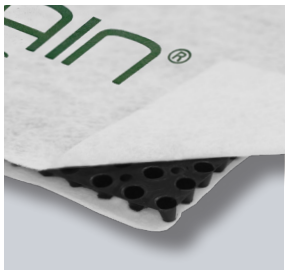
TECHNICAL DATA SHEET

ND X20 Drainage System



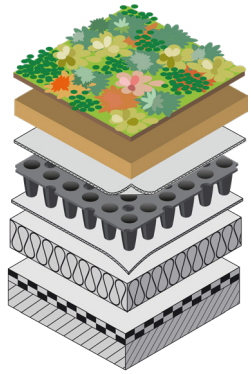
ND X20 Drainage System

High-performance CE-marked drainage system with an innovative dimple design made out of recycled high impact polystyrene and a construction height of approx. 20 mm. The core of the ND Drainage System is a perforated, vapour-permeable dimpled sheet with a high compressive strength, an excellent creep resistance guaranteeing a consistent long term drainage capacity. The ND X20 Drainage System has a water buffering capacity of approx. 3.5 l/m^2.

A non-woven geotextile is glued to the back of the dimpled sheet as a filter layer and a vapour-permeable geotextile is bonded to each dimple as a protection and separation layer. Both geotextiles have an overlap of approx. 10 cm. The geotextiles are 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.

Applications

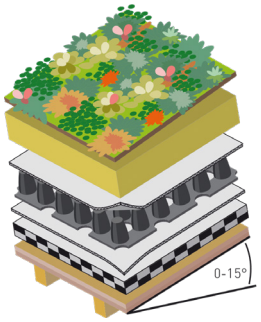
The ND X20 Drainage System is a component of the Nophadrain Extensive Green Roof System that acts as a filter, drainage and protection layer. The construction height (approx. 20 mm) prevents waterlogging in the substrate layer and the risk of frost heave affecting the paving and allows longer drainage length. The ND X20 Drainage System is suitable for warm roof and inverted roof constructions until 15 °.



Composition Nophadrain Extensive Green Roof System - inverted roof construction with ND X20 Drainage System

Properties

- Material dimpled sheet: recycled high impact polystyrene (HIPS)
- Material geotextile filter: polypropylene (PP)
- Material vapour-permeable geotextile: polypropylene (PP)
- Geotextile overlap (upper side and bottom side): 100 mm
- Construction height: approx. 20 mm
- Compressive strength: approx. 270 kPa
- Perforations/m^2: approx. 1,540 / ø 6.3 mm
- Water reservoir: approx. 3.5 l/m^2
- Weight: approx. 958 g/m^2
- Drainage capacity at fall ratio 2 % at 10 kPa: approx. 0.92 l/(s.m)



Composition Nophadrain Extensive Green Roof System - pitched roof (max 15 °) with ND X20 Drainage System

Product	Dimensions (L x W)	Packaging
ND X20 Drainage System	approx. 30 x 1.20 m	approx. 36 m^2, Roll

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NOPHADRAIN®
SMART GREEN ROOF SYSTEMS

Data sheet	DoPX20-002	ND X20	
Material Properties	**Standard**	**Unit**	**Performance**
Core	-	-	HIPS
Filter geotextile	-	-	PP
Separation film	-	-	-
Separation geotextile	-	-	PP
Mechanical Properties (mean values)			
Compressive strength	hEN ISO 25619-2	kPa	270
Compressive strength at 10 % deformation	hEN ISO 25619-2	kPa	240
Deformation at 1 mPa	hEN ISO 25619-2	%	-
Tensile strength [1] (MD/CMD) [2]	hEN ISO 10319	kN/m	8/8
CBR puncture resistance [1]	hEN ISO 12236	kN	1.15
Dynamic performation (cone drop)	hEN ISO 13433	mm	34
Resistance to weathering [3]	hEN ISO 12224	%	60/80
Physical Properties			
Construction height at 2 kPa	-	mm	20
Dimple height at 2 kPa	-	mm	18.5
Perforations per m²	-	-	1,540
Diameter perforations	-	mm	6.3
Water reservoir	-	l/m²	3.5
Material dimensions (L x W)	-	m	30 x 1.2
Mass per unit area	-	g	958
Surface area per roll	-	m²	36
Roll diameter	-	cm	85
Roll weight	-	kg	34
Hydraulic Properties (mean values)			
Opening size O_{90} [1]	hEN ISO 12956	µm	100
Water permeability H_{50} [1]	hEN ISO 11058	mm/s	110
Drainage Capacity (mean values)			
Vertical drainage / Wall - gradient i=1			
Surface load **Build-in-depth**			
20 kPa 2.0 m	hEN ISO 12958 [4]	l/(s.m)	7.30
30 kPa 3.0 m	hEN ISO 12958 [4]	l/(s.m)	7.00
50 kPa 5.0 m	hEN ISO 12958 [4]	l/(s.m)	6.63
100 kPa 10.0 m	hEN ISO 12958 [4]	l/(s.m)	5.90
200 kPa Exceptional	hEN ISO 12958 [4]	l/(s.m)	5.31
Horizontal drainage / Roof			
Fall = 0 % - Exceptional case			
≤ 2 kPa - extensive green roof	FH Karlsruhe (D) [5]	l/(s.m)	-
≤ 10 kPa - intensive green roof	FH Karlsruhe (D) [5]	l/(s.m)	-
Fall = 1 % - Exceptional case			
≤ 10 kPa - extensive green roof	hEN ISO 12958 [4]	l/(s.m)	0.50
≤ 20 kPa - intensive green roof	hEN ISO 12958 [4]	l/(s.m)	0.40
100 kPa - podium roof deck	hEN ISO 12958 [4]	l/(s.m)	0.42
200 kPa - parking roof deck	hEN ISO 12958 [4]	l/(s.m)	0.33
Fall = 1.5 %			
≤ 10 kPa - extensive green roof	hEN ISO 12958 [4]	l/(s.m)	0.70
≤ 20 kPa - intensive green roof	hEN ISO 12958 [4]	l/(s.m)	0.73
100 kPa - podium roof deck	hEN ISO 12958 [4]	l/(s.m)	0.60
200 kPa - parking roof deck	hEN ISO 12958 [4]	l/(s.m)	0.40
Fall = 2 %			
≤ 10 kPa - extensive green roof	hEN ISO 12958 [4]	l/(s.m)	0.92
≤ 20 kPa - intensive green roof	hEN ISO 12958 [4]	l/(s.m)	0.80
100 kPa - podium roof deck	hEN ISO 12958 [4]	l/(s.m)	0.82
200 kPa - parking roof deck	hEN ISO 12958 [4]	l/(s.m)	0.50
Fall = 2.5 %			
≤ 10 kPa - extensive green roof	hEN ISO 12958 [4]	l/(s.m)	1.00
≤ 20 kPa - intensive green roof	hEN ISO 12958 [4]	l/(s.m)	0.90
100 kPa - podium roof deck	hEN ISO 12958 [4]	l/(s.m)	0.81
200 kPa - parking roof deck	hEN ISO 12958 [4]	l/(s.m)	0.63
Fall = 3 %			
≤ 10 kPa - extensive green roof	hEN ISO 12958 [4]	l/(s.m)	1.22
≤ 20 kPa - intensive green roof	hEN ISO 12958 [4]	l/(s.m)	1.13
100 kPa - podium roof deck	hEN ISO 12958 [4]	l/(s.m)	0.80
200 kPa - parking roof deck	hEN ISO 12958 [4]	l/(s.m)	0.72

[1] Performance expressed of the filter/geotextile only
[2] MD = Machine direction / CMD = Cross Machine Direction
[3] Material has to be completely covered within 14 days after installation
[4] hEN ISO 12958 tested hard/soft
[5] 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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