

Dr. Upmeier

Sachverständigenbüro

Sachverständigenbüro Dr. Martin Upmeier
Diplom-Geologe

von der Landwirtschaftskammer Rheinland-
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Sachverständiger im Bereich Gartenbau für:
Bau- und Pflegeleistungen, Teilbereich
Schwimm- und Badeteiche
Dachbegrünungen
Erden und Substrate

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Dattenberg, 02.04.2019

Test report according to FLL-Green-Roofing Guidelines (2018)

Test report number: PG-2019-0013

Extensive roof substrate (single layer construction)

Sample number: AP-2019-0010

The material sample is fully compliant with the FLL Green Roofing Guidelines (2018).

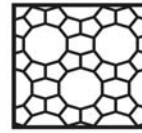
Note on salinity: an increased level of salinity in water was detected. When this occurs, an additional measurement in saturated gypsum solution is tested. The value for this measurement fulfils the FLL-requirement. Therefore, the high salinity in water is caused by sulphate, which in this concentration is not detrimental to plant growth.

The test report includes 3 pages (this page, test report (2 pages)).

The test report is valid until 01.04.2022.

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Test report according to FLL-Green-Roofing Guidelines (2018)

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Material name:
Substrate for extensiv green roofs

Type of substrate (FLL): Extensive roof substrate (single layer construction)
Declaration of ingredients: crushed brick, compost
Production facility: inapplicable, laboratory sample
Place of sampling: no information
Type of sampling: no information
Sample size: 25 l
Date of sampling: 21.03.2019
Sampler: Dr. Martin Upmeier
Date laboratory delivery: 19.02.2019
Sample number: AP-2019-0010
Laboratory processing: Dr. Martin Upmeier
Test report number: PG-2019-0013
Date test report: 02.04.2019
Validity: 01.04.2022

Analysis results

Properties	Unit	Value according FLL	Analysis value
Grain size distribution			
Elutriate particles (d ≤ 0,063 mm)	weight-%	≤ 10	3,4
Medium gravel (d > 4 mm)	weight-%	≤ 75	60,6
Weight per volume ¹⁾			
In dry condition	g/cm ³	-	0,93
At maximum water capacity	g/cm ³	-	1,29
bulk density (DIN EN 1097-3)	g/cm ³	-	n.d.
Water / air conditions			
Total pore volume ¹⁾	Vol.-%	-	64,3
Maximum water capacity	Vol.-%	≥ 20 bis ≤ 65	35,8
Air content at maximum water capacity	Vol.-%	≥ 10	28,5
Air content at pF 1,8 ³⁾	Vol.-%	≥ 20	n.d.
Hydraulic permeability mod. Kf	mm/min	60 - 400	367
pH-value, salinity			
pH-value (in CaCl ₂)		6,0 - 8,5	8,4
Salinity (water extract), expressed as KCl ²⁾	g/l	≤ 3,5	8,7
Salinity (gypsum extract) ³⁾	g/l	≤ 2,5	1,4

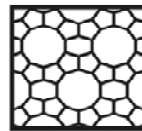
¹⁾ No requirement

²⁾ A low value should be aimed

³⁾ To be proofed, if necessary

Test report

Page 2/2



Dr. Upmeier

Expert office

Material name: Substrate for extensiv green roofs
 Sample number: AP-2019-0010

Properties	Unit	Value according FLL	Analysis value
Organic substance			
organic matter content (loss on ignition)	g/l	≤ 40	16,4
loss on ignition	weight-%	-	1,8
Plant available nutrients (CAT)			
Nitrogen (N)	mg/l	≤ 80	6
Phosphorus (P ₂ O ₅)	mg/l	≤ 50	42
Potassium (K ₂ O)	mg/l	≤ 500	486
Magnesium (Mg)	mg/l	≤ 200	67
readable impurities			
Diameter > 6 mm			
Tiles, glass, ceramics	weight-%	≤ 0,3	0,1
Metal, plastic	weight-%	≤ 0,1	0
Area sum for plastics	cm ² /l	≤ 10	0

The investigations were carried out in accordance with relevant testing methods, designated in the FLL-Green-Roofing Guidelines 2018. All parameters are related to a defined laboratory compaction (FLL-Green-Roofing Guideline).

n.d.: value not determined

