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Aschaffenburg, 25 May 2018

From: Zu-mue
Authorized by: Dr. Zang

REPORT

Order No.: 3601/31 **Page 1 of 4 pages**

Client: Cartiera del Chiese S.p.A.
Via Tito Speri, 61
25018 Montichiari (Brescia)
Italy

Date of order: 22 November 2017

Receipt of sample material: 18 December 2017

Origin of sample material: From the client

Purpose: Analysis according to EN 13432:2000



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Department

The present report refers exclusively to the samples as laid out therein. Information and statistical data on the results can be obtained on request.

Sample Material

For analysis the following sample was in hand:

Sample 1: **KAL WS - ECOKRAFT 120 g/m²**

Carrying out of the Tests

Examination period: 19 December 2017 to 24 May 2018

The examination was conducted according to EN 13432:2000-12 (*'Packaging - Requirements for packaging recoverable through composting and biodegradation – Test scheme and evaluation criteria for the final acceptance of packaging'*).

1. Chemical Characterization

Tab. 1: Quantitative characterization of the sample material

parameter	sample 1	limit (EN 13432)
dry content [% FW] (DIN EN ISO 638:2009-01*)	93.7	-
residue on ignition [% DW] (DIN 38409-H1:1987-01*)	8.2	50
grammage [g/m ²] (DIN EN 536*)	119.7	-
fluorine ¹ [mg/kg DW] (DIN ISO 10304-1:2009-07*)	< 50	100
copper ² [mg/kg DW] (DIN EN ISO 11885:2009-09*)	13	50
cadmium ² [mg/kg DW] (DIN EN ISO 11885:2009-09*)	< 0.2	0.5
lead ² [mg/kg DW] (DIN EN ISO 11885:2009-09*)	< 5	50
molybdenum ² [mg/kg DW] (DIN EN ISO 11885:2009-09*)	< 0.5	1
selenium ² [mg/kg DW] (DIN EN ISO 11885:2009-09*)	< 0.5	0.75
arsenic ² [mg/kg DW] (DIN EN ISO 11885:2009-09*)	< 2	5
mercury ² [mg/kg DW] (DIN EN 1483:1997-08*)	< 0.25	0.5
zinc ² [mg/kg DW] (DIN EN ISO 11885:2009-09*)	20	150
nickel ² [mg/kg DW] (DIN EN ISO 11885:2009-09*)	2.7	25
chromium ² [mg/kg DW] (DIN EN ISO 11885:2009-09*)	6.4	50

¹after oxidative digestion

²after microwave digestion

2. Disintegration test

The disintegration test was carried out in an indoor test composting site (pilot-scale test). The sample material was added to artificial biowaste of a defined composition according to ISO 16929:2013-04 and filled into an insulated composting bin. The composting process was surveyed by measurement of temperature (fig. 1), oxygen content, humidity and pH. Disintegration was quantified after 12 weeks by sieving (tab. 2).

After 12 weeks of composting, the maximum admissible retain on a sieve with a mesh size of 2 mm is 10% DW (EN 13432:200-12).

Tab. 2: Results of the disintegration test (DW: dry weight)

composting time [weeks]	retain on screen mesh > 2 mm [% DW]
0	100
2	100 ¹
4	63 ¹
6	57 ¹
8	0 ¹
10	0 ¹
12	0

¹ Data from intermediate evaluation

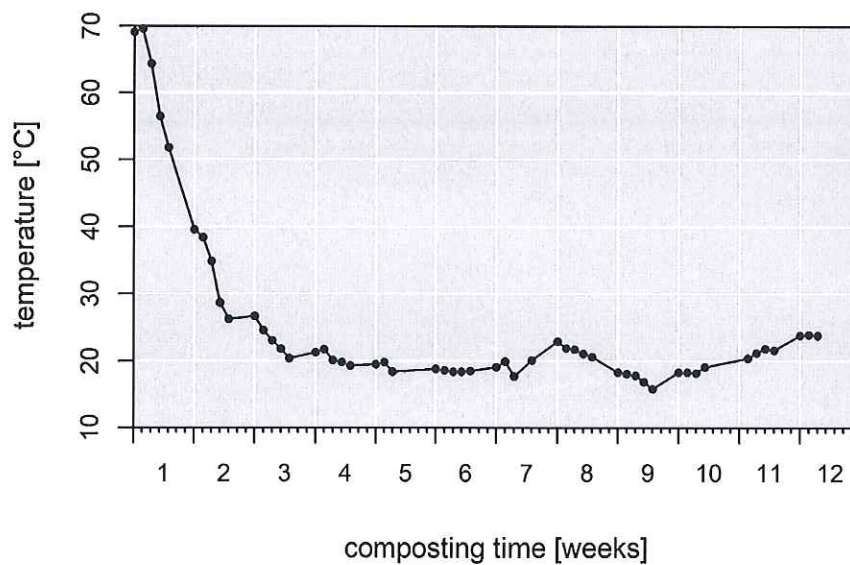


Fig. 1: Time course of temperature inside the composting material during the test period

Tab. 3: Characterization of test compost and blank compost at the end of the test

parameter	test compost	blank compost
humidity [% FW] (DIN 38409-H1:1987-01*)	66	69
pH (ISO 10390)	9.29	9.06
ammonium-N [g/kg DW] (DIN 38406-E5:1983-10*)	0.86	0.73
total N [g/kg DW] (DIN EN 25663:1993-11*)	26	24
phosphorus [g/kg DW] (DIN EN ISO 11885:2009-09*)	2.0	2.2
magnesium [g/kg DW] (DIN EN ISO 11885:2009-09*)	0.30	0.42
calcium [g/kg DW] (DIN EN ISO 11885:2009-09*)	1.2	1.6

Evaluation

With regard to chemical characteristics and disintegration behavior, the tested sample fulfills the criteria for compostability according to EN 13432:2000-12.

The accreditation applies to the methods marked with * in the test report (Register no. D-PL-14160-01-01 and D-PL-14160-01-02).

End of report