build-up height:	from approx. 260mm
Weight, saturated:	from approx. 360kg/m²
Water retention capacity:	from approx. 100l/m²

Technically accurate implementation = per functioning roof landscapes.

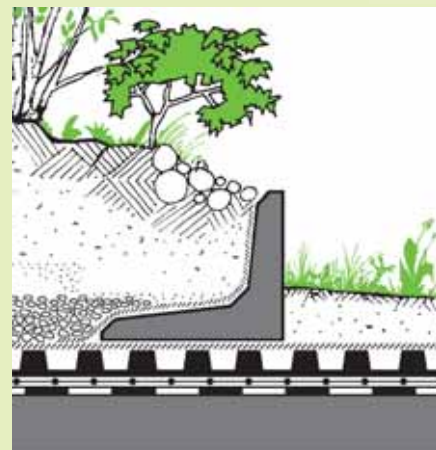
Plant growth is especially affected by the type and depth of applied substrate. On a substrate height of approx 150 mm, near-natural wild grasslands are possible. For sophisticated perennial plantings, as well as for bushes and trees, deeper embankments are required. The potential for horizontal extension of the roots of trees and bushes must be insured. ZinCo offers a range of substrates with which every green roof request can be fulfilled.



Planting bushes and trees

In order to establish trees and bushes permanently on roof areas, it is often necessary to create more space for the roots by forming special planting quarters. Anchor fixings are often used for securing bushes and trees against wind damage, and can be attached to the borders of the quarters.

If there is no possibility to do so, the plants can also be tied for example, to galvanized reinforcing mats, which are laid into the substrate layer or fastened to perforated paving slabs.



Bordering areas with deeper substrate layers

Within a system build-up, not only "mounds", but also borders for areas of deeper and varied substrates are possible. For example, if bushes were to be planted around a roof garden for

more privacy. An attractive possibility to create such borders are the ZinCo L-concrete kerbs (see above).





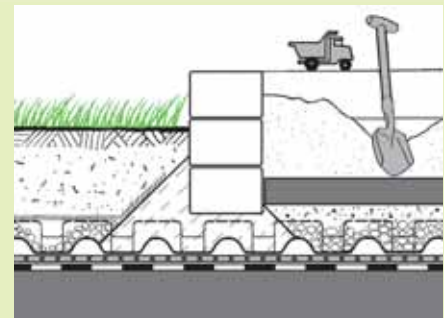
Play areas

Provided there are safety rails at the perimeters of underground garages or roofs, it is possible to construct playgrounds with slides and sandpits with no problem.

Treated timber planks, for example, make a very suitable border between the sandpit and the soil area. Concrete paving slabs placed at the bottom of the sandpit, above the drainage element, provide an additional protective

barrier for the waterproofing in such critical areas and also makes the exchange of the sand easier.

Of course, the current safety regulations regarding roofs and underground garage decks must be taken into account; that is the play equipment must be well anchored and their foundations sufficiently covered or secured by fall protection slabs.

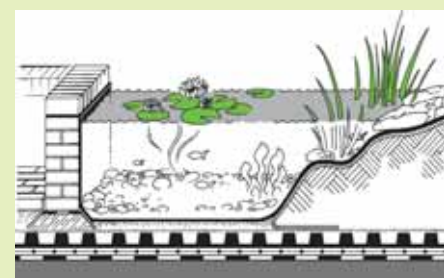


Ponds and pools

With the correct design, ponds and pools can be installed on roof decks.

They should generally be placed above the drainage layer and lined separately with a special plastic membrane; should the pool ever leak, the water will flow to the regular roof drainage. It is recommended to have at least 300 mm

depth of water to compensate for the higher evaporation rate on high and exposed buildings.



“Heather with Lavender“, the ideal system blooming perennials and fragrant herbs.

Unlike the “Roof Garden“ or the “Underground Garage Deck“, where the whole range of plants from nurseries can be used (provided they are suitable for the environment), the semi-intensive build-up “Heather with Lavender“ is offered with selection of plants already included. The plant community “Heather with Lavender“ contains amongst

ground covering filler plants also fragrant herbs and small shrubs such as thyme, oregano and lavender. This plant selection represents a drought resistant and visually pleasant character. The relevant “Heather with Lavender“ system substrate, which has been specifically designed for the plant community “Heather with Lavender“, in combination with the water retention and drainage element type Floradrain® FD 40 create the necessary habitat conditions so that

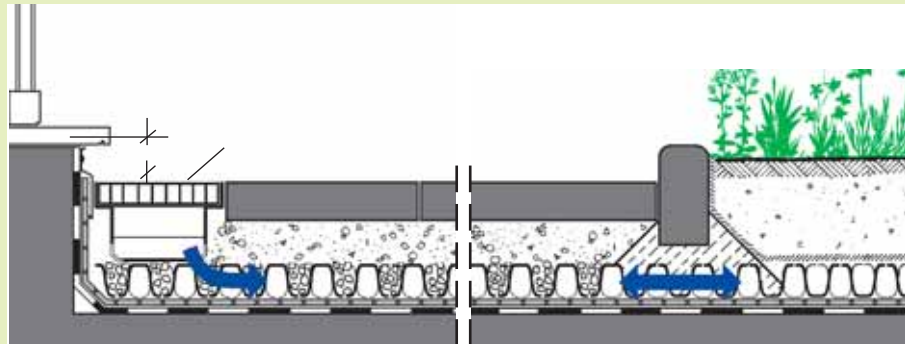
the “Heather with Lavender“ – once rooted – requires little maintenance.



On Floradrain® you can build and design . . .

Floradrain® FD 40 is ideally as a substructure for green roofs, but it can be applied just as well under concrete slabs or paved surfaces.

Moreover, borders between different areas can be founded in a stable and secure manner. L-concrete kerbs and kerbs can be set directly in concrete or mortar onto the Floradrain® without impeding the water run off. Floradrain® also safely drains the excess water out of the channels or grills, which are often installed to safe guard door sills. In this case,



the required upstand height which is normally 150 mm, according to the German “Flat Roof Principles“, can be reduced to 50 mm above the finished surface. Under concrete slabs, which should have a fall of at least 1 %, the

troughs of the Floradrain® elements must be filled with stone chippings. Also, the Floradrain® elements are to be laid “upside down“ with the openings facing the protection mat.

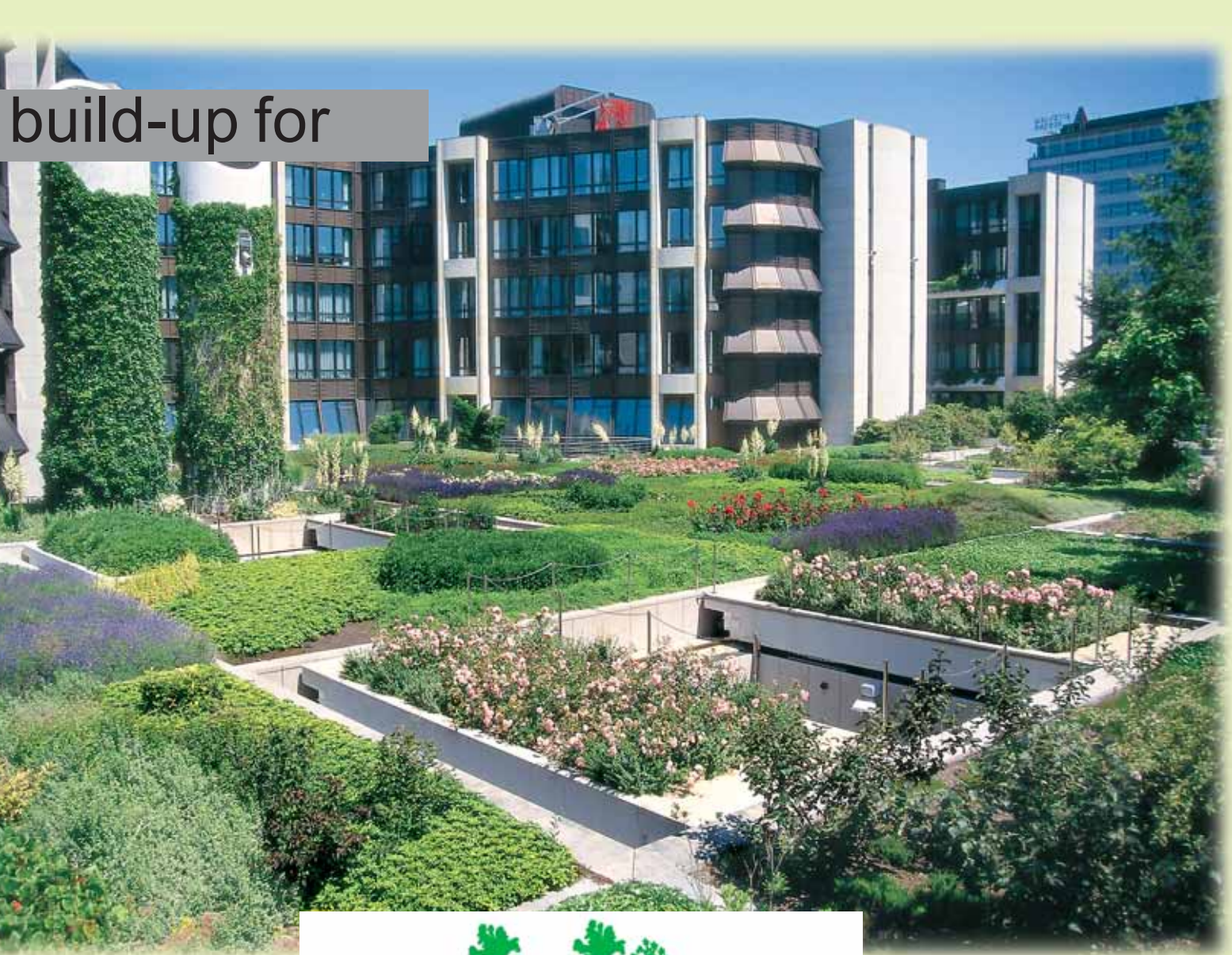
Plant list “Heather with Lavender“ from 100 mm on “Heather with Lavender“ system substrate

mounds of 150 mm
for Lavender plants

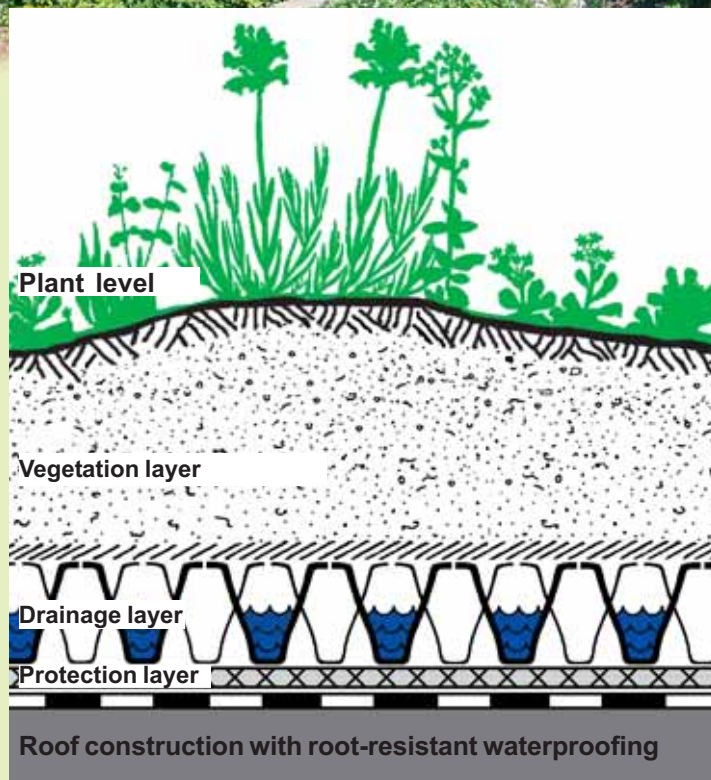
Botanical Name	Common Name	Height (cm)	Blossom Colour	Blossom period (month)
Groups of 3, 5 or 7 plants				
<i>Achnatherum calamagrostis</i>	Goldear Grass	60 - 70	brownish	6 - 9
<i>Calamintha nepeta ssp. nepeta</i>	Lesser calamint	40 - 50	violett	7 - 9
<i>Euphorbia myrsinithes</i>	Spurge	15 - 25	yellow	5 - 7
<i>Festuca amethystina</i>	Tufted fescue	25 - 40	teal	6 - 8
<i>Hyssopus officinalis</i>	Hyssop	30 - 45	blue	6 - 9
<i>Lavandula angustifolia</i>	Lavender	40 - 60	violett	6 - 7
<i>Pulsatilla vulgaris</i>	Pasque Flower	20	violett	3 - 4
<i>Sedum telephium 'Herbstfreude'</i>	Stonecrop	30 - 50	roströt	9 - 10
Filler plants				
<i>Anaphalis triplinervis</i> 'Sommerschnee'	Pearly everlasting	20 - 25	white	7 - 9
<i>Armeria maritima i.S.</i>	Sea thrift	15 - 25	rosa	5 - 6
<i>Chamaemelum nobile 'Plena'</i>	Double Flowering Chamomile	20 - 25	white	6 - 8
<i>Fragaria vesca var. vesca</i>	Crinita woods-strawberry	20 - 25	white	4 - 6
<i>Hypericum polyphyllum</i>	St. Johnswort	10 - 15	yellow	6 - 7
<i>Matricaria caucasica</i>	Caucasian Chamomile	15	yellow, white	5 - 7
<i>Nepeta x faassenii</i>	Faasen's catmint	25 - 30	violett	6 - 9
<i>Oenothera missouriensis</i>	Ozark sundrops	20 - 25	light yellow	6 - 9
<i>Origanum vulgare 'Compactum'</i>	Compact marjoram	15	light rosa	7 - 9
<i>Teucrium chamaedrys</i>	Germander	20 - 25	rosa	7 - 8



build-up for



Weight kg/m ²		Height mm
dry	water-saturated	
100 - 150	150 - 225	100 - 150
3	11	40
103 - 150	161 - 236	



Plant level according to plant list "Heather with Lavender"

"Heather with Lavender" system substrate

Filter Sheet SF

FLORADRAIN® FD 40

Water Retention and Protection Mat SSM 45

Note:
If non root-resistant waterproofing is used, WSF 40 root barrier is required!

Build-up height:	approx. 160 mm
Weight, saturated:	approx. 195 kg/m²
Water retention capacity:	approx. 70 l/m²

Creating open spaces on roofs - with system.

This planning guide is intended to provide a detailed overview of the technology available to support you in developing project-specific, highly effective intensive green roof specifications for your future building projects.

Our

ZinCo Technical Department

as well as our

technical consultants

will assist you with support and advice from the planning stage through to the writing of the

specification documentation.

Challenge us!



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