

nophADRAIN®

GREEN ROOF INNOVATORS

PRODUCT OVERVIEW

0.6

The lower half of the page features a large, abstract graphic design. It consists of several overlapping, rounded shapes in various shades of grey and a vibrant green. The shapes are layered, creating a sense of depth and movement. The green shape is positioned in the bottom right corner, partially overlapping the grey shapes. The overall aesthetic is modern and architectural.

1 SEPARATION AND PROTECTION LAYER

- 1.1 ND SV-300/ND SV-500/ND SV-800 Protective Geotextile
- 1.2 ND TGF-20 Slip Film
- 1.3 ND TSF-100 Slip and Protection Sheet

2 ROOT BARRIER LAYER

- 2.1 ND WSB-50/ND WSB-80 Root Barrier

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- 3.2 ND 200/ND 220 Drainage Composite/ND 200 Balcony Drain
- 3.3 ND 200s/ND 200sv Drainage Composite
- 3.4 ND 600/ND 620/ND 620hd Drainage Composite
- 3.5 ND 600s/ND 600sv/ND 600hdsv Drainage Composite
- 3.6 ND 4+1lt/ND 4+1 High Drainage Composite
- 3.7 ND 5+1 Drainage Composite
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- 10.2 ND RS-10/ND RS-20 VarioExtension Element
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- 12.5 GreenLiner Ring
- 12.6 GreenLiner TKP Pond Liner Clip

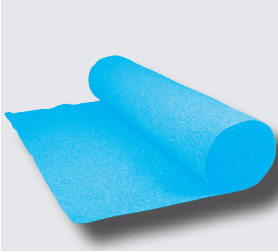
13 GABIONS (NEW)

- 13.1 GreenGabion Gabion System

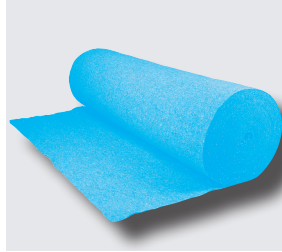


1 SEPARATION AND PROTECTION LAYER

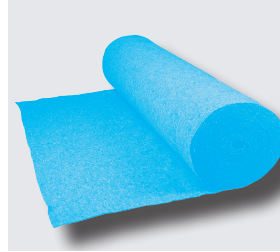
1.1 ND SV-300/ND SV-500/ND SV-800 Protective Geotextile



ND SV-300 Protective Geotextile



ND SV-500 Protective Geotextile



ND SV-800 Protective Geotextile

Protection of the waterproofing membrane against minimal static loads.

Application

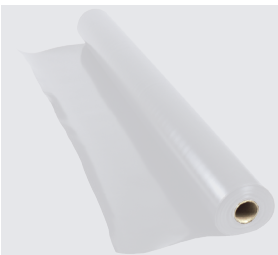
Extensive Green Roof System
Intensive Green Roof System

Technical specifications

- Material: recycled polypropylene (PP)/polyester (PES)/Acrylic
- Colour: mixed colours
- Thickness: approx. 3/5/8mm
- Weight: approx. 300/500/800g/m²
- Puncture resistance: $\geq 1.3\text{kN}/\geq 2.4\text{kN}/\geq 2.4\text{kN}$

Product	Dimensions (L x W)	Packaging
ND SV-300 Protective Geotextile	42 x 2.4m	Roll approx. 100m ²
ND SV-500 Protective Geotextile	42 x 2.4m	Roll approx. 100m ²
ND SV-800 Protective Geotextile	21 x 2.4m	Roll approx. 50m ²

1.2 ND TGF-20 Slip Film



ND TGF-20 Slip Film

Loose laid plastic sheet that acts as a slip layer to protect the waterproofing membrane.

Application

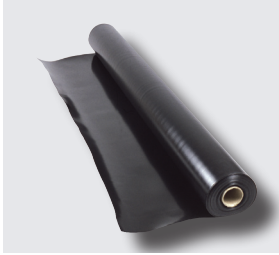
Extensive Green Roof System – inverted roof construction
Intensive Green Roof System – inverted roof construction
Parking Deck System-Cars – load class 2 – inverted roof construction
Parking Deck System-Trucks – load class 3 – inverted roof construction

Technical specifications

- Material: modified high density polyethylene (HDPE)
- Colour: black/transparent
- Thickness: approx. 0.2mm
- Weight: approx. 186g/m²

Product	Dimensions (L x W)	Packaging
ND TGF-20/4 Slip Film	50 x 4m	Roll 200m ²
ND TGF-20/6 Slip Film	50 x 6m	Roll 300m ²

1.3 ND TSF-100 Slip and Protection Sheet



ND TSF-100 Slip and Protection Sheet

Loose laid plastic sheet that acts as a slip and protection layer to protect the waterproofing membrane against damage caused by static and dynamic loads.

Tests

- Tested by TU Munich (D) as system component of the Nophadrain Parking Deck System
- Index test by TBU Greven (D) in accordance with BS EN 13719-2002 "Geotextiles and geotextile-related products. Determination of the long term protection efficiency of geotextiles in contact with geosynthetic barriers"

Application

Intensive Green Roof System
 Parking Deck System-Cars – load class 2
 Parking Deck System-Trucks – load class 3

Technical specifications

- Material: modified high density polyethylene (HPDE)
- Colour: black
- Thickness: approx. 1mm
- Weight: approx. 930g/m²

Product	Dimensions (L x W)	Packaging
ND TSF-100/1 Slip and Protection Sheet	100 x 1m	Roll 100m ²
ND TSF-100/2 Slip and Protection Sheet	100 x 2m	Roll 200m ²

2 ROOT BARRIER LAYER

2.1 ND WSB-50/ND WSB-80 Root Barrier



ND WSB-50 Root Barrier

Loose laid plastic sheet, tested in accordance with the FLL* Root Penetration Test, that protects the waterproofing membrane of a green roof against potential damage from roots that may grow through.

Application

Extensive Green Roof System
 Intensive Green Roof System

Technical specifications

- Material: modified low density polyethylene (LDPE)
- Colour: black
- Thickness: approx. 0.5mm/0.8mm
- Weight: approx. 475/760g/m²



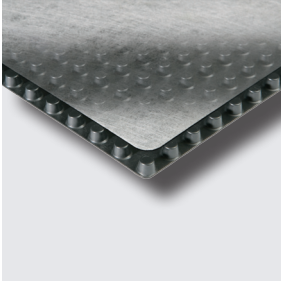
ND WSB-80 Root Barrier

Product	Dimensions (L x W)	Packaging
ND WSB-50/6 Root Barrier	25 x 6m	Roll 150m ²
ND WSB-50/8 Root Barrier	25 x 8m	Roll 200m ²
ND WSB-80/6 Root Barrier	25 x 6m	Roll 150m ²
ND WSB-80/8 Root Barrier	25 x 8m	Roll 200m ²

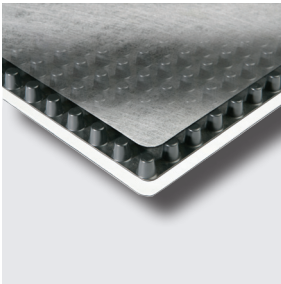
* Forschungsgesellschaft Landschaftsentwicklung Landschaftsbau e.V. - www.fll.de – a German research association

3 FILTER AND DRAINAGE LAYER

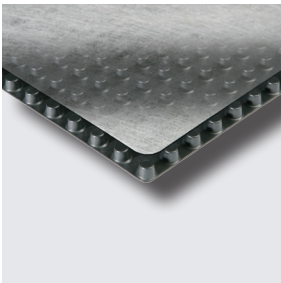
3.1 ND 100/ND 120 Drainage Composite/ND 100 Balcony Drain



ND 100 Drainage Composite



ND 120 Drainage Composite



ND 100 Balcony Drain

An approx. 8mm high CE-marked plastic drainage composite. Dependent upon the application it can be provided with a pressure dividing plastic slip film on the back (type ND 120). The ND 100 Balcony Drain is essentially a reduced width format of the ND 100 Drainage Composite.

Application

Vertical drainage and protection of substructures
 Extensive Green Roof System – pitched roofs
 Balconies
 Roof Terraces

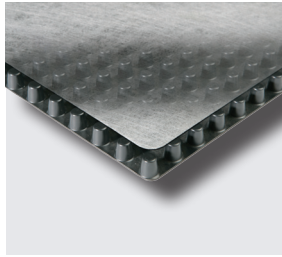
Technical specifications

- Material dimpled sheet: high impact polystyrene (HIPS)
- Material filter fabric: non-woven polypropylene (PP) approx. 125g/m²
- Material slip film ND 120: modified polypropylene (PP)
- Thickness: approx. 8mm
- Weight ND 100/ND120: approx. 680/730g/m²
- Compressive strength: approx. 500kN/m²
- Drainage capacity: complies with BS EN ISO 12958* – see brochure “Designing the drainage layer”

Product	Dimensions (L x W)	Packaging
ND 100 Drainage Composite	32 x 1.25m	Roll 40m ²
ND 120 Drainage Composite	32 x 1.25m	Roll 40m ²
ND 100 Balcony Drain	10 x 0.6m	Roll 6m ²

* BS EN ISO 12958: “Planning, design and installation of drainage systems protecting structures against water in the ground”

3.2 ND 200/ND 220 Drainage Composite/ND 200 Balcony Drain

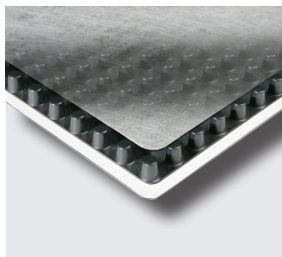


ND 200 Drainage Composite

An 12,5mm high CE-marked drainage composite consisting of a dimpled sheet of high impact polystyrene (HIPS) with a non-woven filter fabric bonded to each dimple. The drainage composite can be provided with a pressure dividing plastic slip film on the back (type ND 220). The ND 200 Balcony Drain is essentially a reduced width format of the ND 200 Drainage Composite.

Application

Drainage and protection of vertical substructures
Podium Deck System – load class 1
Balconies
Roof Terraces

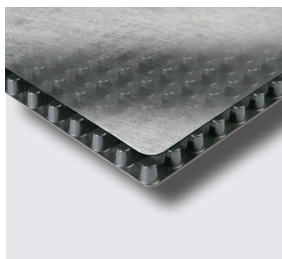


ND 220 Drainage Composite

Technical specifications

- Material dimpled sheet: polystyrene (HIPS)
- Material filter fabric: polypropylene (PP) approx. 125g/m²
- Material slip film ND 220: modified polypropylene (PP)
- Thickness: approx. 12,5mm
- Weight ND 200/ND 220: approx. 940/980g/m²
- Compressive strength: approx. 700kN/m²
- Drainage capacity: complies with BS EN ISO 12958* – see brochure "Designing the drainage layer"

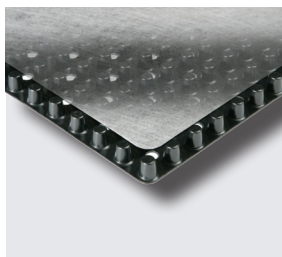
Product	Dimensions (L x W)	Packaging
ND 200 Drainage Composite	32 x 1.25m	Roll 40m ²
ND 220 Drainage Composite	32 x 1.25m	Roll 40m ²
ND 200 Balcony Drain	10 x 0.6m	Roll 6m ²



ND 200 Balcony Drain

* BS EN ISO 12958: "Planning, design and installation of drainage systems protecting structures against water in the ground"

3.3 ND 200s/ND 200sv Drainage Composite



ND 200s Drainage Composite

An 12,5mm high CE-marked drainage composite. The sheet is perforated and can be provided with a pressure dividing damp open filter fabric on the back (type 200sv).

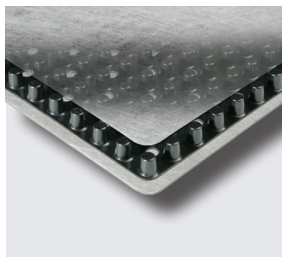
Application

Podium Deck System – load class 1 – inverted roof construction

Technical specifications

- Material dimpled sheet: polystyrene (HIPS)
- Material filter fabric: polypropylene (PP) approx. 125g/m²
- Material damp open filter fabric: polypropylene (PP) approx. 125g/m²
- Thickness: approx. 12,5mm
- Weight ND 200s/ND 200sv: approx. 940/1,075g/m²
- Compressive strength: approx. 700kN/m²
- Drainage capacity: complies with BS EN ISO 12958* – see brochure "Designing the drainage layer"

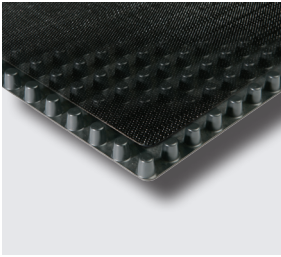
Product	Dimensions (L x W)	Packaging
ND 200s Drainage Composite	32 x 1.25m	Roll 40m ²
ND 200sv Drainage Composite	32 x 1.25m	Roll 40m ²



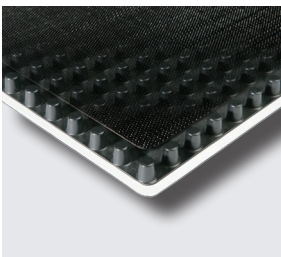
ND 200sv Drainage Composite

* BS EN ISO 12958: "Planning, design and installation of drainage systems protecting structures against water in the ground"

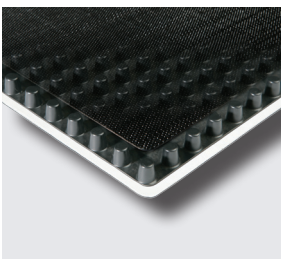
3.4 ND 600/ND 620/ND 620hd Drainage Composite



ND 600 Drainage Composite



ND 620 Drainage Composite



ND 620hd Drainage Composite

An 12,5mm high CE-marked drainage composite with a high compressive strength consisting of a dimpled sheet of high impact polystyrene (HIPS) with a woven filter fabric bonded to each dimple. The drainage composite can be provided with a pressure dividing plastic slip film on the back (type ND 620/ND 620hd).

Tests

Tested by TU Munich (D) as system component of the Nophadrain Parking Deck System – load class 2 and 3

Application

- Intensive Green Roof System
- Podium Deck System – load class 1
- Parking Deck System-Cars – load class 2
- Parking Deck System-Trucks (ND 620hd) – load class 3

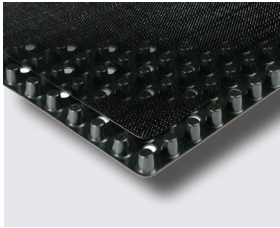
Technical specifications

- Material dimpled sheet: polystyrene (HIPS)
- Material filter fabric: polypropylene (PP) approx. 190g/m²
- Material slip film ND 620/ND 620hd: modified polypropylene (PP)
- Thickness: approx. 12,5mm
- Weight ND 600/ND 620/ND 620hd: approx. 1,170/1,200/1,385g/m²
- Compressive strength ND 600/ND 620/ND 620hd: approx. 850/850/1.100kN/m²
- Drainage capacity: complies with BS EN ISO 12958* – see brochure "Designing the drainage layer"

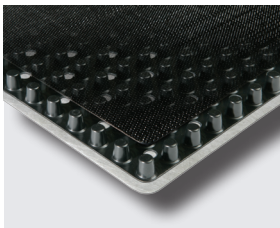
Product	Dimensions (L x W)	Packaging
ND 600 Drainage Composite	32 x 1.25m	Roll 40m ²
ND 620 Drainage Composite	32 x 1.25m	Roll 40m ²
ND 620hd Drainage Composite	32 x 1.25m	Roll 40m ²

* BS EN ISO 12958: "Planning, design and installation of drainage systems protecting structures against water in the ground"

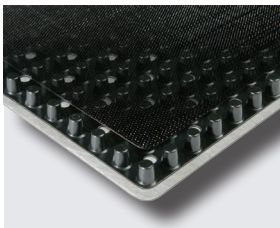
3.5 ND 600s/ND 600sv/ND 600hdsv Drainage Composite



ND 600s Drainage Composite



ND 600sv Drainage Composite



ND 600hdsv Drainage Composite

An 12,5mm high CE-marked drainage composite with a high compressive strength consisting of a perforated sheet of high impact polystyrene (HIPS) with a woven filter fabric bonded to each dimple. The drainage composite can be provided with a damp open filter fabric on the back (ND 600sv/ND 600hdsv).

Tests

Tested by TU Munich as system component of the Nophadrain Parking Deck System – load class 2 and 3

Application

Intensive Green Roof System – inverted roof construction
 Podium Deck System – load class 1 – inverted roof construction
 Parking Deck System-Cars – load class 2 – inverted roof construction
 Parking Deck System-Trucks – load class 3 – inverted roof construction

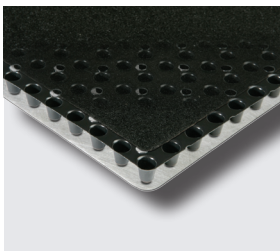
Technical specifications

- Material dimpled sheet: polystyrene (HIPS)
- Material filter fabric: polypropylene (PP) approx. 190 g/m²
- Material damp open filter fabric: polypropylene (PP) approx. 125g/m²
- Thickness: 12,5mm
- Weight ND 600s/ND 600sv/ND 600hdsv: approx. 1,170/1,500/1,670g/m²
- Compressive strength ND 600s/ND 600sv/ND 600hdsv: approx. 850/850/1,100kN/m²
- Drainage capacity: complies with BS EN ISO 12958* – see brochure "Designing the drainage layer"

Product	Dimensions (L x W)	Packaging
ND 600s Drainage Composite	32 x 1.25m	Roll 40m ²
ND 600sv Drainage Composite	32 x 1.25m	Roll 40m ²
ND 600hdsv Drainage Composite	32 x 1.25m	Roll 40m ²

* BS EN ISO 12958: "Planning, design and installation of drainage systems protecting structures against water in the ground"

3.6 ND 4+1lt/ND 4+1 High Drainage Composite



ND 4+1lt Drainage Composite



ND 4+1 High Drainage Composite

An 12,5/17,5mm high CE-marked drainage composite with a high compressive strength consisting of a perforated sheet of high impact polystyrene (HIPS) with a non-woven filter fabric bonded to each dimple. The drainage composite is provided with a pressure dividing damp open filter fabric.

Application

Extensive Green Roof System – also suitable for an inverted roof construction
 Intensive Green Roof System – also suitable for an inverted roof construction
 Podium Deck System – load class 1 – also suitable for an inverted roof construction

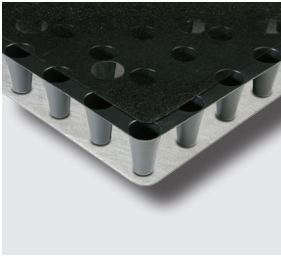
Technical specifications

- Material dimpled sheet: polystyrene (HIPS)
- Material filter fabric: polypropylene (PP) approx. 140 g/m²
- Material damp open backing: polypropylene (PP) approx. 125 g/m²
- Thickness: approx. 12,5/17,5mm
- Weight ND 4+1lt/ND 4+1 High: approx. 880/1,140 g/m²
- Compressive strength ND 4+1lt/ND 4+1 High: approx. 300/450kN/m²
- Drainage capacity: complies with BS EN ISO 12958* – see brochure "Designing the drainage layer"

Product	Dimensions (L x W)	Packaging
ND 4+1lt Drainage Composite	32 x 1.25m	Roll 40m ²
ND 4+1 High Drainage Composite	32 x 1.25m	Roll 40m ²

* BS EN ISO 12958: "Planning, design and installation of drainage systems protecting structures against water in the ground"

3.7 ND 5+1 Drainage Composite



ND 5+1 Drainage Composite

A 27,5 mm high CE-marked drainage composite consisting of a perforated sheet of high impact polystyrene (HIPS) with a woven filter fabric bonded to each dimple. The drainage composite is provided with a pressure dividing damp open filter fabric.

Application

Extensive Green Roof System – also suitable for an inverted roof construction
 Intensive Green Roof System – also suitable for an inverted roof construction
 Podium Deck System – load class 1 – also suitable for an inverted roof construction

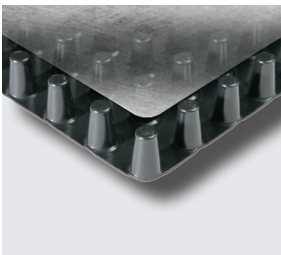
Technical specifications

- Material dimpled sheet: polystyrene (HIPS)
- Material filter fabric: polypropylene (PP) approx. 140g/m²
- Material damp open backing: polypropylene (PP) approx. 125g/m²
- Thickness: approx. 27,5mm
- Weight: approx. 1,450g/m²
- Compressive strength: approx. 500kN/m²
- Drainage capacity: complies with BS EN ISO 12958* – see brochure “Designing the drainage layer”

Product	Dimensions (L x W)	Packaging
ND 5+1 Drainage Composite	20 x 1.25m	Roll 25m ²

* BS EN ISO 12958: “Planning, design and installation of drainage systems protecting structures against water in the ground”

3.8 ND 5+1lt Drainage Composite



ND 5+1lt Drainage Composite

A 27,5 mm high CE-marked drainage composite with no water reservoir consisting of a perforated sheet of high impact polystyrene (HIPS) with a woven filter fabric bonded to each dimple.

Application

Extensive Green Roof System
 Intensive Green Roof System
 Podium Deck system – load class 1

Technical specifications

- Material dimpled sheet: polystyrene (HIPS)
- Material filter fabric: polypropylene (PP) approx. 125g/m²
- Thickness: approx. 27,5mm
- Weight: approx. 1,260g/m²
- Compressive strength: approx. 330kN/m²
- Drainage capacity: complies with BS EN ISO 12958* – see brochure “Designing the drainage layer”

Product	Dimensions (L x W)	Packaging
ND 5+1lt Drainage Composite	20 x 1.25m	Roll 25m ²

* BS EN ISO 12958: “Planning, design and installation of drainage systems protecting structures against water in the ground”

3.9 ND 6+1lt Drainage Composite



ND 6+1 Drainage Composite

An 26.5mm high CE-marked drainage composite with additional waterreservoir. The drainage composite is provided with a filter fabric bonded on each dimple.

Application

Extensive Green Roof System – also suitable for an inverted roof construction
Intensive Green Roof System – also suitable for an inverted roof construction

Technical specifications

- Material dimpled sheet: polystyrene (HIPS)
- Material filter fabric: polypropylene (PP) approx. 146 g/m²
- Thickness: approx. 26,5 mm
- Weight: approx. 1,237 gr/m²
- Compressive strength: approx. 300 kPa
- Waterretention: approx. 8 l/m²
- Drainage capacity: complies with BS EN ISO 12958* – see brochure "Designing the drainage layer"

Product	Dimensions (L x W)	Packaging
ND 6+1 drainage composite	20 x 1,20m	Roll 24m ²

* BS EN ISO 12958: "Planning, design and installation of drainage systems protecting structures against water in the ground"

3.10 ND Strip Drainage Composite



ND Strip 150 Drainage Composite

A 25mm high CE-marked plastic drainage composite. The ND Strip Drainage Composite is available in widths of 150, 300, 450, 600 and 900mm. Standard widths: 150mm and 300mm.

Application

As replacement for land drains
Golf courses, sports fields and road construction
Extensive Green Roof System – single-layer system with falls >1 in 50 (<2%)

Technical specifications

- Material dimpled sheet: polystyrene (HIPS)
- Material filter fabric: polypropylene (PP) approx. 140g/m²
- Thickness: approx. 25mm
- Weight: approx. 1,450g/m²
- Compressive strength: approx. 330kN/m²
- Drainage capacity: complies with BS EN ISO 12958* – see brochure "Designing the drainage layer"

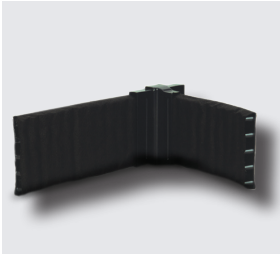
Product	Dimensions (L x W)	Packaging
ND Strip 150 Drainage Composite	30 x 0.15m	Roll 30m
ND Strip 300 Drainage Composite	30 x 0.30m	Roll 30m



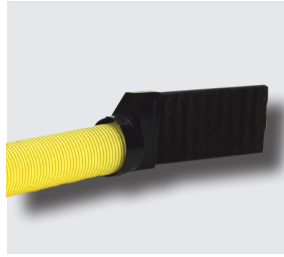
ND Strip 300 Drainage Composite

* BS EN ISO 12958: "Planning, design and installation of drainage systems protecting structures against water in the ground"

3.11 ND Strip Connector



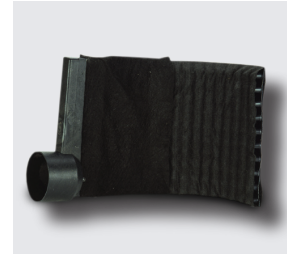
ND Strip 150 T-Connector



ND Strip 150 End Connector



ND Strip Universal T-Connector



ND Strip Universal End Connector

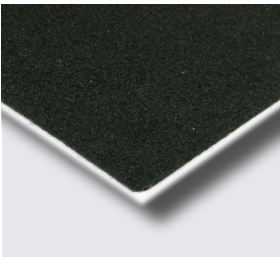
Various plastic connectors to connect the ND Strip Drainage Composite to drainage pipes, to extend the drainage strips or to make a T-connection.

Technical specifications

- Material: polyethylene (PE)
- Colour: black

Product	Packaging
ND Strip 150 Splice	Each
ND Strip 150 T-Connector	Each
ND Strip 150 End Connector	Each
ND Strip Universal T-Connector	Each
ND Strip Universal End Connector	Each

3.12 ND FV-105 Filter Fabric



ND FV-105 Filter Fabric

CE-marked filter fabric to prevent the growing medium from washing out and clogging the drainage layer.

Application

Extensive Green Roof System
Intensive Green Roof System

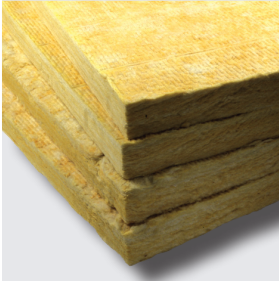
Technical specifications

- Material: polypropylene (PP)
- Colour: black
- Thickness: approx. 1mm
- Weight: approx. 100g/m²
- Puncture resistance: ≥1.3kN

Product	Dimensions (L x W)	Packaging
ND FV-150/250 Filter Fabric	100 x 2.5m	Roll 250m ²
ND FV-150/375 Filter Fabric	150 x 2.5m	Roll 375m ²

4 WATER RESERVOIR LAYER

4.1 ND WSM-50 Water Reservoir Panel



ND WSM-50 Water Reservoir Panel

Water absorbing mineral wool panels as a substrate substitute in accordance with the FLL* Directive.

Tests

- Test: Filter stability, ND WSM-50 Water Reservoir Panel with an organic-based layer
- Test: Moisture-retention, ND WSM-50 Water Reservoir Panel with an organic-based layer

Application

Extensive Green Roof System – multi-layer lightweight build-up
 Extensive Green Roof System – pitched roofs

Technical specifications

- Material: hydrophilic mineral wool
- Density: approx. 120 kg/m³
- Water retention capacity: approx. 40 l/m² = 80 Vol. %
- Air volume: approx. 16%
- pH-Value: approx. 7-8
- Weight: approx. 6 kg/m², saturated approx. 46 kg/m²

Product	Dimensions (L x W x H)	Packaging
ND WSM-50 Water Reservoir Panel	100 x 60 x 5cm	Package 3.6m ²

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

5 GROWING MEDIUM LAYER – SUBSTRATE

5.1 ND DGS-I Growing Medium Extensive



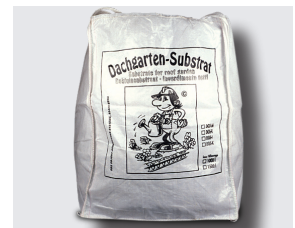
Loose tipped



Forced air distribution



Bags



Bulk bags

Substrate with a mixture of organic and mineral components as defined in the German FLL* Directive.

Application

Extensive Green Roof System – multi-layer build-up

Technical specifications

- Material: mixture of mineral and organic components
- Weight - dry: approx. 0.95 t/m³
- Weight - saturated and compacted: approx. 1.5 t/m³
- Water retention capacity: approx. 40 Vol. %
- pH-Value: approx. 7.5

Product	Packaging
ND DGS-E Growing Medium Extensive	Loose tipped approx. 28 m ³
ND DGS-E Growing Medium Extensive	Silo load - forced air distribution approx. 27 m ³
ND DGS-E Growing Medium Extensive	Bags of approx. 21 Litre
ND DGS-E Growing Medium Extensive	Bulk bags of 1 m ³ – approx. 1.000 Litre

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

5.2 ND DGS-M Growing Medium Mineral



Loose tipped



Forced air distribution



Bags



Bulk bags

A 100% pure mineral substrate as defined in the German FLL* Directive.

Application

Extensive Green Roof System – single-layer build-ups

Mulch layer on ND SM-25/ND SM-50 Substrate Panels

As a substrate sub-layer beneath a 500mm deep layer of ND DGS-I Growing Medium Intensive

As a bedding material for turf paving systems

Technical specifications

- Material: 100% mineral components
- Weight – dry: approx. 0.95t/m³
- Weight – saturated and compacted: approx. 1.5t/m³
- Water retention capacity: approx. 26Vol.%
- pH-value: approx. 7.5

Product	Packaging
ND DGS-M Growing Medium Mineral	Loose tipped approx. 28m ³
ND DGS-M Growing Medium Mineral	Silo load – forced air distribution approx. 27m ³
ND DGS-M Growing Medium Mineral	Bags of approx. 21 Litre
ND DGS-M Growing Medium Mineral	Bulk bags of 1m ³ – approx. 1,000Litre

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

5.3 ND DGS-I Growing Medium Intensive



Loose tipped



Forced air distribution



Bags



Bulk bags

Substrate with a mixture of organic and mineral components as defined in the German FLL* Directive.

Application

Intensive Green Roof System

Technical specifications

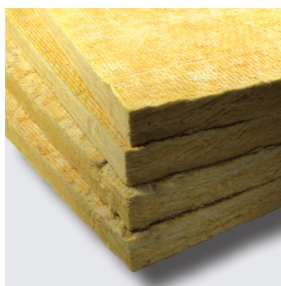
- Material: mixture of mineral and organic components
- Weight – dry: approx. 0.95t/m³
- Weight – saturated and compacted: approx. 1.5t/m³
- Water retention capacity: approx. 55Vol.%
- pH-value: approx. 6.5

Product	Packaging
ND DGS-I Growing Medium Intensive	Loose tipped approx. 28m ³
ND DGS-I Growing Medium Intensive	Silo load – forced air distribution approx. 27m ³
ND DGS-I Growing Medium Intensive	Bags of approx. 21Litre
ND DGS-I Growing Medium Intensive	Bulk bags of 1m ³ – approx. 1,000Litre

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

6 GROWING MEDIUM LAYER – SUBSTRATE PANELS

6.1 ND SM-50 Substrate Panel



ND SM-50 Substrate Panel

Water absorbing mineral wool panels as a substrate substitute in accordance with the FLL* Directive. The panels replace the substrate as growing medium in the Nophadrain Lightweight Green Roof System. By using these panels in combination with vegetation mats, the weight of the build-up for an extensive green roof can be reduced to approx. 50kg/m².

Application

Extensive Green Roof System – multi-layer lightweight build-up
 Extensive Green Roof System – pitched roofs
 Extensive Green Roof System – steep roofs

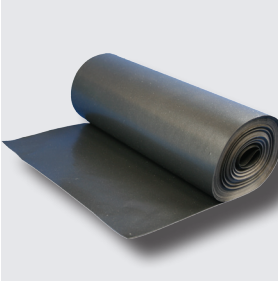
Technical specifications

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

Product	Dimensions (L x W x H)	Packaging
ND SM-50 Substrate Panel	120 x 60 x 5cm	Package 3. 6m ²

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

6.2 ND WSF-24 Film Strips



ND WSF-24 Film Strips

Plastic film as a barrier to be placed between SM Substrate Panels. This film prevents rapid loss of water from the substrate panels.

Application

Extensive Green Roof System – pitched roofs

Technical specifications

- Material: special low density polyethylene (LDPE) UV-stabilised
- Thickness: approx. 0.3mm
- Weight: approx. 280g/m²

Product	Dimensions (L x W)	Packaging
ND WSF-24 Film Strips	250 x 24cm	Roll 6m ²



Build-up pitched roofs

7 EROSION PROTECTION LAYER

7.1 ND 5+1esn Dimpled Sheet



ND 5+1esn Dimpled Sheet

A 27,5mm high dimpled sheet filled with ND DGS-M Growing Medium Mineral.

Application

Extensive Green Roof System – pitched roofs

Technical specifications

- Material dimpled sheet: polystyrene (HIPS)
- Thickness: approx. 2.75cm
- Weight: approx. 1,080g/m²
- Compressive strength: approx. 330kN/m²

Product	Dimensions (L x W)	Packaging
ND 5+1esn Dimpled Sheet	20 x 1.25m	Roll 25m ²



Build-up pitched roofs



7.2 ND ESK-60 Erosion Protection Glue



ND ESK-60 Erosion Protection Glue

Biologically neutral glue which is mixed with substrate to protect it from erosion.

Application

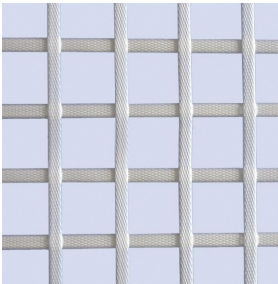
Extensive Green Roof System – pitched and steep roofs

Contents

- Organic Fertilizers
- Natural Cellulose Fibres
- Bio-Adhesives

Product	Packaging
ND ESK-60 Erosion Protection Glue	Bag approx. 60Litre (Capacity 25m ²)

7.3 ND ESG-60/60 Erosion Protection Grid



ND ESG-60/60 Erosion Protection Grid

Grid to fasten the GreenLiner 45DC Erosion Protection Profile – Clip.

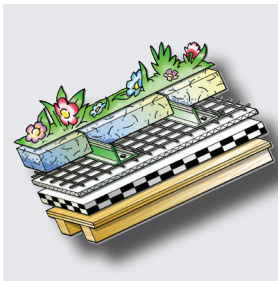
Application

Extensive Green Roof System – steep roofs

Technical specifications

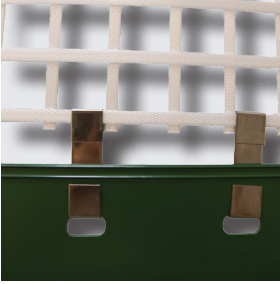
- Material: polypropylene (PP)
- Grid size: approx. 3.1cm x 3.1cm
- Pull strength: $\geq 60\text{kN}/\geq 60\text{kN}$
- Weight: approx. 360g/m²

Product	Dimensions (L x W)	Packaging
ND ESG-60/60 Erosion Protection Grid	100 x 4.75m	Roll 475m ²



Build-up steep roofs

7.4 GreenLiner 45DC Erosion Protection Profile – Clip



GreenLiner 45DC Erosion Protection Profile – Clip

Erosion Protection Profile – Clip combined with ND ESG-60/60 Erosion Protection Grid and GreenLiner Clip to fasten ND SM-50 Substrate Panels.

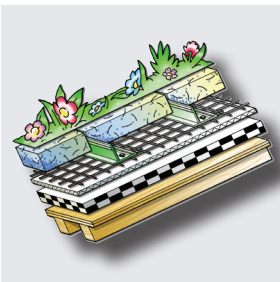
Application

Extensive Green Roof System – steep roofs

Technical specifications

- Material: polyvinyl chloride (PVC)
- Colour: green
- Perforations: approx. every 7.5cm

Product	Dimensions (L x W x H)	Packaging
GreenLiner 45DC Erosion Protection Profile – Clip	250 x 9 x 4.5cm	Package 10 pcs. = 25m



Build-up steep roofs

7.5 GreenLiner Clip



GreenLiner Clip

Clip to fasten the GreenLiner 45DC Erosion Protection Profile – Clip to the ND ESG-60/60 Erosion Protection Grid.

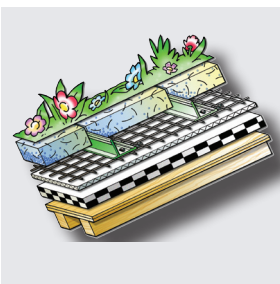
Application

Extensive Green Roof System – steep roofs

Technical specifications

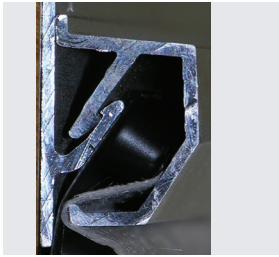
- Material: stainless steel
- Weight: approx. 15g

Product	Dimensions (L x W)	Packaging
GreenLiner Clip	7 x 2cm	Each

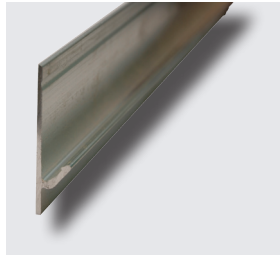


Build-up steep roofs

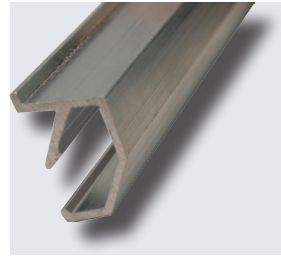
7.8 ND Clic Fixing Profile



ND Clic Fixing Profile



ND Clic Fixing Profile Wall



ND Clic Fixing Profile Front

Profile to fasten the ND 100/120 Drainage Composite.

Application

Vertical substructures
Extensive Green Roof System – steep and pitched roofs

Technical specifications

- Material: aluminium
- Weight: approx. 467g/lm

Product	Dimensions (L x W)	Packaging
ND Clic Fixing Profile	241 x 4.2cm	Package 10 pieces = 24m

8 VEGETATION LAYER

8.1 ND Plug Plants – Sedum/Herbs/Grasses



ND Plug Plants



ND Plug Plants



ND Plug Plants

Cultivated plug plants with a flat root layer.

Application

Extensive Green Roof System – 15 to 20 Plants per m² (see plant list on www.nophadrain.nl)

Product	Dimensions (Ø x H)	Packaging
ND Plug Plants Sedum	4.5 x 5cm	Tray 66 pieces
ND Plug Plants Grass/Herbs	4.5 x 5cm	Tray 66 pieces

8.2 ND Sedum Cuttings



ND Sedum Cuttings

Sedum cuttings with a minimum length of 20mm cut from existing Sedum plants. A mixture of 5 to 7 different varieties of Sedum.

Application

Extensive Green Roof System – minimum quantity to be used is 75 to 100g/m²
(see plant list on www.nophadrain.nl)

Product	Packaging
ND Sedum Cuttings	Bag starting from 1kg

8.3 ND Vegetation Mats Sedum/Sedum, Grass, Herbs



ND Vegetation Mats Sedum, Grass, Herbs

Vegetation Mats are pre-cultivated mats of Sedum or a combination of Sedum, Grass and Herbs. The mats should have at least 80% of their surface area covered with 5-8 different varieties of Sedum.

Application

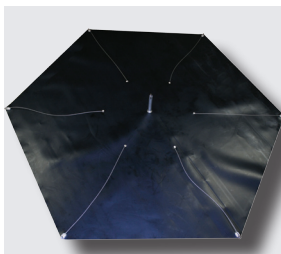
Extensive Green Roof System – flat, steep and pitched roofs

Product	Dimensions (L x W)	Packaging
ND Vegetation Mats Sedum*	1 x 1.20m	Roll 1,2m ²
ND Vegetation Mats Sedum/Grass/Herbs*	1 x 1.20m	Roll 1,2m ²

* optional with reinforcement for pitched roofs

9 FALL PROTECTION

9.1 ParaSave P1 Fall Protection



ParaSave P1 Fall Protection

Non-protruding anchor point for use with personal fall protection harnesses. Easy to install in the growing medium layer.

Application

Extensive Green Roof System

Technical specifications

- CE-marked: according to DIN EN 795
- Material: high density polyethylene (HDPE)
- Minimum load: 85kg/m²

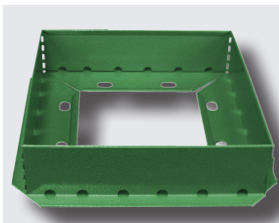
Product	Dimensions	Packaging
ParaSave P1 Fall Protection	Ø 342cm	Each



ParaSave P1 Fall Protection – installed

10 INSPECTION CHAMBERS – DRAINAGE CHANNELS – ROOF EDGE PROFILES

10.1 ND RS-VarioBasic Inspection Chamber/ND RS-VarioLid/ND RS-VarioGrid



ND RS-VarioBasic Inspection Chamber

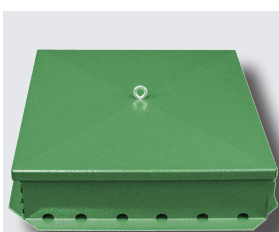
The Inspection Chamber is used to cover roof outlets located within vegetated areas. The ND RS-VarioBasic Inspection Chamber can be fitted to roof outlets of different shapes; e.g. linear, U-shape, triangular, square, etc.

Application

Extensive Green Roof System

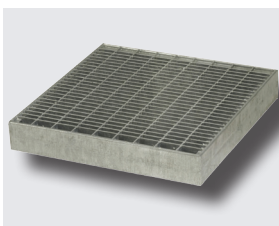
Technical specifications

- Material: galvanised steel
- Lid: closed and insulated
- Colour: green
- Flange: 34 x 34cm
- Inspection chamber: 30 x 30 x 8cm
- Grid: 30 x 30 x 2.5cm



ND RS-VarioLid

Product	Dimensions (L x W x H)	Packaging
ND RS-VarioBasic Inspection Chamber	30 x 30 x 8cm	Each
ND RS-VarioLid	30 x 30 x 1.5cm	Each
ND RS-VarioGrid	30 x 30 x 2.5cm	Each



ND RS-VarioGrid

10.2 ND RSA-10 Vario-/ND RSA-20 Extension VarioElement



ND RSA-10 VarioExtension Element

Depending upon the growing medium layer depth, the inspection chamber should be extended with the ND RS-10 Vario-/RS-20 VarioExtension Elements.

Technical specifications

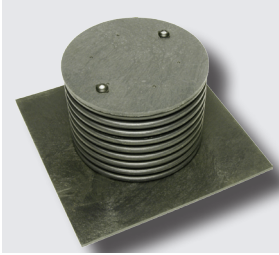
- Material: galvanised steel
- Colour: green

Product	Dimensions (L x W x H)	Packaging
ND RSA-10 VarioExtension Element	30 x 30 x 10cm	Each
ND RSA-20 VarioExtension Element	30 x 30 x 20cm	Each



ND RSA-20 VarioExtension Element

10.3 ND RS-30/ND RS-50 Inspection Chamber



ND RS-30 Inspection Chamber

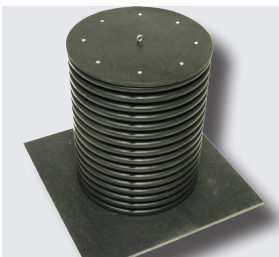
The Inspection chamber is used when a roof outlet is positioned in an intensive vegetated area.

Application

Intensive Green Roof System

Technical specifications

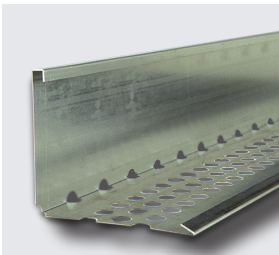
- Material: polyethylene (PE)
- Lid: closed and isolated, optional lockable
- Colour: black
- Flange: 50 x 50cm
- Inspection shaft: Ø 34cm



ND RS-50 Inspection Chamber

Product	Afmetingen (Ø x H)	Packaging
ND RS-30 Inspection Chamber	34 x 30cm	Each
ND RS-50 Inspection Chamber	34 x 50cm	Each

10.4 ND RP-100/ND RP-101 Roof Edge Profile



ND RP-100 Roof Edge Profile

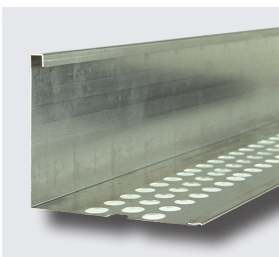
The ND RP Roof Edge Profile is an L-shaped metal edging strip that can be used on those roofs covered with an extensive vegetation regime but lacking a retaining kerb or parapet. The profile is available with or without drainage slots. The roof edge profiles are connected through the ND RPV Connectors.

Application

Extensive Green Roof System

Technical specifications

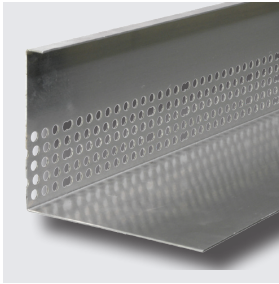
- Material: aluminium



ND RP-101 Roof Edge Profile

Product	Dimensions (L x W x H)	Packaging
ND RP-100 Roof Edge Profile	250 x 12 x 10cm	Each – with drainage slots
ND RP-101 Roof Edge Profile	250 x 12 x 10cm	Each – without drainage slots
ND RPV connectors	20 x 11cm (L x H)	Each

10.5 ND KL-80 Gravel Edge Profile



ND KL-80 Gravel Edge Profile

ND KL-80 Gravel Edge Profile is used to separate gravel within a clear strip from vegetated areas.

Application

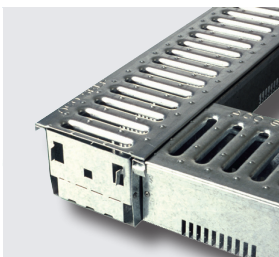
Extensive Green Roof System

Technical specifications

- Material: aluminium

Product	Dimensions (L x W x H)	Packaging
ND KL-80 Gravel Edge Profile	250 x 10 x 8cm	Each
ND KLV connectors	20 x 8cm (L x H)	Each

10.6 ND FR Drainage Channel/ND TR-80 Telescopic Channel



ND FR-81 Drainage Channel

The ND FR Drainage Channel is placed along facades and at door thresholds to avoid water accumulation (storm water) by wind and melting snow. Channel extensions, 90° corners and T-connections can easily be made without the need of any additional parts.

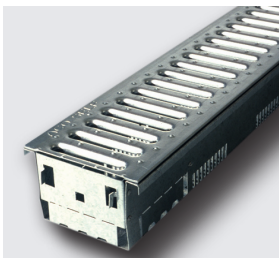
The ND TR-80 Telescopic Channel is a variable channel to extend the ND FR-81/FR-82 Drainage Channel to a length of up to 1m. The channels include a removable grating.

Application

Extensive Green Roof System
Intensive Green Roof System
Podium Deck System – load class 1

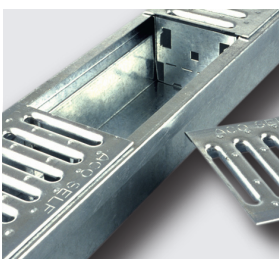
Technical specifications

- Material: galvanised steel
- Colour: metal



ND FR-82 Drainage Channel

Product	Dimensions (L x W x H)	Packaging
ND FR-81 Drainage Channel	100 x 12 x 8cm	Each
ND FR-82 Drainage Channel	200 x 12 x 8cm	Each
ND TR-80 Telescopic Channel	100 x 12 x 8cm	Each



ND TR-80 Telescopic Channel

11 ACCESSORIES

11.1 ND Sheet Cutter



ND Sheet Cutter

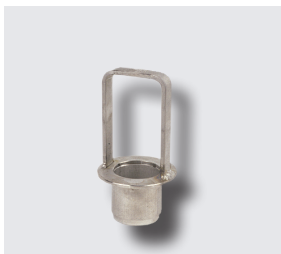
Pull cutter to cut plastic sheets, filter fabrics and ND Drainage Composites. The cutter is specially designed to protect the waterproofing membrane while cutting materials.

Application

Cutting of foils, geotextiles and drainage composites.

Product	Packaging
ND Sheet Cutter	Each
ND Blades	10 pcs.

11.2 ND PLS-Profi Plug Cutter/ND PS Template



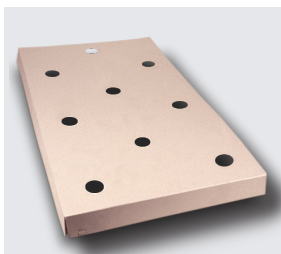
ND PLS-Profi Plug Cutter

Tool to cut holes for ND Plug Plants into the ND SM-50 Substrate Panels. The cardboard ND PS Template ensures that the ND Plus Plants are evenly spaced over the surface (approx. 16 plug plants per m²).

Technical specifications

- Material Plug Cutter: steel
- Diameter hole: approx. 4.5cm – depth 4.5cm
- Material template: high quality industrial-grade cardboard
- Dimensions template: 120 x 60cm
- Hole size: approx. 5cm
- Holes: 9 pcs. approx. 16 pcs. per m²

Product	Dimensions (L x W)	Packaging
ND PLS-Profi Plug Cutter	4.5 x 5cm (Ø x H)	Each
ND PS Template	120 x 60cm	Each



ND PS Template

11.3 ND Pix Geotextile Fastener

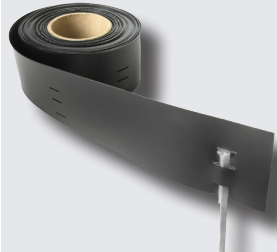


ND Pix Geotextile Fastener

To attach fleece overlaps.

Product	Packaging
ND Pix Geotextile Fastener	20 pcs.

12.1 GreenLiner Edge Retaining Profile – PE



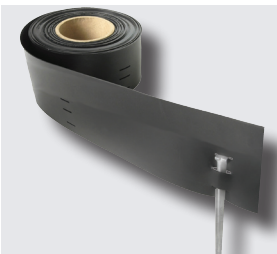
GreenLiner PE 150 Edge Retaining Profile

Flexible plastic edge retaining profile used as an edging between vegetated and vegetation free or paved zones.

Application
Gardens

Technical specifications

- Material: polyethylene (PE)
- Colour: black
- Thickness: approx. 2.5mm
- Dimensions: approx. 25m x 15/25cm x 2.5mm (L x W x H)
- Nails: galvanized steel, approx. 23cm long, approx. 2 pcs./meter
- Attachment: integrated in profile



GreenLiner PE 250 Edge Retaining Profile

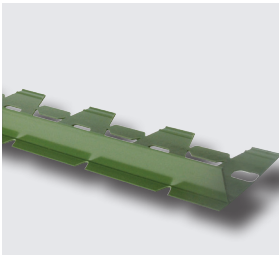
Product	Dimensions (L x W x H)	Packaging
GreenLiner PE 150 Edge Retaining Profile	25m x 15cm x 2.5mm	Roll 25m (incl. 50 nails)
GreenLiner PE 250 Edge Retaining Profile	25m x 25cm x 2.5mm	Roll 25m (incl. 50 nails)



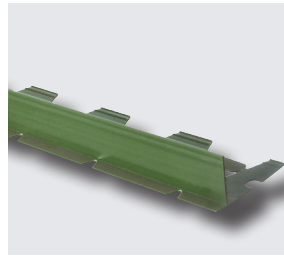
GreenLiner Nails



12.2 GreenLiner Edge Retaining Profile – PVC



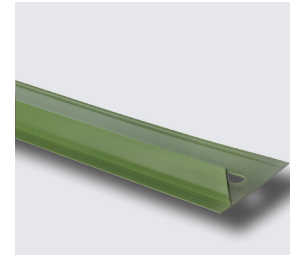
GreenLiner 35 rigid/flexible



GreenLiner 45 rigid/flexible



GreenLiner 25P rigid



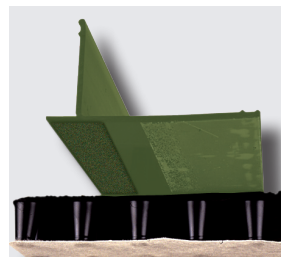
GreenLiner 25P rigid



GreenLiner 45P rigid



GreenLiner 45D



GreenLiner 25DK/45DK

The GreenLiner Edge Retaining Profile is used as an edging between vegetated and vegetation free or paved zones. The profile can create a perfect straight edge or can become flexible by removing the noggins, allowing the GreenLiner to be laid to curves. Do not use nails for fixing to roof decks. The separation profile can also be used to create perfect pond edges in combination with the ND GreenLiner TKP-40/TKP-50 Pond Liner Clip.

Application

Extensive Green Roof System
Podium Deck System – load class 1
Gardens
Pond Edges

Technical specifications

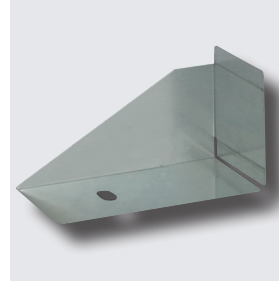
- Material: polyvinyl chloride (PVC)
- Colour: green
- GreenLiner 35/45: flexible up to 90° in all directions after removing the noggins
- GreenLiner 25P/35P/45P: rigid profile with holes for ground fixing
- GreenLiner 45D: rigid profile without Velcro
- GreenLiner 25DK/45DK: rigid profile with Velcro for fixing

Product	Dimensions (L x W x H)	Packaging
GreenLiner 35 Edge Retaining Profile	250 x 9 x 3.5cm	Package 10 pcs. = 25m
GreenLiner 45 Edge Retaining Profile	250 x 9 x 4.5cm	Package 10 pcs. = 25m
GreenLiner 25P Edge Retaining Profile	250 x 9 x 2.5cm	Package 10 pcs. = 25m
GreenLiner 35P Edge Retaining Profile	250 x 9 x 3.5cm	Package 10 pcs. = 25m
GreenLiner 45P Edge Retaining Profile	250 x 9 x 4.5cm	Package 10 pcs. = 25m
GreenLiner 45D Edge Retaining Profile	250 x 9 x 4.5cm	Package 10 pcs. = 25m
GreenLiner 25DK Edge Retaining Profile	250 x 9 x 2.5cm	Package 10 pcs. = 25m
GreenLiner 45DK Edge Retaining Profile	250 x 9 x 4.5cm	Package 10 pcs. = 25m

12.3 GreenLiner Edge Retaining Profile – Metal



GreenLiner 110V, GreenLiner 160V and GreenLiner 210V



GreenLiner Elevation Element



GreenLiner Expansion Joint



GreenLiner Nails

Flexible steel separation profile used as a permanent edge between vegetation and vegetation free or paved zones. These profiles can be used to make perfectly straight or gently curved edges. The separation profile can also be used to create perfect pond edges in combination with the ND GreenLiner TKP-40/TKP-50 Pond Liner Clip.

The 110VH, 160VH and 210VH Edge Retaining profile can create beds with a height up to 21cm. The GreenLiner Elevation Element is shoved onto the Edge Retaining Profile, placed on the ground and attached with the GreenLiner Nails.

Application

Ponds
Self-binding gravel
Beds

Technical specifications

- Material: galvanised metal
- Colour: metal

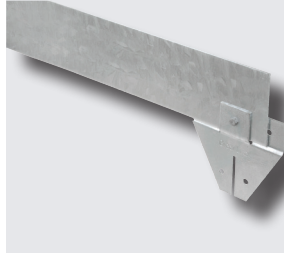
Product	Dimensions [L x W x H]	Packaging
GreenLiner 110V Edge Retaining Profile	250 x 0.3 x 11cm	Package 10 pcs. = 25m
GreenLiner 160V Edge Retaining Profile	250 x 0.3 x 16cm	Package 10 pcs. = 25m
GreenLiner 210V Edge Retaining Profile	250 x 0.3 x 21cm	Package 10 pcs. = 25m
GreenLiner 110VH Edge Retaining Profile	250 x 0.3 x 11cm	Package 10 pcs. = 25m*
GreenLiner 160VH Edge Retaining Profile	250 x 0.3 x 16cm	Package 10 pcs. = 25m*
GreenLiner 210VH Edge Retaining Profile	250 x 0.3 x 21cm	Package 10 pcs. = 25m*
GreenLiner Expansion Joint	-	Set 50 pcs.
GreenLiner Nails	23 x 1 x 0.15cm	Set 25/50 pcs.

* including 25 Elevation Elements

12.4 GreenLiner Edge Retaining Profile – Steel/Oxidised steel



GreenLiner 100/4V (Steel)



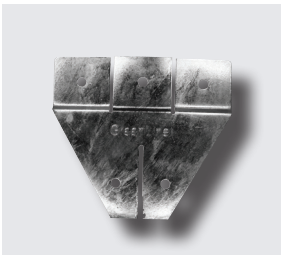
GreenLiner 150/4V (Steel)



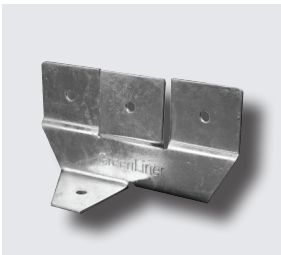
GreenLiner 150/4C (Oxidised Steel)



GreenLiner 200-250/4V (Steel)



GreenLiner FS Fixing Anchor



GreenLiner FSD Fixing Anchor Roof



GreenLiner Connector

Flexible steel separation profile used as a permanent edge between vegetation and vegetation free or paved zones. The GreenLiner Edge Retaining Profile is fastened to the ground using the GreenLiner FS Fixing Anchor. When using the GreenLiner Steel on roofs, the FSD Fixing Anchor Roof is used.

The Edge Retaining Profiles can be used as a pond edge in combination with the GreenLiner TKP-70 Pond Liner Clip.

Application

Intensive Green Roof System
 Podium Deck System – Load class 1
 Parking Deck System – Load class 2
 Ponds
 Self-binding gravel
 Beds

Technical specifications

- Material Edge Retaining profile: steel or oxidised steel
- Material FS/FSD Fixing Anchor: steel

Product	Dimensions (L x W x H)	Packaging
GreenLiner 100/4V (Steel)	200 x 0.4 x 10cm	Per 2m
GreenLiner 150/4V (Steel)	200 x 0.4 x 15cm	Per 2m
GreenLiner 200/4V (Steel)	200 x 0.4 x 20cm	Per 2m
GreenLiner 250/4V (Steel)	200 x 0.4 x 25cm	Per 2m
GreenLiner 100/4C (Oxidised Steel)	200 x 0.4 x 10cm	Per 2m
GreenLiner 150/4C (Oxidised Steel)	200 x 0.4 x 15cm	Per 2m
GreenLiner FS Fixing Anchor	20 x 0.3 x 18cm	Each (1 per m)
GreenLiner FSD Fixing Anchor Roof	20 x 0.3 x 10.5cm	Each (1 per m)
GreenLiner Connector	10 x 5 x 0.2cm	Each (1 per 2m)

12.5 GreenLiner Ring



GreenLiner Ring 100/4V (Steel)



GreenLiner Ring 150/4V (Steel)



GreenLiner Ring 150/4C (Oxidised steel)



GreenLiner Ring 200-250/4V (Steel)

Curved edge retaining ring made out of galvanised or oxidised steel and used to create tree pits or planter beds within lawned areas or paving. The rings have a diameter of 640mm or multiples thereof of that and are attached to the soil using GreenLiner FS Fixing Anchors.

Application

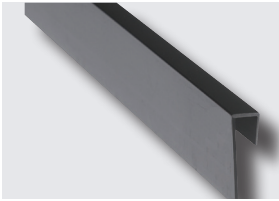
Beds
Trees
Staircases

Technical specifications

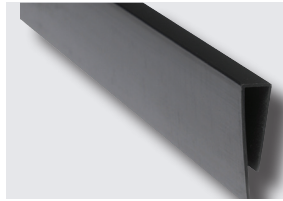
- Material: steel or oxidised steel
- Diameter: from 64/128/192cm
- Height: approx. 10/15/20/25cm
- Thickness: approx. 4mm
- Material FS/FSD Fixing Anchor: steel

Product	Dimensions (Ø x W x H)	Packaging
GreenLiner Ring 100/4V (Steel)	64/128/192 x 0.4 x 10cm	per 2m
GreenLiner Ring 150/4V (Steel)	64/128/192 x 0.4 x 15cm	per 2m
GreenLiner Ring 200/4V (Steel)	64/128/192 x 0.4 x 20cm	per 2m
GreenLiner Ring 250/4V (Steel)	64/128/192 x 0.4 x 25cm	per 2m
GreenLiner Ring 100/4C (Oxidised Steel)	64/128/192 x 0.4 x 10cm	per 2m
GreenLiner Ring 150/4C (Oxidised Steel)	64/128/192 x 0.4 x 15cm	per 2m

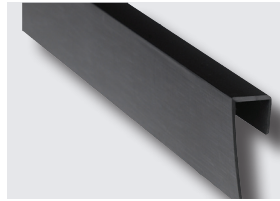
12.6 GreenLiner TKP Pond Liner Clip



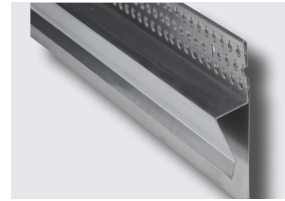
GreenLiner TKP-40/11



GreenLiner TKP-50/11



GreenLiner TKP-40/13



GreenLiner TKP-70/15

Pond liners created using the GreenLiner Edge Retaining Profiles (PVC and Metal) need to be completed using the GreenLiner TKP-40/TKP-50 Pond Liner Clip. For pond liners constructed using GreenLiner Edge Retaining Profile (Steel/Oxidised Steel), the GreenLiner TKP-70 Pond Liner Clip should be used.

Application

Ponds

Technical specifications

- Material: black polyvinyl phloride (PVC – TKP-40/TKP-50)/aluminium (TKP-70)

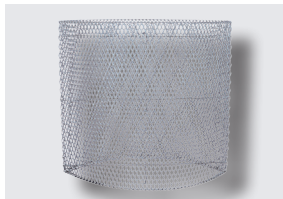
Product	Dimensions (L x W x H)	Packaging
GreenLiner TKP-40/11 Pond Liner Clip	250 x 1.1 x 1.5 – 4cm	Each
GreenLiner TKP-50/11 Pond Liner Clip	250 x 1.1 x 4.0 – 5cm	Each
GreenLiner TKP-40/13 Pond Liner Clip	250 x 1.3 x 1.5 – 4cm	Each
GreenLiner TKP-70/15 Pond Liner Clip	250 x 1.5 x 3.0 – 7cm	Each

13 GABIONS (NEW)

13.1 GreenGabion Gabion System



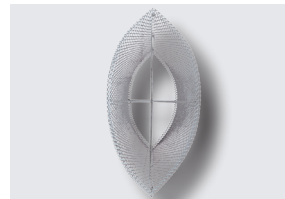
GreenGabion 100/50/3d



GreenGabion 100/100/3d



GreenGabion 100/150/3d



Top View GreenGabion

Elliptical gabions that make it easy to create curved lines. The gabions can be filled with granular material starting from Ø 32/64.

Application

Gardens
Beds

Technical Specifications

- Material: galvanised steel
- Colour: metal
- Mesh: diamond format approx. 5.2 x 2.3cm

Product	Dimensions (L x W x H)	Packaging
GreenGabion 100/50/3d	100 x 50 x 50cm	Each
GreenGabion 100/100/3d	100 x 50 x 100cm	Each
GreenGabion 100/150/3d	100 x 50 x 150cm	Each

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