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SWEDEN

Title : **Test report for order 11932513**
Test report number : **AR-19-FR-034505-01**

Project name : **Biochar according to EBC**

Number of samples : **3**
Sample type : **biochar**
Sample Taker: **Client**
Sampling Area: **Hammenhög**

Sample reception date : **2019-10-21**
Sample processing time : **2019-10-21 - 2019-12-06**

The test results refer solely to the analysed test specimen. Unless the sampling was done by our laboratory or in our sub-order the responsibility for the correctness of the sampling is disclaimed. This test report is only valid with signature and may only be further published completely and unchanged. Extracts or changes require the authorisation of the EUROFINS UMWELT in each individual case.

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Accredited test laboratory according to DIN EN ISO/IEC 17025:2005 notification under the DAkkS German Accreditation System for Testing. The laboratory is according (D-PL-14081-01-00) accredited.

Attachments

119131711-1
119131711-2
119131712-1
119131712-2
119131713-1
119131713-2
PNP_11932513_119131711+119131712+119131713
11932513_119131711+119131712+119131713_JenaBIOS_FA
11932513_119131711_TUBAF1_FA
11932513_119131712_TUBAF1_FA
11932513_119131713_TUBAF1_FA



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Prüfleitung

								Description		15012			15013		
								Sample number		119131711			119131712		
				Limit values											
Parameter	Lab	Accr.	Method	GW 1 ar	GW 1 db	GW 2 ar	GW 2 db	LOQ	Unit		ar	db		ar	db
Biochar properties															
Bulk density	FR	JE02	DIN 51705: 2001-06						kg/m³	-	327	-	-	362	-
water holding capacity (WHC)	SB99/o		DIN EN ISO 14238, A: 2014-03						% (w/w)	-	123.5	-	-	116.2	-
Moisture	FR	JE02	DIN 51718: 2002-06					0.1	% (w/w)	-	34.6	-	-	39.9	-
Ash content (550°C)	FR	JE02	DIN 51719: 1997-07					0.1	% (w/w)	-	14.5	22.2	-	13.3	22.2
Ash content (815°C)	FR	JE02	DIN 51719: 1997-07					0.1	% (w/w)	-	14.2	21.8	-	13.0	21.7
Volatile Compounds	FR	JE02	DIN 51720: 2001-03					0.2	% (w/w)	-	4.5	6.9	-	3.7	6.2
gross calorific value (Ho,V)	FR	JE02	DIN 51900-1: 2004-02					200	kJ/kg	-	17000	26000	-	15600	26000
net calorific value (Hu,p)	FR	JE02	DIN 51900-1: 2004-02					200	kJ/kg	-	16000	25700	-	14500	25700
Hydrogen	FR	JE02	DIN 51732: 2014-07					0.1	% (w/w)	-	0.8	1.2	-	0.8	1.3
Carbon	FR	JE02	DIN 51732: 2014-07		> 50		> 50	0.2	% (w/w)	-	46.1	70.5	-	42.4	70.5
Total nitrogen	FR	JE02	DIN 51732: 2014-07					0.05	% (w/w)	-	1.54	2.36	-	1.41	2.35
Oxygen	FR	JE02	DIN 51733: 2016-04						% (w/w)	-	2.6	4.0	-	2.5	4.1
Total inorganic carbon (TIC)	FR	JE02	DIN 51726: 2004-06					0.1	% (w/w)	-	0.3	0.4	-	0.1	0.2
carbonate-CO2	FR	JE02	DIN 51726: 2004-06					0.4	% (w/w)	-	1.0	1.6	-	< 0.4	0.6
carbon (organic)	FR	JE02	berechnet						% (w/w)	-	45.8	70.1	-	42.3	70.3
H/C ratio (molar)	FR	JE02	berechnet		< 0.6		< 0.6			-	0.21	0.21	-	0.21	0.21
H/Corg ratio (molar)	FR	JE02	berechnet		< 0.7		< 0.7			-	0.21	0.21	-	0.21	0.21
O/C ratio (molar)	FR	JE02	berechnet		< 0.4		< 0.4			-	0.042	0.043	-	0.044	0.044
Sulphur (S), total	FR	JE02	DIN 51724-3: 2012-07					0.03	% (w/w)	-	0.08	0.12	-	0.07	0.12
pH in CaCl2	FR		DIN ISO 10390: 2005-12	10		10				-	10.1	-	-	10.0	-
Conductivity	FR		BGK III. C2: 2006-09					5	µS/cm	-	1560	-	-	1290	-
salt content	FR		BGK III. C2: 2006-09					0.005	g/kg	-	8.24	12.6	-	6.86	11.4
salt content	FR		BGK III. C2: 2006-09					0.005	g/l	-	2.69	4.12	-	2.48	4.13
thermogravimetry TGA 950°C by N-Atm.	FR		TGA 701 D4C							-	see attachment	-	-	see attachment	-

								Description		15012			15013		
								Sample number		119131711			119131712		
Limit values															
Parameter	Lab	Accr.	Method	GW 1 ar	GW 1 db	GW 2 ar	GW 2 db	LOQ	Unit		ar	db		ar	db
Polychlorinated dibenzodioxins/-furans (17 PCDD/F) by GC-HRMS															
2,3,7,8-TetraCDD	GF/lo	A028	Internal					0.18	ng/kg dw	-	-	< 0.17	-	-	< 0.23
1,2,3,7,8-PentaCDD	GF/lo	A028	Internal					0.24	ng/kg dw	-	-	< 0.23	-	-	< 0.30
1,2,3,4,7,8-HexaCDD	GF/lo	A028	Internal					0.48	ng/kg dw	-	-	< 0.46	-	-	< 0.61
1,2,3,6,7,8-HexaCDD	GF/lo	A028	Internal					0.48	ng/kg dw	-	-	< 0.46	-	-	< 0.61
1,2,3,7,8,9-HexaCDD	GF/lo	A028	Internal					0.48	ng/kg dw	-	-	< 0.46	-	-	< 0.61
1,2,3,4,6,7,8-HeptaCDD	GF/lo	A028	Internal					0.54	ng/kg dw	-	-	< 0.52	-	-	< 0.68
OctaCDD	GF/lo	A028	Internal					2.2	ng/kg dw	-	-	< 2.1	-	-	< 2.8
2,3,7,8-TetraCDF	GF/lo	A028	Internal					0.32	ng/kg dw	-	-	< 0.31	-	-	< 0.41
1,2,3,7,8-PentaCDF	GF/lo	A028	Internal					0.44	ng/kg dw	-	-	< 0.42	-	-	< 0.58
2,3,4,7,8-PentaCDF	GF/lo	A028	Internal					0.44	ng/kg dw	-	-	< 0.42	-	-	< 0.58
1,2,3,4,7,8-HexaCDF	GF/lo	A028	Internal					0.40	ng/kg dw	-	-	< 0.38	-	-	< 0.51
1,2,3,6,7,8-HexaCDF	GF/lo	A028	Internal					0.40	ng/kg dw	-	-	< 0.38	-	-	< 0.51
1,2,3,7,8,9-HexaCDF	GF/lo	A028	Internal					0.40	ng/kg dw	-	-	< 0.38	-	-	< 0.51
2,3,4,6,7,8-HexaCDF	GF/lo	A028	Internal					0.40	ng/kg dw	-	-	< 0.38	-	-	< 0.51
1,2,3,4,6,7,8-HeptaCDF	GF/lo	A028	Internal					0.52	ng/kg dw	-	-	< 0.50	-	-	< 0.66
1,2,3,4,7,8,9-HeptaCDF	GF/lo	A028	Internal					0.38	ng/kg dw	-	-	< 0.36	-	-	< 0.48
OctaCDF	GF/lo	A028	Internal					3.2	ng/kg dw	-	-	< 3.1	-	-	< 4.1
WHO(2005)-PCDD/F TEQ (lower-bound)	GF/lo	A028	Internal		< 20		< 20		ng/kg dw	-	-	ND	-	-	ND
WHO(2005)-PCDD/F TEQ (upper-bound)	GF/lo	A028	Internal					0.92	ng/kg dw	-	-	< 0.92	-	-	1.2
I-TEQ (NATO/CCMS) (lower-bound)	GF/lo	A028	Internal		< 20		< 20		ng/kg dw	-	-	ND	-	-	ND
I-TEQ (NATO/CCMS) (upper-bound)	GF/lo	A028	Internal						ng/kg dw	-	-	0.856	-	-	1.14

								Description		15012			15013		
								Sample number		119131711			119131712		
				Limit values											
Parameter	Lab	Accr.	Method	GW 1 ar	GW 1 db	GW 2 ar	GW 2 db	LOQ	Unit		ar	db		ar	db
Polychlorinated biphenyl (12 WHO PCB) by GC-HRMS															
PCB 77	GF/ø	A026	Internal					3.6	ng/kg dw	-	-	< 3.4	-	-	8.5
PCB 81	GF/ø	A026	Internal					0.78	ng/kg dw	-	-	< 0.74	-	-	< 0.99
PCB 105	GF/ø	A026	Internal					7.8	ng/kg dw	-	-	23	-	-	43
PCB 118	GF/ø	A026	Internal					28	ng/kg dw	-	-	86	-	-	100
PCB 114	GF/ø	A026	Internal					0.94	ng/kg dw	-	-	1.1	-	-	< 1.2
PCB 123	GF/ø	A026	Internal					0.80	ng/kg dw	-	-	1.2	-	-	< 1.0
PCB 126	GF/ø	A026	Internal					1.0	ng/kg dw	-	-	< 0.97	-	-	< 1.3
PCB 156	GF/ø	A026	Internal					4.4	ng/kg dw	-	-	15	-	-	16
PCB 157	GF/ø	A026	Internal					0.90	ng/kg dw	-	-	2.1	-	-	2.7
PCB 167	GF/ø	A026	Internal					2.2	ng/kg dw	-	-	6.0	-	-	5.3
PCB 169	GF/ø	A026	Internal					2.4	ng/kg dw	-	-	< 2.3	-	-	< 3.0
PCB 189	GF/ø	A026	Internal					0.80	ng/kg dw	-	-	0.94	-	-	1.5
WHO(2005)-PCB TEQ (lower-bound)	GF/ø	A026	Internal						ng/kg dw	-	-	0.00405	-	-	0.00598
WHO(2005)-PCB TEQ (upper-bound)	GF/ø	A026	Internal					0.17	ng/kg dw	-	-	0.17	-	-	0.23
WHO(2005)-PCDD/F+PCB TEQ (lower-bound)	GF/ø	A026	Internal						ng/kg	-	-	0.00405	-	-	0.00598
WHO(2005)-PCDD/F+PCB TEQ (upper-bound)	GF/ø	A026	Internal						ng/kg	-	-	1.04	-	-	1.39

								Description		15012			15013		
								Sample number		119131711			119131712		
				Limit values											
Parameter	Lab	Accr.	Method	GW 1 ar	GW 1 db	GW 2 ar	GW 2 db	LOQ	Unit		ar	db		ar	db
Polychlorinated biphenyl (7 PCB) by GC-HRMS															
PCB 28	GF/0	A028	Internal					0.082	µg/kg dw	-	-	0.21	-	-	0.27
PCB 52	GF/0	A028	Internal					0.061	µg/kg dw	-	-	0.089	-	-	0.17
PCB 101	GF/0	A028	Internal					0.098	µg/kg dw	-	-	0.19	-	-	0.20
PCB 118	GF/0	A028	Internal					0.028	µg/kg dw	-	-	0.086	-	-	0.10
PCB 138	GF/0	A028	Internal					0.072	µg/kg dw	-	-	0.16	-	-	0.15
PCB 153	GF/0	A028	Internal					0.12	µg/kg dw	-	-	0.18	-	-	0.17
PCB 180	GF/0	A028	Internal					0.030	µg/kg dw	-	-	0.056	-	-	0.088
Total 6 ndl-PCB (lower-bound)	GF/0	A028	Internal		< 200		< 200		µg/kg dw	-	-	0.889	-	-	1.05
Total 6 ndl-PCB (upper-bound)	GF/0	A028	Internal						µg/kg dw	-	-	0.889	-	-	1.05
Total 7 Indicator PCB (lower-bound)	GF/0	A028	Internal		< 200		< 200		µg/kg dw	-	-	0.975	-	-	1.15
Total 7 Indicator PCB (upper-bound)	GF/0	A028	Internal					0.46	µg/kg dw	-	-	0.98	-	-	1.2
Elements from the micro wave pressure digestion acc. to DIN 22022-1: 2014-07															
Arsenic (As)	FR	JE02	DIN EN ISO 17294-2: 2005-02		< 13		< 13	0.8	mg/kg	-	-	< 0.8	-	-	< 0.8
Lead (Pb)	FR	JE02	DIN EN ISO 17294-2: 2005-02		< 150		< 120	2	mg/kg	-	-	< 2	-	-	< 2
Cadmium (Cd)	FR	JE02	DIN EN ISO 17294-2: 2005-02		< 1.5		< 1	0.2	mg/kg	-	-	< 0.2	-	-	< 0.2
Copper (Cu)	FR	JE02	DIN EN ISO 17294-2: 2005-02		< 100		< 100	1	mg/kg	-	-	22	-	-	22
Nickel (Ni)	FR	JE02	DIN EN ISO 17294-2: 2005-02		< 50		< 30	1	mg/kg	-	-	4	-	-	4
Mercury (Hg)	FR	JE02	DIN 22022-4: 2001-02		< 1		< 1	0.07	mg/kg	-	-	< 0.07	-	-	< 0.07
Zinc (Zn)	FR	JE02	DIN EN ISO 17294-2: 2005-02		< 400		< 400	1	mg/kg	-	-	152	-	-	148
Chromium (Cr)	FR	JE02	DIN EN ISO 17294-2: 2005-02		< 90		< 80	1	mg/kg	-	-	6	-	-	5
Boron (B)	FR	JE02	DIN EN ISO 17294-2: 2005-02					1	mg/kg	-	-	15	-	-	15
Manganese (Mn)	FR	JE02	DIN EN ISO 17294-2: 2005-02					1	mg/kg	-	-	252	-	-	245

				Limit values				Description		15012			15013			
Parameter		Lab	Accr.	Method	GW 1 ar	GW 1 db	GW 2 ar	GW 2 db	Sample number		119131711			119131712		
									LOQ	Unit		ar	db		ar	db
Elements fr. the borate digestion of ash 550 °C acc. to DIN 51729-11: 1998-11																
Phosphorus as P2O5	FR	JE02	DIN EN ISO 11885 (E22): 2009-09						0.1	% (w/w)	-	-	11.1	-	-	10.9
Magnesium as MgO	FR	JE02	DIN EN ISO 11885 (E22): 2009-09						0.1	% (w/w)	-	-	3.6	-	-	3.5
Calcium as Calciumoxid	FR	JE02	DIN EN ISO 11885 (E22): 2009-09						0.1	% (w/w)	-	-	6.4	-	-	6.2
Potassium as K2O	FR	JE02	DIN EN ISO 11885 (E22): 2009-09						0.1	% (w/w)	-	-	14.1	-	-	13.8
Sodium as Na2O	FR	JE02	DIN EN ISO 11885 (E22): 2009-09						0.1	% (w/w)	-	-	0.9	-	-	1.0
Iron as Fe2O3	FR	JE02	DIN EN ISO 11885 (E22): 2009-09						0.1	% (w/w)	-	-	0.8	-	-	0.8
Silicon as SiO2	FR	JE02	DIN EN ISO 11885 (E22): 2009-09						0.1	% (w/w)	-	-	53.1	-	-	54.6
sulphur as SO3	FR	JE02	DIN EN ISO 11885 (E22): 2009-09						0.1	% (w/w)	-	-	4.5	-	-	4.8
Elements fr. the borate digestion of ash 550°C acc. to DIN 51729-11:1998-11 (OS)																
Calcium (Ca)	FR	JE02	DIN EN ISO 11885 (E22): 2009-09							% (w/w)	-	-	1.0	-	-	1.0
Iron (Fe)	FR	JE02	DIN EN ISO 11885 (E22): 2009-09							% (w/w)	-	-	0.1	-	-	0.1
Potassium (K)	FR	JE02	DIN EN ISO 11885 (E22): 2009-09							% (w/w)	-	-	2.6	-	-	2.5
Magnesium (Mg)	FR	JE02	DIN EN ISO 11885 (E22): 2009-09							% (w/w)	-	-	0.5	-	-	0.5
Sodium (Na)	FR	JE02	DIN EN ISO 11885 (E22): 2009-09							% (w/w)	-	-	0.1	-	-	0.2
Phosphorus	FR	JE02	DIN EN ISO 11885 (E22): 2009-09							% (w/w)	-	-	1.1	-	-	1.1
Sulphur (S)	FR	JE02	DIN EN ISO 11885 (E22): 2009-09							% (w/w)	-	-	0.4	-	-	0.4
Silicon (Si)	FR	JE02	DIN EN ISO 11885 (E22): 2009-09							% (w/w)	-	-	5.5	-	-	5.7

								Description		15012				15013		
								Sample number		119131711				119131712		
Parameter	Lab	Accr.	Method	GW 1 ar	GW 1 db	GW 2 ar	GW 2 db	LOQ	Unit		ar	db		ar	db	
Elements from toluene extraction																
Naphthalene	FR	JE02	DIN EN 16181:2019-08					0.1	mg/kg	-	-	0.6	-	-	0.6	
Acenaphthylene	FR	JE02	DIN EN 16181:2019-08					0.1	mg/kg	-	-	< 0.1	-	-	< 0.1	
Acenaphthene	FR	JE02	DIN EN 16181:2019-08					0.1	mg/kg	-	-	0.1	-	-	< 0.1	
Fluorene	FR	JE02	DIN EN 16181:2019-08					0.1	mg/kg	-	-	< 0.1	-	-	< 0.1	
Phenanthrene	FR	JE02	DIN EN 16181:2019-08					0.1	mg/kg	-	-	0.3	-	-	0.3	
Anthracene	FR	JE02	DIN EN 16181:2019-08					0.1	mg/kg	-	-	< 0.1	-	-	< 0.1	
Fluoranthene	FR	JE02	DIN EN 16181:2019-08					0.1	mg/kg	-	-	0.3	-	-	0.2	
Pyrene	FR	JE02	DIN EN 16181:2019-08					0.1	mg/kg	-	-	0.2	-	-	0.2	
Benz(a)anthracene	FR	JE02	DIN EN 16181:2019-08					0.1	mg/kg	-	-	< 0.1	-	-	< 0.1	
Chrysene	FR	JE02	DIN EN 16181:2019-08					0.1	mg/kg	-	-	< 0.1	-	-	< 0.1	
Benzo(b)fluoranthene	FR	JE02	DIN EN 16181:2019-08					0.1	mg/kg	-	-	< 0.1	-	-	< 0.1	
Benzo(k)fluoranthene	FR	JE02	DIN EN 16181:2019-08					0.1	mg/kg	-	-	< 0.1	-	-	< 0.1	
Benzo(a)pyrene	FR	JE02	DIN EN 16181:2019-08					0.1	mg/kg	-	-	< 0.1	-	-	< 0.1	
Indeno(1,2,3-cd)pyrene	FR	JE02	DIN EN 16181:2019-08					0.1	mg/kg	-	-	< 0.1	-	-	< 0.1	
Dibenz(a,h)anthracene	FR	JE02	DIN EN 16181:2019-08					0.1	mg/kg	-	-	< 0.1	-	-	< 0.1	
Benzo(g,h,i)perylene	FR	JE02	DIN EN 16181:2019-08					0.1	mg/kg	-	-	< 0.1	-	-	< 0.1	
Total 16 EPA-PAH excl. LOQ	FR	JE02	DIN EN 16181:2019-08		< 12		< 4		mg/kg	-	-	1.5	-	-	1.3	
Other parameters																
Cation exchange capacity	SCT9/o		see attachment							see attachment	-	-	see attachment	-	-	
Specific Surface (BET), full-isotherm	SUIB/o		DIN 86137/DIN ISO 9277						m2/g	118 +/- 11 *	-	-	127 +/- 19 *	-	-	
True Density	SUIB/o		DIN 86137/DIN ISO 9277						g/cm3	1.7	-	-	1.7	-	-	

Parameter	Lab	Accr.	Method	Limit values				Description		15014		
				GW 1 ar	GW 1 db	GW 2 ar	GW 2 db	Sample number		119131713		
								LOQ	Unit		ar	db
Biochar properties												
Bulk density	FR	JE02	DIN 51705: 2001-06						kg/m³	-	390	-
water holding capacity (WHC)	SB99/o		DIN EN ISO 14238, A: 2014-03						% (w/w)	-	135.7	-
Moisture	FR	JE02	DIN 51718: 2002-06					0.1	% (w/w)	-	45.2	-
Ash content (550°C)	FR	JE02	DIN 51719: 1997-07					0.1	% (w/w)	-	11.9	21.7
Ash content (815°C)	FR	JE02	DIN 51719: 1997-07					0.1	% (w/w)	-	11.6	21.2
Volatile Compounds	FR	JE02	DIN 51729: 2001-03					0.2	% (w/w)	-	4.7	8.6
gross calorific value (Ho,V)	FR	JE02	DIN 51900-1: 2004-02					200	kJ/kg	-	14200	26000
net calorific value (Hu,p)	FR	JE02	DIN 51900-1: 2004-02					200	kJ/kg	-	12900	25600
Hydrogen	FR	JE02	DIN 51732: 2014-07					0.1	% (w/w)	-	1.0	1.8
Carbon	FR	JE02	DIN 51732: 2014-07		> 50		> 50	0.2	% (w/w)	-	38.2	69.7
Total nitrogen	FR	JE02	DIN 51732: 2014-07					0.05	% (w/w)	-	1.45	2.65
Oxygen	FR	JE02	DIN 51733: 2016-04						% (w/w)	-	2.5	4.5
Total inorganic carbon (TIC)	FR	JE02	DIN 51726: 2004-06					0.1	% (w/w)	-	0.1	0.2
carbonate-CO2	FR	JE02	DIN 51726: 2004-06					0.4	% (w/w)	-	0.4	0.8
carbon (organic)	FR	JE02	berechnet						% (w/w)	-	38.1	69.5
H/C ratio (molar)	FR	JE02	berechnet		< 0.6		< 0.6			-	0.32	0.31
H/Corg ratio (molar)	FR	JE02	berechnet		< 0.7		< 0.7			-	0.32	0.32
O/C ratio (molar)	FR	JE02	berechnet		< 0.4		< 0.4			-	0.049	0.048
Sulphur (S), total	FR	JE02	DIN 51724-3: 2012-07					0.03	% (w/w)	-	0.06	0.11
pH in CaCl2	FR		DIN ISO 10390: 2005-12	10		10				-	10.1	-
Conductivity	FR		BGK III, C2: 2006-09					5	µS/cm	-	1200	-
salt content	FR		BGK III, C2: 2006-09					0.005	g/kg	-	6.61	12.1
salt content	FR		BGK III, C2: 2006-09					0.005	g/l	-	2.58	4.70
thermogravimetry TGA 950°C by N-Atm.	FR		TGA 701 D4C							-	see attachment	-

								Description		15014		
								Sample number		119131713		
				Limit values								
Parameter	Lab	Accr.	Method	GW 1 ar	GW 1 db	GW 2 ar	GW 2 db	LOQ	Unit		ar	db
Polychlorinated dibenzodioxins/-furans (17 PCDD/F) by GC-HRMS												
2,3,7,8-TetraCDD	GF/lo	A026	Internal					0.18	ng/kg dw	-	-	< 0.22
1,2,3,7,8-PentaCDD	GF/lo	A026	Internal					0.24	ng/kg dw	-	-	< 0.29
1,2,3,4,7,8-HexaCDD	GF/lo	A026	Internal					0.48	ng/kg dw	-	-	< 0.59
1,2,3,6,7,8-HexaCDD	GF/lo	A026	Internal					0.48	ng/kg dw	-	-	< 0.59
1,2,3,7,8,9-HexaCDD	GF/lo	A026	Internal					0.48	ng/kg dw	-	-	< 0.59
1,2,3,4,6,7,8-HeptaCDD	GF/lo	A026	Internal					0.54	ng/kg dw	-	-	< 0.66
OctaCDD	GF/lo	A026	Internal					2.2	ng/kg dw	-	-	< 2.7
2,3,7,8-TetraCDF	GF/lo	A026	Internal					0.32	ng/kg dw	-	-	< 0.39
1,2,3,7,8-PentaCDF	GF/lo	A026	Internal					0.44	ng/kg dw	-	-	< 0.54
2,3,4,7,8-PentaCDF	GF/lo	A026	Internal					0.44	ng/kg dw	-	-	< 0.54
1,2,3,4,7,8-HexaCDF	GF/lo	A026	Internal					0.40	ng/kg dw	-	-	< 0.49
1,2,3,6,7,8-HexaCDF	GF/lo	A026	Internal					0.40	ng/kg dw	-	-	< 0.49
1,2,3,7,8,9-HexaCDF	GF/lo	A026	Internal					0.40	ng/kg dw	-	-	< 0.49
2,3,4,6,7,8-HexaCDF	GF/lo	A026	Internal					0.40	ng/kg dw	-	-	< 0.49
1,2,3,4,6,7,8-HeptaCDF	GF/lo	A026	Internal					0.52	ng/kg dw	-	-	< 0.64
1,2,3,4,7,8,9-HeptaCDF	GF/lo	A026	Internal					0.38	ng/kg dw	-	-	< 0.47
OctaCDF	GF/lo	A026	Internal					3.2	ng/kg dw	-	-	< 3.9
WHO(2005)-PCDD/F TEQ (lower-bound)	GF/lo	A026	Internal		< 20		< 20		ng/kg dw	-	-	ND
WHO(2005)-PCDD/F TEQ (upper-bound)	GF/lo	A026	Internal					0.92	ng/kg dw	-	-	1.1
I-TEQ (NATO/CCMS) (lower-bound)	GF/lo	A026	Internal		< 20		< 20		ng/kg dw	-	-	ND
I-TEQ (NATO/CCMS) (upper-bound)	GF/lo	A026	Internal						ng/kg dw	-	-	1.10

								Description		15014		
				Limit values				Sample number		119131713		
Parameter	Lab	Accr.	Method	GW 1 ar	GW 1 db	GW 2 ar	GW 2 db	LOQ	Unit		ar	db
Polychlorinated biphenyl (12 WHO PCB) by GC-HRMS												
PCB 77	GF/o	A026	Internal					3.6	ng/kg dw	-	-	62
PCB 81	GF/o	A026	Internal					0.78	ng/kg dw	-	-	2.5
PCB 105	GF/o	A026	Internal					7.8	ng/kg dw	-	-	65
PCB 118	GF/o	A026	Internal					28	ng/kg dw	-	-	180
PCB 114	GF/o	A026	Internal					0.94	ng/kg dw	-	-	7.2
PCB 123	GF/o	A026	Internal					0.80	ng/kg dw	-	-	2.1
PCB 126	GF/o	A026	Internal					1.0	ng/kg dw	-	-	< 1.3
PCB 156	GF/o	A026	Internal					4.4	ng/kg dw	-	-	12
PCB 157	GF/o	A026	Internal					0.90	ng/kg dw	-	-	2.7
PCB 167	GF/o	A026	Internal					2.2	ng/kg dw	-	-	4.7
PCB 169	GF/o	A026	Internal					2.4	ng/kg dw	-	-	< 2.9
PCB 189	GF/o	A026	Internal					0.80	ng/kg dw	-	-	< 0.98
WHO(2005)-PCB TEQ (lower-bound)	GF/o	A026	Internal						ng/kg dw	-	-	0.0152
WHO(2005)-PCB TEQ (upper-bound)	GF/o	A026	Internal					0.17	ng/kg dw	-	-	0.23
WHO(2005)-PCDD/F+PCB TEQ (lower-bound)	GF/o	A026	Internal						ng/kg	-	-	0.0152
WHO(2005)-PCDD/F+PCB TEQ (upper-bound)	GF/o	A026	Internal						ng/kg	-	-	1.35

								Description		15014		
								Sample number		119131713		
Parameter		Lab	Accr. Method	GW 1 ar	GW 1 db	GW 2 ar	GW 2 db	LOQ	Unit			
Polychlorinated biphenyl (7 PCB) by GC-HRMS												
PCB 28	GF/0	A028	Internal					0.082	µg/kg dw	-	-	9.5
PCB 52	GF/0	A028	Internal					0.061	µg/kg dw	-	-	2.9
PCB 101	GF/0	A028	Internal					0.098	µg/kg dw	-	-	0.41
PCB 118	GF/0	A028	Internal					0.028	µg/kg dw	-	-	0.18
PCB 138	GF/0	A028	Internal					0.072	µg/kg dw	-	-	0.16
PCB 153	GF/0	A028	Internal					0.12	µg/kg dw	-	-	0.19
PCB 180	GF/0	A028	Internal					0.030	µg/kg dw	-	-	0.054
Total 6 ndl-PCB (lower-bound)	GF/0	A028	Internal		< 200		< 200		µg/kg dw	-	-	13.2
Total 6 ndl-PCB (upper-bound)	GF/0	A028	Internal						µg/kg dw	-	-	13.2
Total 7 Indicator PCB (lower-bound)	GF/0	A028	Internal		< 200		< 200		µg/kg dw	-	-	13.3
Total 7 Indicator PCB (upper-bound)	GF/0	A028	Internal					0.46	µg/kg dw	-	-	13
Elements from the micro wave pressure digestion acc. to DIN 22022-1: 2014-07												
Arsenic (As)	FR	JE02	DIN EN ISO 17294-2: 2005-02		< 13		< 13	0.8	mg/kg	-	-	< 0.8
Lead (Pb)	FR	JE02	DIN EN ISO 17294-2: 2005-02		< 150		< 120	2	mg/kg	-	-	7
Cadmium (Cd)	FR	JE02	DIN EN ISO 17294-2: 2005-02		< 1.5		< 1	0.2	mg/kg	-	-	< 0.2
Copper (Cu)	FR	JE02	DIN EN ISO 17294-2: 2005-02		< 100		< 100	1	mg/kg	-	-	23
Nickel (Ni)	FR	JE02	DIN EN ISO 17294-2: 2005-02		< 50		< 30	1	mg/kg	-	-	4
Mercury (Hg)	FR	JE02	DIN 22022-4: 2001-02		< 1		< 1	0.07	mg/kg	-	-	< 0.07
Zinc (Zn)	FR	JE02	DIN EN ISO 17294-2: 2005-02		< 400		< 400	1	mg/kg	-	-	162
Chromium (Cr)	FR	JE02	DIN EN ISO 17294-2: 2005-02		< 90		< 80	1	mg/kg	-	-	5
Boron (B)	FR	JE02	DIN EN ISO 17294-2: 2005-02					1	mg/kg	-	-	15
Manganese (Mn)	FR	JE02	DIN EN ISO 17294-2: 2005-02					1	mg/kg	-	-	235

				Limit values				Description		15014	
								Sample number		119131713	
Parameter	Lab	Accr.	Method	GW 1 ar	GW 1 db	GW 2 ar	GW 2 db	LOQ	Unit	ar	db
Elements fr. the borate digestion of ash 550 °C acc. to DIN 51729-11: 1998-11											
Phosphorus as P2O5	FR	JE02	DIN EN ISO 11885 (E22): 2009-09					0,1	% (w/w)	-	11,0
Magnesium as MgO	FR	JE02	DIN EN ISO 11885 (E22): 2009-09					0,1	% (w/w)	-	3,6
Calcium as Calciumoxid	FR	JE02	DIN EN ISO 11885 (E22): 2009-09					0,1	% (w/w)	-	6,5
Potassium as K2O	FR	JE02	DIN EN ISO 11885 (E22): 2009-09					0,1	% (w/w)	-	13,9
Sodium as Na2O	FR	JE02	DIN EN ISO 11885 (E22): 2009-09					0,1	% (w/w)	-	1,0
Iron as Fe2O3	FR	JE02	DIN EN ISO 11885 (E22): 2009-09					0,1	% (w/w)	-	0,8
Silicon as SiO2	FR	JE02	DIN EN ISO 11885 (E22): 2009-09					0,1	% (w/w)	-	55,0
sulphur as SO3	FR	JE02	DIN EN ISO 11885 (E22): 2009-09					0,1	% (w/w)	-	3,3
Elements fr. the borate digestion of ash 550°C acc. to DIN 51729-11:1998-11 (OS)											
Calcium (Ca)	FR	JE02	DIN EN ISO 11885 (E22): 2009-09						% (w/w)	-	1,0
Iron (Fe)	FR	JE02	DIN EN ISO 11885 (E22): 2009-09						% (w/w)	-	0,1
Potassium (K)	FR	JE02	DIN EN ISO 11885 (E22): 2009-09						% (w/w)	-	2,5
Magnesium (Mg)	FR	JE02	DIN EN ISO 11885 (E22): 2009-09						% (w/w)	-	0,5
Sodium (Na)	FR	JE02	DIN EN ISO 11885 (E22): 2009-09						% (w/w)	-	0,2
Phosphorus	FR	JE02	DIN EN ISO 11885 (E22): 2009-09						% (w/w)	-	1,0
Sulphur (S)	FR	JE02	DIN EN ISO 11885 (E22): 2009-09						% (w/w)	-	0,3
Silicon (Si)	FR	JE02	DIN EN ISO 11885 (E22): 2009-09						% (w/w)	-	5,6

								Description		15014		
								Sample number		119131713		
				Limit values								
Parameter	Lab	Accr.	Method	GW 1 ar	GW 1 db	GW 2 ar	GW 2 db	LOQ	Unit		ar	db
Elements from toluene extraction												
Naphthalene	FR	JE02	DIN EN 16181:2019-08					0.1	mg/kg	-	-	1.4
Acenaphthylene	FR	JE02	DIN EN 16181:2019-08					0.1	mg/kg	-	-	< 0.1
Acenaphthene	FR	JE02	DIN EN 16181:2019-08					0.1	mg/kg	-	-	< 0.1
Fluorene	FR	JE02	DIN EN 16181:2019-08					0.1	mg/kg	-	-	0.1
Phenanthrene	FR	JE02	DIN EN 16181:2019-08					0.1	mg/kg	-	-	0.7
Anthracene	FR	JE02	DIN EN 16181:2019-08					0.1	mg/kg	-	-	0.1
Fluoranthene	FR	JE02	DIN EN 16181:2019-08					0.1	mg/kg	-	-	0.4
Pyrene	FR	JE02	DIN EN 16181:2019-08					0.1	mg/kg	-	-	0.3
Benz(a)anthracene	FR	JE02	DIN EN 16181:2019-08					0.1	mg/kg	-	-	0.2
Chrysene	FR	JE02	DIN EN 16181:2019-08					0.1	mg/kg	-	-	0.1
Benzo(b)fluoranthene	FR	JE02	DIN EN 16181:2019-08					0.1	mg/kg	-	-	< 0.1
Benzo(k)fluoranthene	FR	JE02	DIN EN 16181:2019-08					0.1	mg/kg	-	-	< 0.1
Benzo(a)pyrene	FR	JE02	DIN EN 16181:2019-08					0.1	mg/kg	-	-	< 0.1
Indeno(1,2,3-cd)pyrene	FR	JE02	DIN EN 16181:2019-08					0.1	mg/kg	-	-	< 0.1
Dibenz(a,h)anthracene	FR	JE02	DIN EN 16181:2019-08					0.1	mg/kg	-	-	< 0.1
Benzo(g,h,i)perylene	FR	JE02	DIN EN 16181:2019-08					0.1	mg/kg	-	-	< 0.1
Total 16 EPA-PAH excl. LOQ	FR	JE02	DIN EN 16181:2019-08		< 12		< 4		mg/kg	-	-	3.3
Other parameters												
Cation exchange capacity	SC79/o		see attachment							see attachment	-	-
Specific Surface (BET), full-isotherm	SUIB/o		DIN 66137/DIN ISO 9277						m2/g	117 +/- 2 *	-	-
True Density	SUIB/o		DIN 66137/DIN ISO 9277						g/cm3	1.6	-	-

Explanations

LOQ - Limit of quantification

ar - as received

db - dry basis

Lab - Abbreviation of the performing laboratory

Accr. - Abbreviation of the accreditation of the performing laboratory

ND - not determined since all parameters are below LOQ

* Comment on parameter 'Specific Surface (BET)': The measurement was performed with the full-isothermic procedure. Negative C-value, BET corrected.

The C-value is a qualitative measure for the pore volume distribution. A negative C-value is an indication for a high portion of micropores. In these cases, the BET-value can be corrected due to the full-isothermic procedure.

The parameters identified by FR have been performed by the laboratory Eurofins Umwelt Ost GmbH (Bobritzsch-Hilbersdorf). The accreditation code JE02 identifies the parameters accredited according to DIN EN ISO/IEC 17025:2005 D-PL-14081-01-00 .

The parameters identified by GF have been performed by the laboratory Eurofins GfA Lab Service GmbH (Hamburg). The accreditation code A026 identifies the parameters accredited according to DIN EN ISO/IEC 17025:2005 D-PL-14629-01-00 .

The parameters identified by SB99 have been performed by the laboratory GEOS Freiberg (Freiberg).

The parameters identified by SCT9 have been performed by the laboratory Jena Bios GmbH (Jena).

The parameters identified by SUIB have been performed by the laboratory TU Bergakademie Freiberg (IEC) (Freiberg).

/o - The analysis has been outsourced.

Explanations regarding Limits

Analysis performed according to guidelines for sustainable production of biochar of the european biochar certificate.

GW 1: basic quality grade (referred to dry basis)

GW 2: premium quality grade (referred to dry basis)

Ho,V / Hu,p: complies calorific value at constant volume or pressure

EUROFINS UMWELT assumes no responsibility for the legal liability of the cited limits.