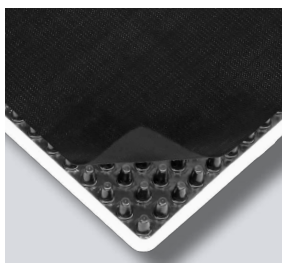
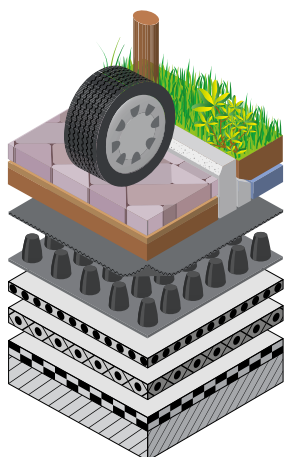


## TECHNICAL DATA SHEET

### ND 600 Drainage System



ND 600 Drainage System



Composition Nophadrain Parking Deck System - cars

High-performance CE-marked drainage system with an innovative dimple design made out of recycled high impact polystyrene. The core of the ND Drainage System is a dimpled sheet with a very high compressive strength, an excellent creep resistance guaranteeing a consistent long term drainage capacity and a construction height of approx. 12.5 mm.

A special mono-filament woven geotextile is bonded to each dimple as a filter layer. The geotextile is glued and not thermally bonded 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.

#### Application

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

#### Properties

- Material dimpled sheet: recycled high impact polystyrene (HIPS)
- Material woven geotextile filter: polypropylene (PP)
- Construction height: approx. 12.5 mm
- Compressive strength: approx. 900 kPa
- Weight: approx. 1,239 g/m<sup>2</sup>
- Drainage capacity at  $i = 1$  at 20 kPa: approx. 5.27 l/(s.m)
- Drainage capacity at fall ratio 2 % 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 under simulated traffic conditions.

Product	Dimensions (L x W)	Packaging
ND 600 Drainage System	approx. 32 x 1.25 m	approx. 40 m <sup>2</sup> , roll

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**Data sheet**

**DoP600-007**

**ND 600**

Material Properties	Standard	Unit	Performance
Core	-	-	HIPS
Filter geotextile	-	-	PP-woven
Separation film	-	-	-
Separation geotextile	-	-	-
<b>Mechanical Properties (mean values)</b>			
Compressive strength	hEN ISO 25619-2	kPa	900
Compressive strength at 10 % deformation	hEN ISO 25619-2	kPa	800
Deformation at 1 mPa	hEN ISO 25619-2	%	-
Tensile strength <sup>1</sup> (MD/CMD) <sup>2</sup>	hEN ISO 10319	kN/m	44/52
CBR puncture resistance <sup>1</sup>	hEN ISO 12236	kN	4
Dynamic performance (cone drop)	hEN ISO 13433	mm	9
Resistance to weathering <sup>3</sup>	hEN ISO 12224	%	60/80
<b>Physical Properties</b>			
Construction height at 2 kPa	-	mm	12.5
Dimple height at 2 kPa	-	mm	12
Perforations per m <sup>2</sup>	-	-	-
Diameter perforations	-	mm	-
Water reservoir	-	l/m <sup>2</sup>	-
Material dimensions (L x W)	-	m	32 x 1.25
Mass per unit area	-	g	1,239
Surface area per roll	-	m <sup>2</sup>	40
Roll diameter	-	cm	75
Roll weight	-	kg	50
<b>Hydraulic Properties (mean values)</b>			
Opening size O <sub>90</sub> <sup>1</sup>	hEN ISO 12956	µm	187
Water permeability H <sub>50</sub> <sup>1</sup>	hEN ISO 11058	mm/s	44
<b>Drainage Capacity (mean values)</b>			
<b>Vertical drainage / Wall - gradient i=1</b>			
<b>Surface load</b>	<b>Build-in-depth</b>		
20 kPa	2.0 m	hEN ISO 12958 <sup>4</sup>	l/(s.m) 5.27
30 kPa	3.0 m	hEN ISO 12958 <sup>4</sup>	l/(s.m) 5.19
50 kPa	5.0 m	hEN ISO 12958 <sup>4</sup>	l/(s.m) 4.97
100 kPa	10.0 m	hEN ISO 12958 <sup>4</sup>	l/(s.m) 4.51
200 kPa	Exceptional	hEN ISO 12958 <sup>4</sup>	l/(s.m) 3.74
<b>Horizontal drainage / Roof</b>			
<b>Fall = 0 % - Exceptional case</b>			
≤ 2 kPa - extensive green roof		FH Karlsruhe (D) <sup>5</sup>	l/(s.m) -
≤ 10 kPa - intensive green roof		FH Karlsruhe (D) <sup>5</sup>	l/(s.m) -
<b>Fall = 1 % - Exceptional case</b>			
≤ 10 kPa - extensive green roof		hEN ISO 12958 <sup>4</sup>	l/(s.m) 0.54
≤ 20 kPa - intensive green roof		hEN ISO 12958 <sup>4</sup>	l/(s.m) 0.49
100 kPa - podium roof deck		hEN ISO 12958 <sup>4</sup>	l/(s.m) 0.36
200 kPa - parking roof deck		hEN ISO 12958 <sup>4</sup>	l/(s.m) 0.28
<b>Fall = 1.5 %</b>			
≤ 10 kPa - extensive green roof		hEN ISO 12958 <sup>4</sup>	l/(s.m) 0.71
≤ 20 kPa - intensive green roof		hEN ISO 12958 <sup>4</sup>	l/(s.m) 0.63
100 kPa - podium roof deck		hEN ISO 12958 <sup>4</sup>	l/(s.m) 0.48
200 kPa - parking roof deck		hEN ISO 12958 <sup>4</sup>	l/(s.m) 0.38
<b>Fall = 2 %</b>			
≤ 10 kPa - extensive green roof		hEN ISO 12958 <sup>4</sup>	l/(s.m) 0.80
≤ 20 kPa - intensive green roof		hEN ISO 12958 <sup>4</sup>	l/(s.m) 0.72
100 kPa - podium roof deck		hEN ISO 12958 <sup>4</sup>	l/(s.m) 0.52
200 kPa - parking roof deck		hEN ISO 12958 <sup>4</sup>	l/(s.m) 0.44
<b>Fall = 2.5 %</b>			
≤ 10 kPa - extensive green roof		hEN ISO 12958 <sup>4</sup>	l/(s.m) 0.85
≤ 20 kPa - intensive green roof		hEN ISO 12958 <sup>4</sup>	l/(s.m) 0.82
100 kPa - podium roof deck		hEN ISO 12958 <sup>4</sup>	l/(s.m) 0.56
200 kPa - parking roof deck		hEN ISO 12958 <sup>4</sup>	l/(s.m) 0.48
<b>Fall = 3 %</b>			
≤ 10 kPa - extensive green roof		hEN ISO 12958 <sup>4</sup>	l/(s.m) 0.95
≤ 20 kPa - intensive green roof		hEN ISO 12958 <sup>4</sup>	l/(s.m) 0.91
100 kPa - podium roof deck		hEN ISO 12958 <sup>4</sup>	l/(s.m) 0.62
200 kPa - parking roof deck		hEN ISO 12958 <sup>4</sup>	l/(s.m) 0.51

<sup>1</sup> Performance expressed on the filter/geotextile only

<sup>2</sup> MD = Machine direction / CMD = Cross Machine Direction

<sup>3</sup> Material has to be completely covered within 14 days after installation

<sup>4</sup> hEN ISO 12958 tested hard/soft

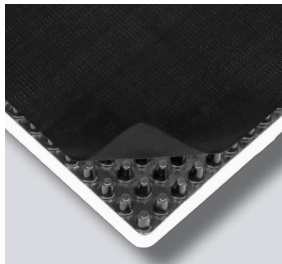
<sup>5</sup> FH Karlsruhe (D) tested hard/hard

The values correspond to average results obtained in our laboratories and outside institutes and are indicative. The right is reserved to make changes at any time without notice. Standard variations in mechanical properties of 15 % and in hydraulic properties of 20 % and in physical properties of 5 % are normal.

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V08.2020

## TECHNICAL DATA SHEET

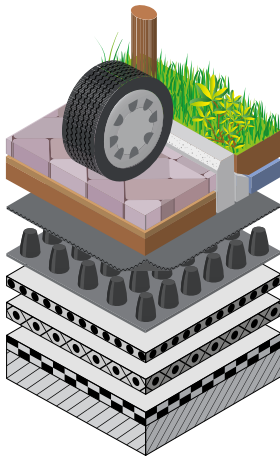
### ND 620 Drainage System



ND 620 Drainage System

High-performance CE-marked drainage system with an innovative dimple design made out of recycled high impact polystyrene. The core of the ND Drainage System is a dimpled sheet with a very high compressive strength, an excellent creep resistance guaranteeing a consistent long term drainage capacity and a construction height of approx. 12.5 mm. A special mono-filament woven geotextile is bonded to each dimple as a filter layer.

The geotextile is glued and not thermally bonded 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. An additional pressure-dividing slip film is 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.



Composition Nophadrain Parking Deck System - cars

#### Application

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

#### Properties

- 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. 900 kPa
- Weight: approx. 1,280 g/m<sup>2</sup>
- Drainage capacity at  $i = 1$  at 20 kPa: approx. 5.27 l/(s.m)
- Drainage capacity at fall ratio 2 % 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 under simulated traffic conditions.

Product	Dimensions (L x W)	Packaging
ND 620 Drainage System	approx. 32 x 1.25 m	approx. 40 m <sup>2</sup> , roll

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**Data sheet**

**DoP620-006**

**ND 620**

Material Properties	Standard	Unit	Performance
Core	-	-	HIPS
Filter geotextile	-	-	PP-woven
Separation film	-	-	PP
Separation geotextile	-	-	-
<b>Mechanical Properties (mean values)</b>			
Compressive strength	hEN ISO 25619-2	kPa	900
Compressive strength at 10 % deformation	hEN ISO 25619-2	kPa	800
Deformation at 1 mPa	hEN ISO 25619-2	%	-
Tensile strength <sup>1</sup> (MD/CMD) <sup>2</sup>	hEN ISO 10319	kN/m	44/52
CBR puncture resistance <sup>1</sup>	hEN ISO 12236	kN	4
Dynamic performance (cone drop)	hEN ISO 13433	mm	9
Resistance to weathering <sup>3</sup>	hEN ISO 12224	%	60/80
<b>Physical Properties</b>			
Construction height at 2 kPa	-	mm	12.5
Dimple height at 2 kPa	-	mm	12
Perforations per m <sup>2</sup>	-	-	-
Diameter perforations	-	mm	-
Water reservoir	-	l/m <sup>2</sup>	-
Material dimensions (L x W)	-	m	32 x 1.25
Mass per unit area	-	g	1,280
Surface area per roll	-	m <sup>2</sup>	40
Roll diameter	-	cm	75
Roll weight	-	kg	51
<b>Hydraulic Properties (mean values)</b>			
Opening size O <sub>90</sub> <sup>1</sup>	hEN ISO 12956	µm	187
Water permeability H <sub>50</sub> <sup>1</sup>	hEN ISO 11058	mm/s	44
<b>Drainage Capacity (mean values)</b>			
<b>Vertical drainage / Wall - gradient i=1</b>			
<b>Surface load</b>	<b>Build-in-depth</b>		
20 kPa	2.0 m	hEN ISO 12958 <sup>4</sup>	l/(s.m) 5.27
30 kPa	3.0 m	hEN ISO 12958 <sup>4</sup>	l/(s.m) 5.19
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100 kPa	10.0 m	hEN ISO 12958 <sup>4</sup>	l/(s.m) 4.51
200 kPa	Exceptional	hEN ISO 12958 <sup>4</sup>	l/(s.m) 3.74
<b>Horizontal drainage / Roof</b>			
<b>Fall = 0 % - Exceptional case</b>			
≤ 2 kPa - extensive green roof		FH Karlsruhe (D) <sup>5</sup>	l/(s.m) -
≤ 10 kPa - intensive green roof		FH Karlsruhe (D) <sup>5</sup>	l/(s.m) -
<b>Fall = 1 % - Exceptional case</b>			
≤ 10 kPa - extensive green roof		hEN ISO 12958 <sup>4</sup>	l/(s.m) 0.54
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<sup>1</sup> Performance expressed of the filter/geotextile only

<sup>2</sup> MD = Machine direction / CMD = Cross Machine Direction

<sup>3</sup> Material has to be completely covered within 14 days after installation

<sup>4</sup> hEN ISO 12958 tested hard/soft

<sup>5</sup> FH Karlsruhe (D) tested hard/hard

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V01.2019