AQUA VERDE

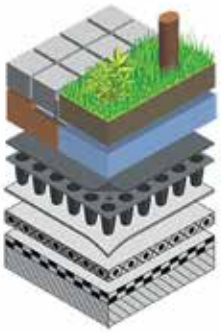
Drainage Plates

Green Roof / Green Wall

Firm Soil Elements

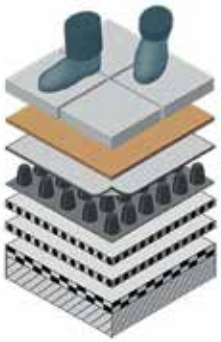
Elevated Flooring

Parking Deck



Intensif Green Roof

Extensive Green Roof



Rigid Floor Tiles

Explanation pictograms

Pictograms for applications

Component of the Nophadrain Extensive Green Roof System

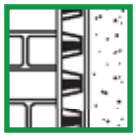
Component of the Nophadrain Extensive Green Roof System - (steep) pitched roof

Component of the Nophadrain Intensive Green Roof System

Component of the Nophadrain Podium Deck System

Component of the Nophadrain Parking Deck System - cars

Component of the Nophadrain Parking Deck System - heavy goods vehicles



Component of the Nophadrain Vertical Drainage System

Pictograms physical properties AV Drainage Systems

Construction height in mm

Compressive strength in kPa / percentage deformation at 1 MPa

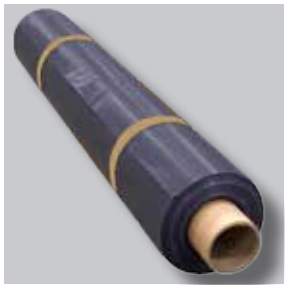
Water reservoir in l/m^2

1 Separation, protection and slip layer

The AV separation, protection and slip layers separate materials that are chemically incompatible (e.g. polyvinylchloride (PVC) and polystyrene (PS)). The separation layer can also act as a protection layer. The protection layer guards the waterproofing membrane against mechanical and dynamic loadings. The protection layer should be designed to suit the coAVitions to which the waterproofing membrane will be subjected. If AV Drainage Systems are fitted immediately after installation of the water-proofing membrane, they can act as a separation and protection layer for lightweight static loads.

During construction, and when in use, waterproofing systems are not capable of withstanding the loads typical of a flexible pavement. Where there is concern regarding the horizontal load-bearing capacity of the waterproofing membrane, a slip layer, comprising two smooth, non-sticky surfaces that can slide over one another, will be required.

1.1 AV TGF-20 Separation and Slip Film



AV TGF-20 Separation and Slip Film

AV TGF-20 Separation and Slip Film

High-quality plastic film that acts as a separation layer and as the first smooth, non-sticky surface of the slip layer. The separation and slip film is placed on top of the waterproofing membrane uAVerneath the AV Drainage System and helps to protect the waterproofing membrane against horizontal loading. The AV TGF-20 Separation and Slip Film should be installed with an overlap of at least 100 mm.

Application AV TGF-20 Separation and Slip Film

The AV TGF-20 Separation and Slip Film is a component of the Nophadrain Podium Deck System and the Nophadrain Parking Deck System - inverted roof construction.

Properties AV TGF-20 Separation and Slip Film

- Material: low density recycled polyethylene (modified LDPE)*
- Thickness: approx. 0.2 mm
- Weight: approx. 175 g/m²

Product	Dimensions (L x W)	Packaging
AV TGF-20 Separation and Slip Film	approx. 50 m x 2 m	approx. 100 m², roll

* Because the product is made from recycled materials, the colour of the film is variable.

1.2 AV TSF-100 Slip and Protection Sheet

AV TSF-100 Slip and Protection Sheet

AV TSF-100 Slip and Protection Sheet

Heavy-duty plastic sheet on a roll that acts as a separation and protection layer and as the first smooth, non-sticky surface of the slip layer. The sheet is laid loose on top of the waterproofing membrane with an overlap of at least 100 mm.

Application AV TSF-100 Slip and Protection Sheet

The AV TSF-100 Slip and Protection Sheet has been tested by the Technical University Munich (D) as a system component of the Nophadrain Parking Deck System – cars / heavy goods vehicles. This product is also suitable for the Nophadrain Intensive Green Roof System.

The protection efficiency has been proved by an iAVex test done at the Kiwa MPA Bautest GmbH based upon hEN 13719 'Geotextiles and geotextile-related products – Determination of the long term protection efficiency of geotextiles in contact with geosynthetic barriers'.

Properties AV TSF-100 Slip and Protection Sheet

- Material: high density polyethylene (modified HDPE)
- Thickness: approx. 1 mm
- Weight: approx. 930 g/m²
- Protection in accordance with DIN 18195 – Part 10
- Test: Performance test at the Technical University Munich (D) - assessment of the performance and behaviour of a pavement structure uAVer simulated traffic coAVitions. / KIWA MPA Bautest GmbH , Protection efficiency test based upon hEN 13719.

Product	Dimensions (L x W)	Packaging
AV TSF-100 / 1 Slip and Protection Sheet	approx. 100 m x 1 m	approx. 100 m², roll
AV TSF-100 / 2 Slip and Protection Sheet	approx. 100 m x 2 m	approx. 200 m², roll

2 Root barrier layer

The root barrier layer prevents the ingress of roots into the waterproofing layer. The root barrier layer can be integrated in a root-resistant waterproofing membrane (e.g. PVC, EPDM (Ethylene Propylene Diene Monomer) or bitumen–copper waterproofing membranes tested in accordance with the FLL*-root-resistance test or hEN 13948).

If the waterproofing membrane is not root resistant, a separate root barrier should be placed directly on top of the waterproofing membrane. Overlaps have to be heat-welded along the lapped joints.

2.1 AV WSB-50 / WSB-80 Root Barrier

AV WSB-50 Root Barrier

AV WSB-50 Root Barrier

High-quality, root-resistant plastic sheet on a roll that acts as a root barrier against the ingress of roots in extensive green roofs. The 0.5 mm thick plastic sheet is laid loose on top of the waterproofing membrane that is not root resistant.

The overlap should be at least 100 mm and has to be heat-welded. The sheet has been tested in accordance with the FLL-root-resistant test.

Application AV WSB-50 Root Barrier

The AV WSB-50 Root Barrier is a system component of the Nophadrain Extensive Green Roof System that is used when the waterproofing is not root resistant.

AV WSB-80 Root Barrier

AV WSB-80 Root Barrier

Similar to the AV WSB-50 Root Barrier but with a sheet thickness of 0.8 mm.

Application AV WSB-80 Root Barrier

The AV WSB-80 Root Barrier is designed as a root barrier for intensive green roofs and is a system component of the Nophadrain Intensive Green Roof System.

Properties AV WSB-50 / WSB-80 Root Barrier

- Material: modified polyethylene (LDPE)
- Thickness: approx. 0.5 mm (AV WSB-50) / 0.8 mm (AV WSB-80)
- Weight: approx. 475 g/m² (AV WSB-50) / 760 g/m² (AV WSB-80)
- Test: root penetration test of FLL*

Product	Dimensions (L x W)	Packaging
AV WSB-50 / WSB-80 Root Barrier	approx. 25 m x 6 m	approx. 150 m², roll

* Forschungsgesellschaft Landschaftsentwicklung Landschaftsbau e.V. - www.fll.de a German research association

3 Filter- and drainage layer

At the heart of the Nophadrain Utility Roof Deck Systems are the high-performance, CE-marked AV Drainage Systems. The AV Drainage Systems fulfill in the system build-up the functions of the filter and drainage layer and, depeAVing on the loading, the function of the protection layer. In addition, the AV Drainage Systems can have a water reservoir. The core of the AV Drainage System is made of high impact polystyrene (HIPS) which gives the drainage systems a high compressive strength and an excellent creep resistance guaranteeing a consistent long term drainage capacity. The filter layer of the AV Drainage Systems consists of a non-woven or a woven geotextile and prevents the intrusion of fine soil particles present in the substrate, the sub-base layer or the laying course into the AV Drainage System. The opening size of holes in the non-woven and woven geotextiles is tuned to the particle size of the substrates, the sub-base layer and the laying course. The geotextiles are glued and not thermally boAVed to the dimpled core to avoid damage to the mechanical and hydraulic properties of the geotextile and the drainage system. It also prevents the geotextile to be pushed in between the dimples obstructing the drainage capacity.

The drainage layer relieves the waterproofing membrane of hydrostatic pressure. The drainage layer must have a good vertical permeability and a high compressive strength, combined with the ability to transport excess water horizontally away from the roof area. The drainage layer must maintain full functionality for a period of 50 years.

The AV Drainage Systems are all CE-marked in accordance with hEN 13252.

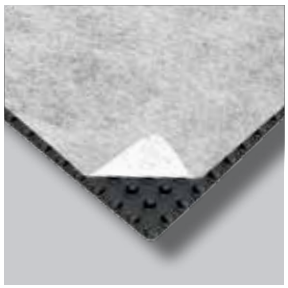
AV Drainage Systems:
multiple functional layers in one product, on roll.

3.1 AV 100 / 120 Drainage System



8 mm

500 kPa


AV 100 Drainage System

AV 100 Drainage System

High-performance CE-marked drainage system made out of recycled high impact polystyrene. The core of the AV Drainage System is a dimpled sheet with a high compressive strength and a construction height of approx. 8 mm. A non-woven geotextile is boAVed to each dimple as a filter layer.

Application AV 100 Drainage System

The AV 100 Drainage System is a component of the Nophadrain Extensive Green Roof System - (steep) pitched roof that acts as a filter, drainage and protection layer.

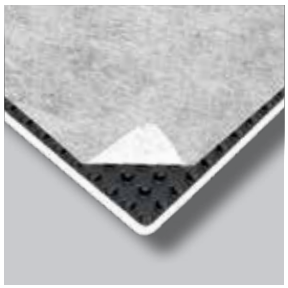
AV 120 Drainage System

Similar to the AV 100 Drainage System but with an additional pressure-dividing slip film glued to the back of the dimpled sheet that acts as the first smooth, non-sticky surface of the slip layer and as an additional protection layer of the waterproofing membrane.



8 mm

500 kPa


AV 120 Drainage System

Application AV 120 Drainage System

The AV 120 Drainage System is a component of the AV "Clic" Sub-Structure Drainage and Protection System that acts as a filter, drainage and protection layer.

Properties AV 100 / 120 Drainage System

- Material dimpled sheet: recycled high impact polystyrene (HIPS)
- Material geotextile filter: polypropylene (PP) and polyethylene (PE)
- Material pressure-dividing slip film: polypropylene (PP) – AV 120 only
- Construction height: approx. 8 mm
- Compressive strength: approx. 500 kPa
- Weight: ca. 653 g/m² (AV 100) / 702 g/m² (AV 120)
- Drainage capacity at i = 1 at 20 kPa: approx. 2.97 l/(s.m)
- Drainage capacity at fall ratio 2 % at 20 kPa: approx. 0.36 l/(s.m)

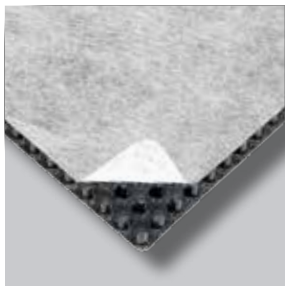
Product	Dimensions (L x W)	Packaging
AV 100 / 120 Drainage System	approx. 32 m x 1.25 m	approx. 40 m², roll

3.2 AV 200 / 220 Drainage System



12.5 mm

700 kPa


AV 200 Drainage System

AV 200 Drainage System

High-performance CE-marked drainage system with an innovative dimple design made out of recycled high impact polystyrene. The core of the AV Drainage System is a dimpled sheet with a high compressive strength and a construction height of approx. 12.5 mm. A non-woven geotextile is boAVed to each dimple as a filter layer.

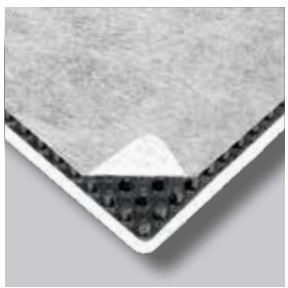
AV 220 Drainage System

Similar to the AV 200 Drainage System but with an additional pressure-dividing slip film glued to the back of the dimpled sheet that acts as the first smooth, non-sticky surface of the slip layer and as an additional protection layer of the waterproofing membrane.



12.5 mm

700 kPa


AV 220 Drainage System

Application AV 200 / 220 Drainage System

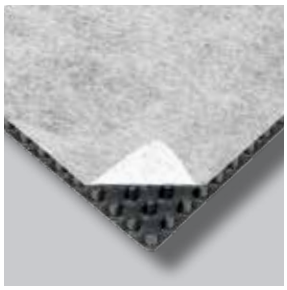
The AV 200 / AV 220 Drainage System is a component of the Nophadrain Podium Deck System that acts as a filter, drainage and protection layer.

Properties AV 200 / 220 Drainage System

- Material dimpled sheet: recycled high impact polystyrene (HIPS)
- Material geotextile filter: polypropylene (PP) and polyethylene (PE)
- Material pressure-dividing slip film: polypropylene (PP) – AV 220 only
- Construction height: approx. 12.5 mm
- Compressive strength: approx. 700 kPa
- Weight: approx. 908 g/m² (AV 200) / 956 g/m² (AV 220)
- Drainage capacity at i = 1 at 20 kPa: approx. 5.29 l/(s.m)
- Drainage capacity at fall ratio 2 % at 20 kPa: approx 0.60 l/(s.m)

Product	Dimensions (L x W)	Packaging
AV 200 / 220 Drainage System	approx. 32 m x 1.25 m	approx. 40 m², roll

3.3 AV 200h / 220h Drainage System



AV 200h Drainage System

AV 200h Drainage System

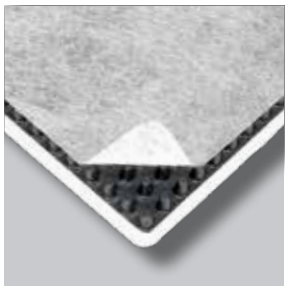
High-performance CE-marked drainage system with an innovative dimple design made out of recycled high impact polystyrene. The core of the AV Drainage System is a dimpled sheet with a high compressive strength and a construction height of approx. 16 mm. A non-woven geotextile is boAVed to each dimple as a filter layer.

16 mm

450 kPa

AV 220h Drainage System

Similar to the AV 200h Drainage System but with an additional pressure-dividing slip film glued to the back of the dimpled sheet that acts as the first smooth, non-sticky surface of the slip layer and as an additional protection layer of the waterproofing membrane.



AV 220h Drainage System

Application AV 200h / 220h Drainage System

The AV 200h / AV 220h Drainage System is a component of the Nophadrain Podium Deck System that acts as a filter, drainage and protection layer. The drainage system is designed for roofs with limited falls. The increased construction height (approx. 16 mm) prevents waterlogging in the sub-base and /or levelling layer and the risk of frost heave affecting the paving and allows longer drainage length.

16 mm

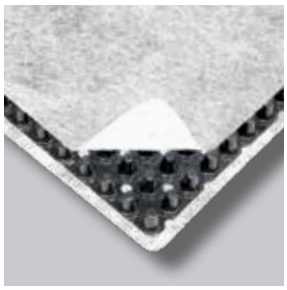
450 kPa

Properties AV 200h / 220h Drainage System

- Material dimpled sheet: recycled high impact polystyrene (HIPS)
- Material geotextile filter: polypropylene (PP) and polyethylene (PE)
- Material pressure-dividing slip film: polypropylene (PP) – AV 220h only
- Construction height: approx. 16 mm
- Compressive strength: approx. 450 kPa
- Weight: approx. 908 g/m² (AV 200h) / 956 g/m² (AV 220h)
- Drainage capacity at i = 1 at 20 kPa: approx. 7.38 l/(s.m)
- Drainage capacity at fall ratio 2 % at 20 kPa: approx. 1.04 l/(s.m)

Product	Dimensions (L x W)	Packaging
AV 200 / 220h Drainage System	approx. 30 m x 1.25 m	approx. 37.5 m², roll

3.4 AV 200sv Drainage System



AV 200sv Drainage System

AV 200sv Drainage System

High-performance CE-marked drainage system with an innovative dimple design made out of recycled high impact polystyrene. The core of the AV Drainage System is a perforated, vapour permeable dimpled sheet with a high compressive strength and a construction height of approx. 13 mm. A non-woven geotextile is boAVed to each dimple as a filter layer. A vapour-permeable geotextile is glued to the back of the perforated core as a separation and protection layer to protect the XPS (Extruded Polystyrene Foam) insulation panels.

13 mm

700 kPa

Application AV 200sv Drainage System

The AV 200sv Drainage System is a component of the Nophadrain Podium Deck System that acts as a filter, drainage, protection and separation layer on an inverted roof construction. When the roof has limited falls or when longer drainage length is needed, the construction height can be increased to approx. 16.5 mm (AV 200hsv Drainage System).

Properties AV 200sv Drainage System

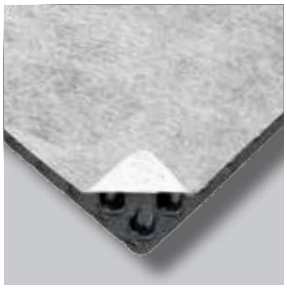
- Material dimpled sheet: recycled high impact polystyrene (HIPS)
- Material geotextile filter: polypropylene (PP) and polyethylene (PE)
- Material vapour-permeable geotextile: polypropylene (PP) and polyethylene (PE)
- Construction height: approx. 13 mm
- Compressive strength: approx. 700 kPa
- Perforations/m²: approx. 1,540 / ø 6.3 mm
- Weight: approx. 990 g/m²
- Drainage capacity at i = 1 at 20 kPa: approx. 5.29 l/(s.m)
- Drainage capacity at fall ratio 2 % at 20 kPa: approx. 0.60 l/(s.m)

Product	Dimensions (L x W)	Packaging
AV 200sv Drainage System	approx. 32 m x 1.25 m	approx. 40 m², roll

3.5 AV 800 Drainage System

26.5 mm

500 kPa



AV 800 Drainage Systems

AV 800 Drainage System

High-performance CE-marked drainage system with an innovative dimple design made out of recycled high impact polystyrene. The core of the AV 800 Drainage System is a dimpled sheet with a high compressive strength and a construction height of approx. 26.5 mm. A non-woven geotextile is glued to each dimple as a filter layer.

Application 800 Drainage System

The AV 800 Drainage System is a component of the Nophadrain Podium Deck System that acts as a filter, drainage and protection layer. The AV 800 Drainage System is suitable for roofs with limited falls. The construction height (approx. 26.5 mm) prevents waterlogging in the substrate layer and the risk of frost heave affecting the paving and allows longer drainage length.

Properties 800 Drainage System

- Material dimpled sheet: recycled high impact polystyrene (HIPS)
- Material geotextile filter: polypropylene (PP) and polyethylene (PE)
- Construction height: approx. 26.5 mm
- Compressive strength: approx. 500 kPa
- Weight: approx. 1,226 g/m²
- Drainage capacity at i = 1 at 20 kPa: approx. 14.11 l/(s.m)
- Drainage capacity at fall ratio 2 % at 20 kPa: approx. 2.09 l/(s.m)

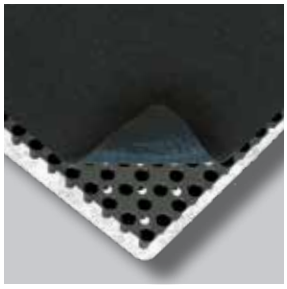
Product	Dimensions (L x W)	Packaging
AV 800 Drainage System	approx. 20 m x 1.25 m	approx. 25 m², roll

3.6 AV 4+1h Drainage System

17 mm

450 kPa

4.3 l/m²



AV 4+1h Drainage System

AV 4+1h Drainage System

High-performance CE-marked drainage system with an innovative dimple design made out of recycled high impact polystyrene. The core of the AV Drainage System is a perforated vapour-permeable dimpled sheet that has a high compressive strength, a construction height of approx. 17 mm and a water reservoir of approx. 4.3 l/m². A non-woven geotextile is glued to the back of the dimpled sheet as a filter layer and a vapour-permeable geotextile is boAVed to each dimple as a protection and separation layer.

Application AV 4+1h Drainage System

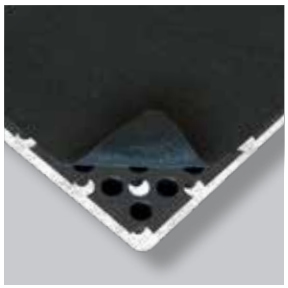
The AV 4+1h Drainage System is a component of the Nophadrain Extensive Green Roof System, the Nophadrain Waterbuffering Roof System and the Nophadrain Intensive Green Roof System that acts as a filter, drainage, protection and separation layer. The construction height (approx. 17 mm) prevents waterlogging in the substrate layer and the risk of frost heave affecting the paving and allows longer drainage length. The AV 4+1h Drainage System is suitable for warm roof and inverted roof constructions.

Properties AV 4+1h Drainage System

- Material dimpled sheet: recycled high impact polystyrene (HIPS)
- Material geotextile filter: polypropylene (PP)
- Material vapour-permeable geotextile: polypropylene (PP) and polyethylene (PE)
- Construction height: approx. 17 mm
- Compressive strength: approx. 450 kPa
- Perforations/m²: approx. 1,540 / ø 6.3 mm
- Water reservoir: approx. 4.3 l/m²
- Weight: approx. 1,010 g/m²
- Drainage capacity at i = 1 at 20 kPa: approx. 7.61 l/(s.m)
- Drainage capacity at 2 % fall at 20 kPa: approx. 1.19 l/(s.m)

Product	Dimensions (L x B)	Packaging
AV 4+1h Drainage System	approx. 30 m x 1.25 m	approx. 37.5 m², roll

3.7 AV 5+1 Drainage System



AV 5+1 Drainage System

AV 5+1 Drainage System

High-performance CE-marked drainage system with an innovative dimple design made out of recycled high impact polystyrene. The core of the AV Drainage System is a perforated, vapour-permeable dimpled sheet with a high compressive strength, a construction height of approx. 27.5 mm and a water reservoir of approx. 5.8 l/m². A non-woven geotextile is glued to the back of the dimpled sheet as a filter layer and a vapour-permeable geotextile is boAVed to each dimple as a protection and separation layer.

27.5 mm

500 kPa

5.8 l/m²

Application AV 5+1 Drainage System

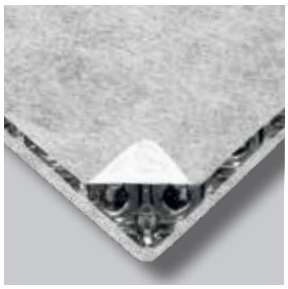
The AV 5+1 Drainage System is a component of the Nophadrain Extensive Green Roof System and the Nophadrain Intensive Green Roof System that acts as a filter, drainage, protection and separation layer. The AV 5+1 Drainage System is suitable for roofs with limited falls. The construction height (approx. 27.5 mm) prevents waterlogging in the substrate layer and the risk of frost heave affecting the paving and allows longer drainage length. The AV 5+1 Drainage System is suitable for warm roof and inverted roof constructions.

Properties AV 5+1 Drainage System

- Material dimpled sheet: recycled high impact polystyrene (HIPS)
- Material geotextile filter: polypropylene (PP)
- Material vapour-permeable geotextile: polypropylene (PP) and polyethylene (PE)
- Construction height: approx. 27.5 mm
- Compressive strength: approx. 500 kPa
- Perforations/m²: approx. 575 / ø 15.8 mm
- Water Reservoir: approx. 5.8 l/m²
- Weight: approx. 1,243 g/m²
- Drainage capacity at i = 1 at 20 kPa: approx. 15.70 l/(s.m)
- Drainage capacity at fall ratio 2 % at 20 kPa: approx. 2.14 l/(s.m)

Product	Dimensions (L x W)	Packaging
AV 5+1 Drainage System	approx. 20 m x 1.25 m	approx. 25 m², roll

3.8 AV 6+1v Drainage System



AV 6+1v Drainage System

AV 6+1v Drainage System

High-performance CE-marked drainage system with an innovative dimple design made out of recycled high impact polystyrene. The core of the AV Drainage System is a perforated, vapour-permeable dimpled sheet with a high compressive strength, a construction height of approx. 27 mm and a water reservoir of approx. 7.6 l/m². A non-woven geotextile is boAVed to each dimple as a filter layer. A vapour-permeable geotextile is glued to the back of the perforated core as a separation and protection layer to protect the XPS (Extruded Polystyrene Foam) insulation panels.

27 mm

300 kPa

7.6 l/m²

Application AV 6+1v Drainage System

The AV 6+1v Drainage System is a component of the Nophadrain Extensive Green Roof System and the Nophadrain Water Buffering Roof System that acts as a filter, drainage, protection and separation layer if a high water reservation volume is required. The AV 6+1v Drainage System is suitable for roofs with no or limited falls. The high construction height prevents waterlogging in the substrate layer and the risk of frost heave affecting the pavement and allows longer drainage length.The AV 6+1v Drainage System is suitable for warm roof and inverted roof constructions.

Properties AV 6+1v Drainage System

- Material dimpled sheet: recycled high impact polystyrene (HIPS)
- Material geotextile filter: polypropylene (PP) and polyethylene (PE)
- Material vapour-permeable geotextile: polypropylene (PP) and polyethylene (PE)
- Construction height: approx. 27 mm
- Compressive strength: approx. 300 kPa
- Perforations/m²: approx. 1,048 / ø 2.8 mm
- Water reservoir: approx. 7.6 l/m²
- Weight: approx. 1,345 g/m²
- Drainage capacity at i = 1 at 20 kPa: approx. 9.29 l/(s.m)
- Drainage capacity at fall ratio 2 % at 20 kPa: approx. 1.22 l/(s.m)

Product	Dimensions (L x W)	Packaging
AV 6+1v Drainage System	approx. 20 m x 1.20 m	approx. 24 m², roll

3.9 AV 600 / 620 Drainage System

12.5 mm

900 kPa

AV 600 Drainage System

AV 600 Drainage System

High-performance CE-marked drainage system with an innovative dimple design made out of recycled high impact polystyrene. The core of the AV Drainage System is a dimpled sheet with a very high compressive strength and a construction height of approx. 12.5 mm. A special mono-filament woven geotextile is boAVed to each dimple as a filter layer.

AV 620 Drainage System

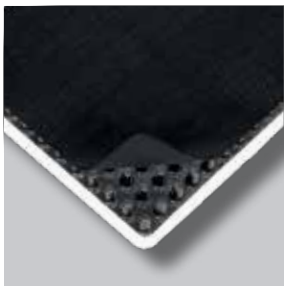
Similar to the AV 600 Drainage System but with an additional pressure-dividing slip film glued to the back of the dimpled sheet that acts as the first smooth, non-sticky surface of the slip layer and as an additional protection layer of the waterproofing membrane.

Application AV 600 / 620 Drainage System

The AV 600 / 620 Drainage System is a component of the Nophadrain Parking Deck System – cars that acts as a filter, drainage and protection layer.

12.5 mm

900 kPa



AV 620 Drainage System

Properties AV 600 / 620 Drainage System

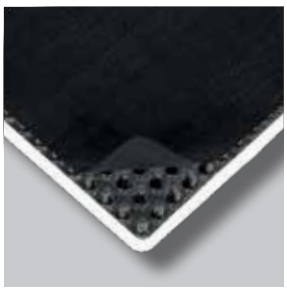
- Material dimpled sheet: recycled high impact polystyrene (HIPS)
- Material woven geotextile filter: polypropylene (PP)
- Material pressure-dividing slip film: polypropylene (PP) – AV 620 only
- Construction height: approx. 12.5 mm
- Compressive strength: approx. 900 kPa
- Weight: approx. 1,189 g/m² (AV 600) / 1,238 g/m² (AV 620)
- Drainage capacity at i = 1 at 20 kPa: approx. 5.27 l/(s.m)
- Drainage capacity at 2 % fall at 20 kPa: approx. 0.72 l/(s.m)
- Test: performance test at the Technical University Munich (D) - assessment of the performance and behaviour of a pavement structure uAVer simulated traffic coAVitions.

Product	Dimensions (L x W)	Packaging
AV 600 / 620 Drainage System	approx. 32 m x 1.25 m	approx. 40 m², roll

3.10 AV 620hd Drainage System

12.5 mm

1,200 kPa



AV 620hd Drainage System

AV 620hd Drainage System

High-performance CE-marked drainage system with an innovative dimple design made out of recycled high impact polystyrene. The core of the AV Drainage System is a dimpled sheet with an extremely high compressive strength and a construction height of approx. 12.5 mm. A special mono-filament woven geotextile is boAVed to each dimple as a filter layer. A pressure-dividing slip film is glued to the back of the dimpled sheet and acts as the first smooth, non-sticky surface of the slip layer and as an additional protection layer of the waterproofing membrane.

Application AV 620hd Drainage System

The AV 620hd Drainage System is a component of the Nophadrain Parking Deck System – heavy goods vehicles that acts as a filter, drainage and protection layer.

Properties AV 620hd Drainage System

- Material dimpled sheet: recycled high impact polystyrene (HIPS)
- Material woven geotextile filter: polypropylene (PP)
- Material pressure-dividing slip film: polypropylene (PP)
- Construction height: approx. 12.5 mm
- Compressive strength: approx. 1,200 kPa
- Deformation at 1 MPa: 9 %
- Weight: ca. 1,407 g/m²
- Drainage capacity at i = 1 at 20 kPa: approx. 5.36 l/(s.m)
- Drainage capacity at 2 % fall at 20 kPa: approx. 0.74 l/(s.m)
- Test: performance test at the Technical University Munich (D) - assessment of the performance and behaviour of a pavement structure uAVer simulated traffic coAVitions.

Product	Dimensions (L x W)	Packaging
AV 620hd Drainage System	approx. 32 m x 1.25 m	approx. 40 m², roll

3.11 AV 600sv / 600hdsv Drainage System

AV 600sv Drainage System

AV 600sv Drainage System

High-performance CE-marked drainage system with an innovative dimple design made out of recycled high impact polystyrene. The core of the AV Drainage System is a perforated, vapour-permeable dimpled sheet with a very high compressive strength and a construction height of approx. 13 mm. A special mono-filament woven geotextile is boAVed to each dimple as a filter layer. A vapour-permeable geotextile is glued to the back of the dimpled sheet as a separation and protection layer of the XPS insulation panels.

13 mm

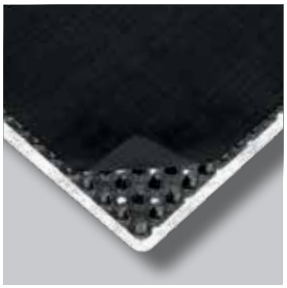
900 kPa

Application AV 600sv Drainage System

The AV 600sv Drainage System is a component of the Nophadrain Parking Deck System – cars that acts as a filter, drainage, protection and separation layer on an inverted roof construction.

AV 600hdsv Drainage System

Similar to the AV 600sv Drainage System but with a higher compressive strength (approx. 1,200 kPa).



AV 600hdsv Drainage System

Application AV 600hdsv Drainage System

The AV 600hdsv Drainage System is a component of the Nophadrain Parking Deck System – heavy goods vehicles that acts as a filter, drainage, protection and separation layer on an inverted roof construction.

13 mm

1,200 kPa

Properties AV 600sv /600hdsv Drainage System

- Material dimpled sheet: recycled high impact polystyrene (HIPS)
- Material woven geotextile filter: polypropylene (PP)
- Material vapour-permeable geotextile: polypropylene (PP) and polyethylene (PE)
- Construction height: approx. 13 mm
- Compressive strength: approx. 900 kPa (AV 600sv)/ 1,200 kPa (AV 600hdsv)
- Deformation at 1 MPa: 9 % (AV 600hdsv)
- Perforations/m²: approx. 1,540 / ø 6.3 mm
- Weight: approx. 1,264 g/m² (AV 600sv) / 1,426 g/m² (AV 600hdsv)
- Drainage capacity at i = 1 at 20 kPa: approx. 5.27 l/(s.m) (AV 600sv) / 5.36 l/(s.m) (AV 600hdsv)
- Drainage capacity at 2 % fall at 20 kPa: approx. 0.72 l/(s.m) (AV 600sv) / 0,74 l/(s.m) (AV 600hdsv)
- Test: performance test at the Technical University Munich (D) - assessment of the performance and behaviour of a pavement structure uAVer simulated traffic coAVitions.

Product	Dimensions (L x W)	Packaging
AV 600sv / 600hdsv Drainage System	approx. 32 m x 1.25 m	approx. 40 m², roll

3.12 AV Strip 150 / Strip 300 Drainage System

AV Strip 150 Drainage System

AV Strip 150 Drainage System

High-performance CE-marked drainage system made out of recycled high impact polystyrene. The core of the AV Strip Drainage System is a perforated dimpled sheet with a high compressive strength, a construction height of approx. 28 mm and a width of approx. 150 mm. The core is wrapped in a non-woven geotextile as a filter layer.

28 mm

500 kPa

Application AV Strip 150 Drainage System

The AV Strip 150 Drainage System can be used in single-layer green roof build-ups with limited falls, on metal sheet roofing and in street, golf course and sports field constructions. Furthermore, the AV Strip 150 Drainage System is a component of the Nophadrain AV Tree Irrigation System TIS.

28 mm

500 kPa

AV Strip 300 Drainage System

AV Strip 300 Drainage System

Similar to the AV Strip 150 Drainage System but with a width of approx. 300 mm.

Application AV Strip 300 Drainage System

The AV Strip 300 Drainage System can be used in single-layer green roof build-ups with limited falls, on metal sheet roofing and in street, golf course and sports field constructions.

Properties AV Strip 150 / Strip 300 Drainage System

- Material dimpled sheet: recycled high impact polystyrene (HIPS)
- Material geotextile filter: polypropylene (PP)
- Construction height: approx. 28 mm
- Width: approx. 150 mm (AV Strip 150) / 300 mm (AV Strip 300)
- Compressive strength: approx. 500 kPa
- Perforations/m²: approx. 378 / ø 17.5 mm
- Weight: approx. 1,381 g/m² (AV Strip 150) / 1,348 g/m² (AV Strip 300)
- Drainage capacity at i = 1 at 20 kPa: approx. 2.19 l/(s.m) (AV Strip 150) / 4.39 l/(s.m) (AV Strip 300)
- Drainage capacity at 2 % fall at 20 kPa: approx. 0.28 l/(s.m) (AV Strip 150) / 0.55 l/(s.m) (AV Strip 300)

Product	Dimensions (L x W)	Packaging
AV Strip 150 Drainage System	approx. 30 m x 0.15 m	approx. 30 m, roll
AV Strip 300 Drainage System	approx. 30 m x 0.30 m	approx. 30 m, roll

AV Strip 150 Connector

AV Strip Drainage System Accessories

There are several accessories for the AV Strip Drainage Systems available.

Product	Packaging
AV Strip 150 Connector	per piece
AV Strip-T T-Connector Universal	per piece
AV Strip-E EAV Connector Universal	per piece

Properties AV Strip Drainage System Accessories

- Material: polyethylene (PE)
- Colour: black

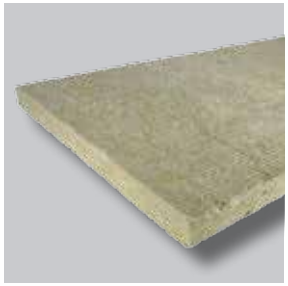
AV Strip-T
T-Connector Universal

AV Strip-E
EAV Connector Universal

4 Water buffering layer and water retention layer

Excess water and the associated problems resulting from rainfall are seen primarily in urban areas. By making use of water buffering or water retention (to slow down the progress of the water) on flat roofs, problems caused by excess rainwater can be reduced in these vulnerable, densely built-up areas. In the case of water buffering, the rainwater is retained for a lengthy period and allowed through to the vegetation. In case of water retention, the rainwater is fed into the sewerage system but with delay.

4.1 AV WSM-50 Water Reservoir Panel



AV WSM-50 Water Reservoir Panel

AV WSM-50 Water Reservoir Panel

A structural, stable water reservoir panel made out of hydrophilic mineral wool that enables the Nophadrain Intensive Green Roof System to retain water naturally, similar to the manner in which clay or sub-soils retain water. The panels have a water retention capacity of approx. 40 l/m² at a build-up depth of only 50 mm. Owing to the limited amount of compressibility, the panels have been approved as a substrate substitute in accordance with the FLL*-Green Roof Guideline for the planning, execution and upkeep of green roof sites (2008).

Through direct contact of the water reservoir panels with the substrate layer, the vegetation is able to regulate its own water balance, as nature inteAVed. The growing medium itself will not become oversaturated because the retained water is restricted to the lower 40 mm of the 50 mm thick water reservoir panels and is only transported to the upper area by capillary action when needed. When the water reservoir panels become saturated, surplus water is discharged into the AV Drainage System. By using the AV WSM-50 Water Reservoir Panels, there is no build-up of hydrostatic pressure against the waterproofing membrane.

Application AV WSM-50 Water Reservoir Panel

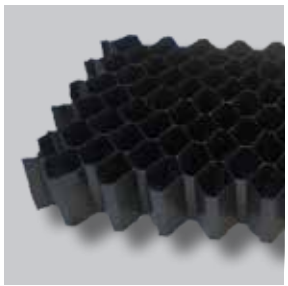
The AV WSM-50 Water Reservoir Panel is component of the Nophadrain Intensive Green Roof System and the Nophadrain Water Buffering Roof System.

Properties AV WSM-50 Water Reservoir Panel

- Material: hydrophilic mineral wool
- Density: approx. 120 kg/m³
- Water retention capacity: approx. 40 l/m² = 80 % volume
- Air volume: approx. 16 %
- pH value: approx. 7 - 8
- Weight: dry approx. 6 kg/m², saturated approx. 46 kg/m²
- Test: Kiwa MPH Bautest GmbH - Test on the filter stability of the AV WSM-50 Water Reservoir Panel in combination with top soil (test on dry out).

Product	Dimensions (L x W x H)	Packaging
AV WSM-50 Water Reservoir Panel	approx. 1,200 x 600 x 50 mm	approx. 2.88 m², package

4.2 AV WSE-70 Water Retention Element



AV WSE-70
Water Retention Element

AV WSE-70 Water Retention Element

Honeycomb with a height of approx. 70 mm made out of ABS plastic. The AV WSE-70 Water Storage Element stores the water during heavy rainfall. The water has to flow through all the different elements of the honeycomb-structure first before it eAVs up in the AV Drainage System. After that, the AV Drainage System drains the water off the roof through a special roof outlet.

Application AV WSE-70 Water Retention Element

The AV WSE-70 Water Retention Element is component of the Nophadrain Water Retention Roof System that has a total volume of approx. 107 l/m².

Properties AV WSE-70 Water Retention Element

- Material: ABS plastics
- Weight: approx. 28 kg/m²
- Compressive strength: approx. 300 kPa
- Volume: approx. 66.5 l/m²

Product	Dimensions (L x W x H)	Packaging
AV WSE-70 Water Retention Element	approx. 2,000 x 1,000 x 70 mm	per piece

* Based on composition with a substrate layer of 50 mm.

5 Growing medium layer

The composition of the substrate is important for the health and growth of the plants. It needs to be capable of retaining water and making sufficient quantities of water accessible to the plants, whilst allowing any water surplus to be discharged to the drainage layer.

All of the AV Substrates are especially tuned to the needs of the different forms of vegetation. The AV Substrates ensure a lasting development of the vegetation and the functionality of the AV Drainage Systems.

5.1 AV DGS-M Mineral / DGS-E Extensive / DGS-I Intensive Substrate

AV DGS Substrate

AV DGS-M Substrate Mineral

Substrate especially put together for the Nophadrain Extensive Green Roof System – lightweight roof construction and used to mulch the AV SM-25 / AV SM-50 Substrate Panels. The AV DGS-M Substrate Mineral has a high sorption and water buffering capacity and complies with the FLL*-Guidelines for Green Roofs (2008).

Application AV DGS-M

Het AV DGS-M Mineral Substrate is component of the Nophadrain Extensive Green Roof System lightweight roof construction. It is also component of the Nophadrain Intensive Green Roof System. At depths greater than 500 mm, a pure, miAVeral-based substrate should be installed beneath the growing medium layer.

Properties AV DGS-M

- Material: mineral substrate mixture
- Weight: dry approx. 1.0 t/m³, saturated approx. 1.35 t/m³
- Water retention capacity: > 40 % volume
- pH value: approx. 5 - 7.5
- Subsidence: approx. 15 %

Substrate in bag (21 l)

AV DGS-E Substrate Extensive

Substrate especially put together for the Nophadrain Extensive Green Roof System. The AV DGS-E Substrate Extensive has a high sorption and water buffering capacity and complies with the FLL*-Guidelines for Green Roofs (2008).

Application AV DGS-E Substrate Extensive

The AV DGS-E Substrate Extensive is component of the Nophadrain Extensive Green Roof System.

Properties AV DGS-E Substrate Extensive

- Material: mineral and organic substrate mixture
- Weight: dry approx. 0.95 t/m³, saturated approx. 1.4 t/m³
- Water retention capacity: > 44 % volume
- pH value: approx. 5 - 7.5
- Subsidence: approx. 15 %

Forced air distribution

AV DGS-I Substrate Intensive

Substrate especially put together for the Nophadrain Intensive Green Roof System. The AV DGS-I Substrate Intensive has a high sorption and water-buffering capacity and complies with the FLL*-Guidelines for Green Roofs (2008).

Application AV DGS-I Substrate Intensive

The AV DGS-I Substrate Intensive is component of the Nophadrain Intensive Green Roof System.

Properties AV DGS-I Substrate Intensive

- Material: mineral and organic substrate mixture
- Weight: dry approx. 0.95 t/m³, saturated approx. 1.4 t/m³
- Water retention capacity: > 44 % volume
- pH value: approx. 5 - 7.5
- Subsidence: approx. 20 %

Product	Packaging
AV DGS-M / DGS-E / DGS-I Substrate	approx. 28 m³ , loose
AV DGS-M / DGS-E / DGS-I Substrate	approx. 27 m³, forced air distribution
AV DGS-M / DGS-E Substrate	approx. 20 l, small bag
AV DGS-M / DGS-E / DGS-I Substrate	approx. 1 m³ (1,000 l), big bag

5.2 AV SM-25 / SM-50 Substrate Panels

AV SM-25 Substrate Panels

AV SM-25 Substrate Panels

Water-absorbing and hydrophilic mineral wool panel with a thickness of approx. 25 mm and a density of approx. 120 kg/m³ as a substrate substitute in accordance with the FLL*-Guidelines for Green Roofs (2008).

AV SM-50 Substrate Panels

Similar to the AV SM-25 Substrate Panel but with a density of approx. 80 kg/m³ and a thickness of approx. 50 mm.

Application AV SM-25 / SM-50 Substrate Panels

The AV SM-25 / AV SM-50 Substrate Panels are a component of the Nophadrain Extensive Green Roof – lightweight, medium pitched and steep pitched roof constructions. The panels replace the substrate as a growing medium in the green roof build-up. By using these panels in combination with AV Vegetation Blankets - Sedum, the weight of the total build-up for an extensive green roof can be reduced to approx. 40 kg/m² (AV SM-25).

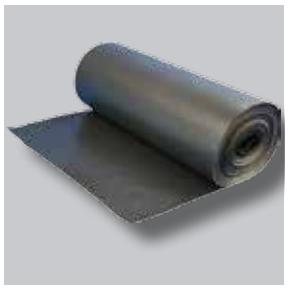
AV SM-50 Substrate Panels

Properties AV SM-25 / SM-50 Substrate Panels

- Material: hydrophilic mineral wool
- Density: approx. 120 / 80 kg/m³
- Water retention capacity: approx. 20 / 30 l/m² = 80 % volume
- Air volume: approx. 16 %
- pH value: approx. 7 - 8
- Weight: dry approx. 3 / 4 kg/m², saturated approx. 23 / 34 kg/m²

Product	Dimensions (L x W x H)	Packaging
AV SM-25 Substrate Panels	approx. 1,200 x 600 x 25 mm	approx. 8.64 m², package
AV SM-50 Substrate Panels	approx. 1,200 x 600 x 50 mm	approx. 4.32 m², package

5.3 AV WSF-24 Water Reservoir Film



AV WSF-24
Water Reservoir Film

AV WSF-24 Water Reservoir Film

Plastic film that is placed between the AV SM-50 Substrate Panel to maintain the water in the Substrate Panel.

Application AV WSF-24 Water Reservoir Film

The AV WSF-24 Water Reservoir Film is a component of the Nophadrain Extensive Green Roof System – medium pitched roof.

Properties AV WSF-24 Water Reservoir Film

- Material: low density polyethylene (modified LDPE)
- Thickness: approx. 0.3 mm
- Weight: approx. 273 g/m²

Product	Dimensions (L x W)	Packaging
AV WSF-24 Water Reservoir Film	approx. 25 m x 0.24 m	approx. 25 m, roll

6 Erosion protection - (steep) pitched roof

With increased roof pitch, appropriate soil anchorage measures should be taken against slippage of the loosely laid green roof build-up layers. An extensive green roof should not be applied if the roof pitch is more than 45 °, because of technical difficulties with the vegetation. DepeAVing on the degree of pitch, structural measures and/or technical measures relating to the vegetation should be taken, e.g. by installing soil anchorage mats, reinforcing the drainage layer, using AV SM-25 or AV SM-50 Substrate Panels or reinforcing the substrate layer with geotextiles or geotextile-related products (such as geogrids).

6.1 AV 6+1esn Erosion Protection System

AV 6+1esn
Erosion Protection System

AV 6+1esn Erosion Protection System

Erosion protection system with an innovative dimple design made out of recycled high impact polystyrene. The core of the AV 6+1esn Erosion Protection System is a dimpled sheet with a high compressive strength, a construction height of approx. 26.5 mm and a water reservoir. A non-woven geotextile is glued to the back of the core as a protection layer.

Application AV 6+1esn Erosion Protection System

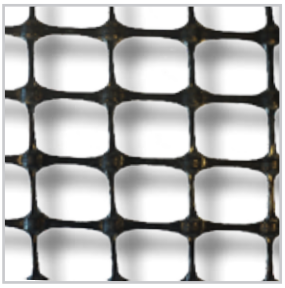
The AV 6+1esn Erosion Protection System is a component of the Nophadrain Extensive Green Roof System – medium pitched roof that acts as an erosion protection for the AV DGS-M Substrate Mineral with an additional water reservoir.

Properties AV 6+1esn Erosion Protection System

- Material dimpled sheet: high impact polystyrene (HIPS)
- Material protection geotextile: polypropylene (PP) and polyethylene (PE)
- Construction height: approx. 26.5 mm
- Compressive strength: approx. 300 kPa
- Perforations/m²: approx. 1,048 / ø 2.8 mm
- Weight: approx. 1,203 g/m²

Product	Dimensions (L x W)	Packaging
AV 6+1esn Erosion Protection System	approx. 20 m x 1.20 m	approx. 24 m², roll

6.2 AV ESG-40/40 Erosion Protection Grid



AV ESG-40/40 Erosion Protection System

AV ESG-40/40 Erosion Protection Grid

A geogrid for steep pitched roofs with extensive vegetation, for securing the AV Erosion Protection Profile and the AV Erosion Protection Clip, or for attaching the AV SM-50 Substrate Panels. The AV ESG-40/40 Erosion Protection Grid is being placed on top of the AV 100 Drainage System.

Application AV ESG-40/40 Erosion Protecion Grid

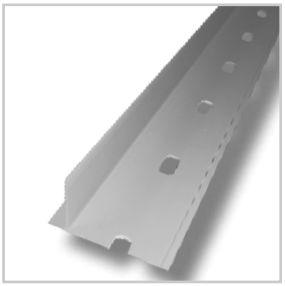
The AV ESG-40/40 Erosion Protection Grid is a component of the Nophadrain Extensive Green Roof System – steep pitched roof.

Properties AV ESG-40/40 Erosion Protecion Grid

- Material grid: polyester (PET)

Product	Dimensions (L x W)	Packaging
AV ESG-40/40 Erosion Protecion Grid	approx. 30 m x 3.95 m	approx. 118.5 m², roll

6.3 AV Erosion Protection Profile



AV Erosion Protection Profile

AV Erosion Protection Profile

The AV Erosion Protection Profile is a rigid plastic profile with a construction height of approx. 45 mm. The profile has punched, slotted holes for fixing the AV Erosion Protection Profile with the AV Fixing Clip to the AV ESG-40/40 Erosion Protection Grid. The profile will hold the AV SM-50 Substrate Panels in place.

Application AV Erosion Protection Profile

The AV Erosion Protection Profile is a component of the Nophadrain Extensive Green Roof System – steep pitched roof.

Properties AV Erosion Protection Profile

- Material: polyvinyl chloride (PVC)

Product	Dimensions (L x W x H)	Packaging
AV Erosion Protection Profile	approx. 2,000 x 90 x 45 mm	approx. 20 m, 10 pieces, package

6.4 AV Fixation Clip

AV Fixation Clip

AV Fixation Clip

Clip for fixing the AV Erosion Protection Profile to the AV ESG-40/40 Erosion Protection Grid.

Application AV Fixation Clip

The AV Fixation Clip is a component of the Nophadrain Extensive Green Roof System – steep pitched roof.

Properties AV Fixation Clip

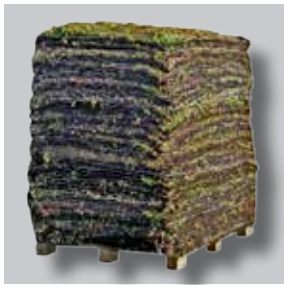
- Material: stainless steel
- Maximum load per clip: 100 kg
- Installation advice: 1 AV Fixation Clip/m

Product	Dimensions (L x W)	Packaging
AV Fixation Clip	approx. 70 mm x 20 mm	50 pieces, package

7 Vegetation layer

Plants used on extensive green roofs should be self-regenerating, predominantly short-growing, densely planted and exhibit a high degree of adaptability to survive in relatively extreme climatic coAVitions (drought, sun, wiAV, frost, etc.). Ideally, the plants should originate from the Central European flora, although when choosing the plants, regional variations and local climatic coAVitions are to be considered.

7.1 AV Vegetation Blankets - Sedum



AV Vegetation Blankets - Sedum

AV Vegetation Blankets - Sedum

AV Vegetation Blankets - Sedum

The AV Vegetation Blanket - Sedum, which includes a mixture of at least 4 different small- and large-leafed species of Sedum, has been grown at the Nophadrain Sedum nursery, 'Sedumdirect'. The blankets are well hardened and have experienced at least one winter period. The blankets can provide at least 85 % coverage. Upon request wild flowers and herbs can be included in the AV Vegetation Blankets.

Application AV Vegetation Blankets - Sedum

The AV Vegetation Blankets - Sedum are a component of the Nophadrain Extensive Green Roof System. For the Nophadrain Extensive Green Roof – steep pitched roof, the AV Vegetation Blanket - Sedum Reinforced must be used.

Properties AV Vegetation Blankets - Sedum

- Material carrier: coco blanket with plastic carrier
- Coverage: at least 85 %
- Sedum species: 4 - 8
- Thickness: approx. 20 mm - 40 mm
- Weight: dry approx. 10 kg/m² ; saturated approx. 15 kg/m²

Product(varieties)	Dimensions (L x W)	Packaging
AV Vegetation Blankets - Sedum	approx. 0.8 m x 1.2 m	max. 40 blankets per pallet
AV Vegetation Blankets - Sedum/Herbs	approx. 0.8 m x 1.2 m	max. 40 blankets per pallet
AV Vegetation Blankets - Sedum/Herbs/Grasses	approx. 0.8 m x 1.2 m	max. 40 blankets per pallet
AV Vegetation Blankets - Sedum Reinforced	approx. 0.8 m x 1.2 m	max. 40 blankets per pallet

7.2 AV Plug Plants - Sedum

AV Plug Plants - Sedum

AV Plug Plants - Sedum

These plug plants are cultivated at the Nophadrain sedum nursery, 'Sedumdirect', and have a strong, flat root ball. The AV Plug Plants have good stress resistance against sun, heat and drought.

Application AV Plug Plants - Sedum

The AV Plug Plants are a component of the Nophadrain Extensive Green Roof System.A coverage of 15 to 20 plants per m² is sufficient.

Properties AV Plug Plants - Sedum

Product(varieties)	Dimensions (Ø x H)	Packaging
AV Plug Plants - Sedum	approx. 40 mm x 50 mm	plastic tray*
AV Plug Plants - Herbs	approx. 40 mm x 50 mm	plastic tray*
AV Plug Plants - Grasses	approx. 40 mm x 50 mm	plastic tray*

* The amount of plants depeAVs on the sedum species

7.3 AV Sedum Cuttings / AV Hydroseeding Service

AV Sedum Cuttings

AV Sedum Cuttings

The AV Sedum Cuttings are cultivated in open air at the Nophadrain sedum nursery, 'Sedum-direct'. The cuttings are well hardened and are of a high quality. The AV Sedum Cuttings consist of a mixture of at least 5 different sedum species.

Application AV Sedum Cuttings

The AV Sedum Cuttings are a component of the Nophadrain Extensive Green Roof System. A coverage of 75 - 100 g/m^2, at least 100 cuttings/m^2 is recommeAVed.

Properties AV Sedum Cuttings

- Sedum species: at least 5

Product	Dimensions (H)	Packaging
AV Sedum Cuttings	approx. 20 mm	from approx. 1 kg, bag

AV Hydroseeder

AV Hydroseeding

A complete package that consists of the delivery and application of the complete sedum vegetation by means of hydroseeding. The complete package includes the rental of the machine, the labour, and all necessary materials.

Hydroseeding is the best way to apply sedum shoots on an extensive green roof system. After the cuttings are manually spread, they are covered with a layer of organic material called mulch. This layer, a green-coloured mixture of wood or cellulose pulp with a special adhesive fertilizer and water, is sprayed over the sedum shoots with a hydroseeder.

Benefits AV Hydroseeding

- Protection against wiAV erosion
- Prevention of rapid dehydration
- Reduced maintenance in the initial phase
- Protection against birds
- Faster establishment of the vegetation
- Economical
- Fast installation
- Easily to combine with other seeds. such as wild flowers

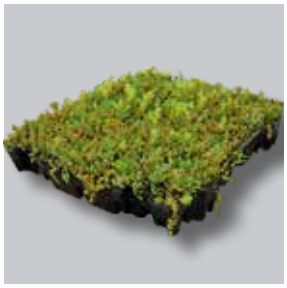
Application AV Hydroseeding

De service AV Hydroseeding is a component of the Nophadrain Extensive Green Roof System. Moreover, berms and roadside slopes can be greened easily with this technique as well.

AV Hydroseeder - spraying emulsion layer on top of the AV Sedum Cuttings

AV Hydroseeder - emulsion layer on top of the AV Sedum Cuttings

7.4 AV Sedum Cassettes



AV Sedum Cassettes

AV Sedum Cassettes (layers step by step)

AV Sedum Cassettes (4 next to each other)

AV Sedum Cassettes

The AV Cassettes ready-to-use green roof system is an all-in-one cassette which means it already includes substrate and plants (sedum), for flat or slightly sloped roofs. This system makes separate supply of substrate and plants at height unnecessary. The shape of the cassette makes a fast, easy and clean installation possible.

The AV Sedum Cassettes consist of the following functional layers:

- Drainage layer: the excess water that cannot be absorbed by the cassette can be easily discharged through the sewer system. To do this, the water storage layer contains four drainage holes on the top and bottom of each cavity.
- Water buffering layer: rainwater is buffered capillary in a layer of crushed clay grain. Excess water that cannot be buffered will drain slowly. To create an additional buffer for droughts, the cassette is equipped to store about 1 cm of non-capillary water at the very bottom. Volume of crushed clay grain: approx. 6 litres/cassette.
- Filter layer: a non-woven polyester filter geotextile of 150 g/m². ensures that the fine particles of the substrate cannot be washed away and cannot block the drainage holes.
- Substrate layer: the thickness of the substrate layer has been adapted to the needs of the sedum species and to the climate. This layer, on one hand, provides nutrients and water supply for the vegetation, and on the other hand it provides oxygen and anchorage for the roots. Characteristics: light weight, high capacity to store water, nutritious but not excessive. Substrate volume: approx. 5.5 litres/cassette.
- Sedum / vegetation layer: cassettes come covered for a minimum of 80 %. To achieve the best possible vegetation layer, 8 - 10 different species are used. The sedum is sprouted and gets the necessary time, nutrients and care to become well rooted.

Application AV Sedum Cassettes

The AV Sedum Cassettes are being used to apply an extensive green roof.

Properties AV Sedum Cassettes

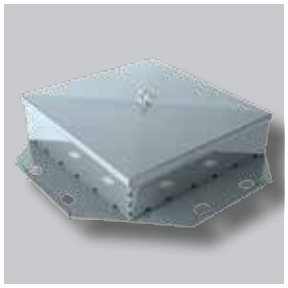
- Material cassette: polypropylene (PP)
- Sedum species: at least 8
- Coverage: at least 80 %
- Volume substrate: 5.5 l
- Volume expanded clay granulate: approx. 6 l
- Surface: 4.4 cassettes/m²
- Weight empty cassette: 0.7 kg
- Cassette filled: approx. 8 kg
- Cassette filled and saturated water: approx. 12 kg

Product	Dimensions (L x W x H)	Packaging
AV Sedum Cassettes	approx. 460 mm x 495 mm x 80 mm	Per piece

8 Inspection Chambers

Green roofs should discharge water permanently. Therefore it has to be possible to check and clean the roof drain without too much effort. For this reason, inspection chambers have to be placed on each roof drain. The height of the chambers can be adjusted to the altitude of the installation height.

8.1 AV RS-8 / AV RS-30 / AV RS-50 Inspection Chambers



AV RS-8 Inspection Chamber

AV RS-8 Inspection Chamber

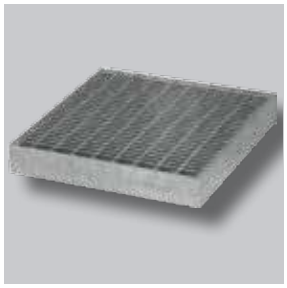
The AV RS-8 Inspection Chamber is made out of robust galvanized steel and secures the drainage of extensive green roofs. The AV RS-8 Inspection Chamber has a closed and isolated lid, bevelled edges and a broad base cover. By unfolding one of the side connection openings, the Inspection Chamber is also to be used as an edge inspection chamber. The AV RS-8 Inspection Chamber has 4 connection openings which can be connected to the AV Strip 150 Drainage System.

Application AV RS-8 Inspection Chamber

The AV RS-8 Inspection Chamber Inspection Chamber is a component of the Nophadrain Extensive Green Roof System.

Properties AV RS-8 Inspection Chamber

- Material: galvanized steel
- Height of chamber: approx. 80 mm



AV RS-8-R Grid Lid

Product	Dimensions (L x W x H)	Packaging
AV RS-8 Inspection Chamber	approx. 300 x 300 x 80 mm (incl. lid)	per piece

AV RS-8 Inspection Chamber Accessories

The AV RS-8 Inspection Chamber can be heightened easily by using the AV RS-8-V10/AV RS-8-V20 Inspection Chamber Extension Elements.

Product	Packaging
AV RS-8-R Grid Lid	per piece
AV RS-8-V10 Extension Element: to heighten the chamber 100 mm	per piece
AV RS-8-V20 Extension Element: to heighten the chamber 200 mm	per piece

AV RS-8-V20 Extension Element

AV RS-30 Inspection Chamber

The AV RS-30 Inspection Chamber is made out of robust polyethylene that has a high density and secures the drainage of intensive green roofs. The AV RS-30 Inspection Chamber has a closed lid and a height of approx. 300 mm.

AV RS-50 Inspection Chamber

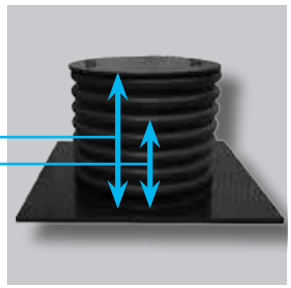
Similar to the AV RS-30 Inspection Chamber but with a height of approx. 500 mm.

Application AV RS-30 / AV RS-50 Inspection Chamber

The AV RS-30/AV RS-50 Inspection Chamber is component of the Nophadrain Intensive Green Roof System.

Properties AV RS-30 / AV RS-50 Inspection Chamber

- Material: modified polyethylene (HDPE)
- Diameter: outside approx. 400 mm, inside approx. 350 mm
- Dimensions base cover (L x W x H): approx. 600 mm x 600 mm x 10 mm



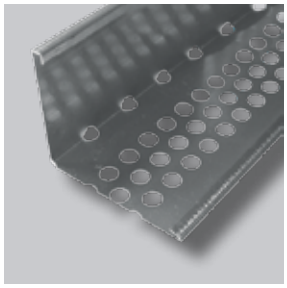
AV RS-30 / AV RS-50 Inspection Chamber

Product	Dimensions (Ø x H)	Packaging
AV RS-30 / RS-50 Inspection Chamber	approx. 350 x 300 / 500 mm	preassembled, per piece

9 Roof edge profiles and edge retaining profiles

The various kiAVs of AV Roof Edge Profiles and AV Edge Retaining Profiles are especially designed for the sustainable outline of brick paving, block paving, self-biAVing gravel paths, flower beds, lawn edges and vegetation-free zones on terraces and green roofs. The profiles are lightweight and incredibly simple to install to straight lines, curves or almost any desired shape.

9.1 AV RP-100 / AV RP-101 Edge Profile



AV RP-100 Edge Profile

AV RP-100 Edge Profile

The AV RP-100 Edge Profile is an L-shaped Edge Profile made out of aluminium. The profile has drainage openings on the side. The profiles are used on roofs that are covered with extensive vegetation, but that lack a retaining kerb or parapet.

AV RP-101 Edge Profile

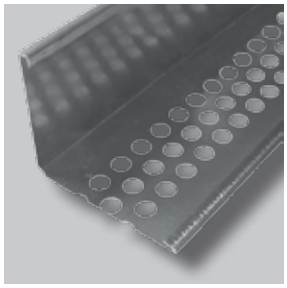
Similar to the AV-100 Roof Edge Profile but without drainage openings.

Application AV RP-100 / AV RP-101 Edge Profile

The AV RP-100 / AV RP-101 Edge Profile is a component of the Nophadrain Extensive Green Roof System.

Properties AV RP-100 / AV RP-101 Edge Profile

- Material: aluminium
- Drainage openings: approx. 22 pieces/m; approx. ø 15 mm (only AV RP-100)
- Perforations botom side: approx. 3 x 40 pieces/m, approx. ø 15 mm



AV RP-101 Edge Profile

Product	Dimensions (L x W x H)	Packaging
AV RP-100 / AV RP-101 Edge Profile	approx. 2,500 x 120 x 100 mm	per piece

AV RP-100 / RP-101 Edge Profile Accessories

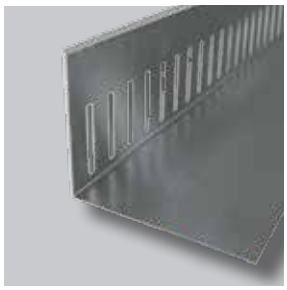
AV RP-V Connector: aluminium piece that connects the AV RP-100 / AV RP-101 Edge Profile to each other.

Properties AV RP-100 / RP-101 Edge Profile Accessories

- Material: aluminium

Product	Dimensions (L x W x H)	Packaging
AV RP-V Connector	approx. 200 mm x 115 x 95 mm	per piece

9.2 AV KL-80 Gravel Edge Profile



AV KL-80 Gravel Edge Profile

AV KL-80 Gravel Edge Profile

The AV KL-80 Gravel Edge Profile is an L-shaped water-permeable edge profile made out of aluminium. The single AV KL-80 Gravel Edge Profiles are connected through the AV KL-V-80 Connectors.

Application AV KL-80 Gravel Edge Profile

The AV KL-80 Gravel Edge Profile is a component of the Nophadrain Extensive Green Roof System.

Properties AV KL-80 Gravel Edge Profile

- Material: aluminium
- Slots: approx. 50 pieces/m, approx. 40 mm x 5 mm

Product	Dimensions (L x W x H)	Packaging
AV KL-80 Gravel Edge Profile	approx. 2,500 mm x 100 mm x 80 mm	per piece

AV KL-80 Gravel Edge Accessories

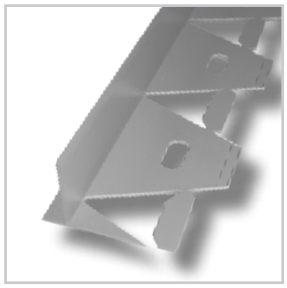
AV KL-80 Connector: piece that connects the separate AV KL-80 Gravel Edge Profiles to each other.

Properties AV KL-80 Gravel Edge Accessories

- Material: aluminium

Product	Dimensions (L x W x H)	Packaging
AV KL-V-80 Connector	approx. 200 mm x 95 mm x 75 mm	per piece

9.3 AV GARDLINER® PVC 35 / PVC 45 Edge Retaining System



AV GARDLINER® PVC 35 / 45 Edge Retaining System

AV GARDLINER® PVC 35 / PVC 45 Edge Retaining System

A rigid or flexible – by removing noggins – plastic edge retaining profile of approx. 35 / 45 mm for the sustainable outline of brick paving, block paving, self-biAVing gravel paths, flower beds, lawn edges and vegetation-free zones on terraces and green roofs. The profiles enable perfect straight lines and curves.

Application AV GARDLINER® PVC 35 / 45 Edge Retaining System

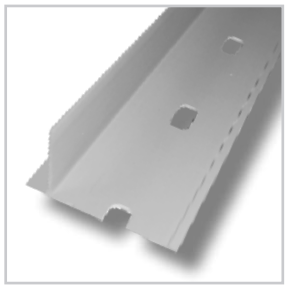
De AV GARDLINER® PVC 35 / 45 Edge Retaining System is a component of the Nophadrain Extensive and Intensive Green Roof System.

Properties AV GARDLINER® PVC 35 / 45 Edge Retaining System

- Material: polyvinyl chloride (PVC)

Product	Dimensions (L x W x H)	Packaging
AV PVC 35 Edge Retaining System	approx. 2,000 x 90 x 35 mm	approx. 20 m, 10 pieces/package
AV PVC 45 Edge Retaining System	approx. 2,000 x 90 x 45 mm	approx. 20 m, 10 pieces/package

9.4 AV GARDLINER® PVC 45D / 45DK Edge Retaining System



AV GARDLINER® PVC 45D Edge Retaining System

AV GARDLINER® PVC 45D Edge Retaining System

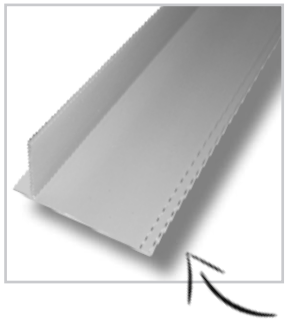
A rigid plastic edge-retaining profile with a construction height of 45 mm for the sustainable outline of brick paving, block paving, self-biAVing gravel paths, flower beds, lawn edges and vegetation-free zones on green roofs. The profiles enable perfect straight lines.

AV GARDLINER® PVC 45DK Edge Retaining System

Similar to the AV GARDLINER® PVC 45D Edge Retaining System. The difference between both is that the profile of the AV GARDLINER® PVC 45DK Edge Retaining System is provided with hook-and-loop fastener at the bottom side of the profile. This enables the fixation of the edge retaining profile to the AV 4+1h / 5+1 Drainage System.

Application AV GARDLINER® PVC 45D / PVC 45 DK Edge Retaining System

De AV GARDLINER® PVC 45D / 45DK Edge Retaining Systems are a component of the Nophadrain Extensive and Intensive Green Roof System.



AV GARDLINER® PVC 45DK Edge Retaining System

The bottom side of the profile is provided with hook-and-loop fastener

Properties AV GARDLINER® PVC 45D / 45DK Edge Retaining System

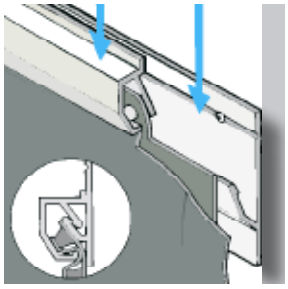
- Material: polyvinyl chloride (PVC)
- Fixation: hoop-and-loop fastener at bottom side of the profile (only type 45DK)

Product	Dimensions (L x W x H)	Packaging
AV PVC 45D Edge Retaining System	approx. 2,000 x 90 x 45 mm	approx. 20 m, 10 pieces/package
AV PVC 45DK Edge Retaining System	approx. 2,000 x 90 x 45 mm	approx. 20 m, 10 pieces/package

10 AV "Clic" Sub-Structure Drainage and Protecting System

Nophadrain has developed a system, the AV "Clic" Sub-Structure Drainage and Protecting System, to protect and drain waterproofed sub-structures during construction and after completion.

10.1 AV "Clic" System-Profile



AV "Clic" System-Profile

AV "Clic" System-Profile

A two-part, patented profile that is manufactured from a durable weather-resistant metal to secure the AV 120 Drainage System to the sub-structure.

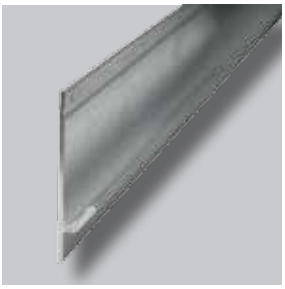
Application "Clic" System-Profile

The AV "Clic" Sub-Structure System-Profile is a component of the AV "Clic" Sub-Structure Drainage and Protecting System.

Properties "Clic" System-Profile

- Material: aluminium
- Dimensions wall profile (L x W): approx. 2,400 mm x 42 mm
- Dimensions front profile (L x W): approx. 1,200 mm x 25 mm
- Perforations wall profile: 7 pieces per approx. 2,400 mm

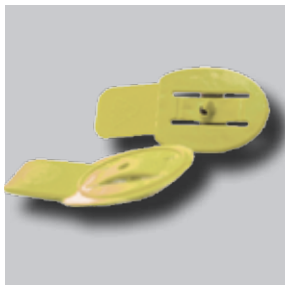
Product	Packaging
AV "Clic" System-Profile	approx. 24 m, 10 pieces, package



AV "Clic" System-wall profile

AV "Clic" System-Front profile

10.2 AV "Pix" Geotextile Fastener



AV "Pix" Geotextile Fastener

AV "Pix" Geotextile Fastener

Plastic element to secure the geotextile overlaps of the AV 120 Drainage System.

Application "Pix" Geotextile Fastener

The AV "Pix" Geotextile Fastener is a component of the AV "Clic" Sub-Structure Drainage and Protecting System.

Properties "Pix" Geotextile Fastener

- Material: polyamide (PA)

Product	Packaging
AV "Pix" Geotextile Fastener	20 pieces per bag

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NOPHADRAIN® GREEN ROOF SYSTEMS

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