GÜTEGEMEINSCHAFT SUBSTRATE FÜR PFLANZEN E.V.

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BARK · GROWING MEDIA · POTTING SOIL · SUBSTRATE BASE MATERIALS · EXPANDED CLAY GRANULES AS GROWING MEDIA · GREEN ROOF SUBSTRATES · TREE PLANTING SUBSTRATES

QUALITY ASSURANCE

RAL GÜTEZEICHEN

SUBSTRATE FÜR PFLANZEN

The company

Vulkatec Riebensahm GmbH

(Production site Kretz)

submitted the

Vulkaplus extensiv 0-12

green roof substrate
for inclusion in the RAL Quality Assurance for Green Roof Substrates in 2011 and 2012.

The results obtained from the stipulated regular external quality surveillance and self-monitoring procedures complied with the quality criteria for green roof substrates (RAL-GZ 250-6) that apply to this type of product.

The present certificate includes the inspection to the FLL Green Roofing Guidline valid at the time. It also includes compliance with the relevant environmental criteria.

The right to carry the seal of quality remains in force.
This certificate shall be valid until 30 June 2014.

Hannover, 28 May 2013

Gütegemeinschaft Substrate für Pflanzen e.V.

Chairman of the quality committee
Green Roof and Tree Planting Substrates

Managing Director

Result 2/1

Tests under the RAL Quality Assurance Programme for Green Roof Substrates
(Means of the external surveillance 2011 – 2012)

Company name: **Vulkatec Riebensahm GmbH**

Production site: **Kretz**

Product: **Vulkaplus extensiv 0-12**

Product group: **Vegetation substrate for extensive greening (multiple layer)**

Base material: **Lava, pumice, composted bark, green waste composts**

Quality criteria		**Requirement of quality assurance programme**	**External surveillance** (mean from 8 samplings)
Physical properties			
Percentage of clay and silt (d ≤ 0.063 mm)	[mass%]	≤ 15	10.1
Percentage of fine and medium gravel (d ≥ 2 mm)	[mass%]	≤ 50	38.6
Raw density (dry)	*[g/cm³]*	---	1.1
Raw density at max. water capacity	[g/cm³]	---	1.5
Total pore space	[vol%]	---	56.7
Max. water capacity	[vol%]	≥ 35 ≤ 65	41.8
Air content at max. water capacity	*[vol%]*	*≥ 10*	*15.6*
Air content at pF = 1.8 *)	[vol%]	≥ 20	
Water permeability mod. k_f	[mm/min]	0.6 – 70	16.6
Separable foreign material d > 2mm	[mass%]	≤ 0.3	0
Plastics (LOI > 70 mass%)	*[mass%]*	*≤ 0.1*	*0*
Chemical properties			
Organic matter	g/L [mass%]	≤ 65	40.3 3.7
pH value ($CaCl_2$)		6,0 – 8,5	7.2
Salinity	[g/L]	Water extract: ≤ 3.5 Gypsum extract: ≤ 2.5 **)	0.4
Available nutrients			
Nitrogen (NH_4-N + NO_3-N)	[mg/L]; $CaCl_2$	≤ 80	4
Phosphorous (P_2O_5)	[mg/L]; CAL	≤ 200	99
Potassium (K_2o)	[mg/L]; CAL	≤ 700	600
Magnesium (Mg)	[mg/L]; $CaCl_2$	≤ 200	115

All values relate to the condition in a specified laboratory compaction test.

*) If the air content at max. water capacity is below the threshold value.

**) If salinity in the water extract exceeds the threshold value.

Result 2/2

Tests under the RAL Quality Assurance Programme for Green Roof Substrates
(Means of the external surveillance 2011 – 2012)

Company name: **Vulkatec Riebensahm GmbH**

Production site: **Kretz**

Product: **Vulkaplus extensiv 0-12**

Product group: **Vegetation substrate for extensive greening (multiple layer)**

Base material: **Lava, pumice, composted bark, green waste composts**

Environmental requirements		Requirement of quality assurance programme	Measuring tolerance	External surveillance
Electrical conductivity [1]	[mg/L eluate]	≤ 2500	± 25	67
Nitrate (NO_3) [1]	[mg/L eluate]	≤ 50	± 2	1
Phosphate (PO_4) [1]	[mg/L eluate]	≤ 6,7	± 0.1	1.7
Sodium (Na) [1]	[mg/L eluate]	≤ 200	± 6	4.3
Chloride (Cl) [1]	[mg/L eluate]	≤ 250	± 25	2.8
Fluoride (F) [1]	[mg/L eluate]	≤ 1,5	± 0.2	0.22
Arsenic (As) [1]	[mg/L eluate]	≤ 0,01	± 0.005	< 0.010
Lead (Pb) [1]	[mg/L eluate]	≤ 0,01	± 0.005	< 0.010
Cadmium (Cd) [1]	[mg/L eluate]	≤ 0,005	± 0.002	< 0.001
Chrome (Cr) [1]	[mg/L eluate]	≤ 0,05	± 0.01	< 0.001
Nickel (Ni) [1]	[mg/L eluate]	≤ 0,02	± 0.01	0.002
Phenol index [2]	[mg/L eluate]	≤ 0,01	± 0.005	< 0.010
Hydrocarbons (HC) [2]	[mg/L eluate]	≤ 0,1	± 0.005	0.100

[1] Values according to the German Drinking Water Ordinance (Trinkwasserverordnung/TrinkWV), from extraction to DIN 38 414 Part 4 (DIN-S4).

[2] Values according to RAL-GZ 515 "Tennenbaustoffe für Sportanlagen" ("Building material for sports grounds")

Result 2/3

Tests under the RAL Quality Assurance Programme for Green Roof Substrates
(Means of the external surveillance 2011 – 2012)

Company name: **Vulkatec Riebensahm GmbH**

Production site: **Kretz**

Product: **Vulkaplus extensiv 0-12**

Product group: **Vegetation substrate for extensive greening (multi layer)**

Base material: **Lava, pumice, composted bark, green waste composts**

Heavy metal contents		Labelling threshold [3)]	Threshold [4)]	External surveillance
Arsenic (As)	[mg/kg DM]	20	40	5.8
Lead (Pb)	[mg/kg DM]	100	150	14
Cadmium (Cd)	[mg/kg DM]	1	1,5	0.01
Chrome (Cr)	[mg/kg DM]	300	-	23
Cobalt (Co)	[mg/kg DM]	40 (0.004%)	120	22
Copper (Cu)	[mg/kg DM]	500 (0.05%)	-	36
Nickel (Ni)	[mg/kg DM]	40	80	39
Mercury (Hg)	[mg/kg DM]	0.5	1,0	0.03
Thallium (Tl)	[mg/kg DM]	0.5	1,0	0.40
Zinc (Zn)	[mg/kg DM]	1000 (0.1 %)	-	81

3) Labelling threshold according to the German Fertilizer Ordinance (DüMV).
4) Threshold values according to the German Fertilizer Ordinance (DüMV).