

Test Report

No. 5678179-01

Date: 25/MAR/2021

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Umicore Galvanotechnik GmbH
Mr. Harald Ziller
Klarenbergstraße 53-79
73525 Schwäbisch Gmünd
GERMANY



The following samples were submitted and identified by/on behalf of the client as

SGS Job file : 5678179
Order date : 16/FEB/2021
Order number : 4500020410
Sample receiving Date : 23/FEB/2021
Sampling : by Client or by a third party acting at the Client's direction
condition of the samples : appropriate for testing
Testing period : 23/FEB/2021 – 25/MAR/2021
Analytical scope : According to client's requirements

Sample No	Sample designation	Sample material
210184641	PALLUNA ® Palladium Solution 460	Process solution for plating

Test requested : In accordance with the RoHS Directive 2011/65/EU and subsequent amendments

Test Method(s) : (1) Determination of Cadmium by ICP-OES, acc. IEC 62321-5:2013-06
(2) Determination of Lead by ICP-OES, acc. IEC 62321-5:2013-06
(3) Determination of Mercury by CV-AAS, acc. IEC 62321-4:2013-06
(4) Determination of Chromium by ICP-OES, acc. IEC 62321-5:2013-06
(5) Determination of Chromium (VI) acc. IEC 62321:
A) (metal samples) Determination after extraction with hot water and derivatisation with 1,5-diphenyl-carbazide based on IEC 62321-7-1:2015-09 (metal samples), ion chromatography
B) (non-metallic samples) Testing acc. IEC 62321-7-2:2017-03,
deviation: measurement via ion chromatography acc. DIN EN ISO 10304-1:2009-07
Remark: Due to its highly reactive nature the concentration of Cr(VI) in a corrosion-protection changes drastically with time and storage conditions. The results obtained by IEC 62321-7-1:2015 can therefore only give an indication of the presence/absence of Cr(VI) within the limitations of the method at the time of testing.
(6) Determination of PBB/PBDE by GC/MS, acc. IEC 62321-6:2015-06
Remark: Please note that acc. to IEC the testing of metals for PBB/PBDE is gratuitous
(7) Determination of Phthalates by GC/MS acc. IEC 62321-8:2017-03
GC-MS after extraction with THF (Tetrahydrofurane)
Method not under accreditation

Test Result(s) : Please refer to next page(s)

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Conclusion

: Based on the performed tests on submitted sample(s), the test results of Lead, Mercury, Cadmium, hexavalent Chromium, Polybrominated Biphenyls (PBB) and Polybrominated Diphenyl Ethers (PBDE) **comply with** the limits as set by RoHS Directive 2011/65/EU, Annex 2 and subsequent amendments

Based on the performed tests on submitted sample(s), the test results of Bis(2-ethylhexyl) phthalate (DEHP), Butyl benzyl phthalate (BBP), Dibutyl phthalate (DBP), and Diisobutyl phthalate (DIBP) **comply with** the limits as set by Directive (EU) 2015/863 amending Annex II to Directive 2011/65/EU.

Signed for and on behalf of

SGS INSTITUT FRESENIUS GmbH

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Test results by chemical method (Unit: mg/kg)

Sample No.		210184641		
Test Item(s):	Method (refer to)		RL	RoHS Limit
Cadmium(Cd)	(1)	n.d.	1	100
Lead (Pb)	(2)	n.d.	10	1000
Mercury (Hg)	(3)	n.d.	0,5	1000
Chromium, hexavalent (Cr(VI))	(5 B)	n.d.	1	1000
Sum of PBDEs	(6)	-	-	1000 (Sum of polybrominated diphenylethers)
Monobromodiphenyl ether		n.d.	50	
Dibromodiphenyl ether		n.d.	50	
Tribromodiphenyl ether		n.d.	50	
Tetrabromodiphenyl ether		n.d.	50	
Pentabromodiphenyl ether		n.d.	50	
Hexabromodiphenyl ether		n.d.	50	
Heptabromodiphenyl ether		n.d.	50	
Octabromodiphenyl ether		n.d.	50	
Nonabromodiphenyl ether		n.d.	50	
Decabromodiphenyl ether		n.d.	50	
Sum of PBBs		-	-	1000 (Sum of polybrominated biphenyls)
Monobromobiphenyl		n.d.	50	
Dibromobiphenyl		n.d.	50	
Tribromobiphenyl		n.d.	50	
Tetrabromobiphenyl		n.d.	50	
Hexabromobiphenyl		n.d.	50	
Pentabromobiphenyl		n.d.	50	
Heptabromobiphenyl		n.d.	50	
Octabromobiphenyl		n.d.	50	
Nonabromobiphenyl		n.d.	50	
Decabromobiphenyl		n.d.	50	
Phthalates	(7)			
Bis(2-ethylhexyl) phthalate (DEHP) (117-81-7)		n.d.	100	1000*
Butyl benzyl phthalate (BBP) (85-68-7)		n.d.	100	1000*
Dibutyl phthalate (DBP) (84-74-2)		n.d.	100	1000*
Diisobutyl phthalate (DIBP) (84-69-5)		n.d.	100	1000*

Note: mg/kg = ppm

n.d.= not detected

RL = Report Limit

n.a.= not analyzed

**= elevated reporting limit due to matrix interferences

* = limit acc. dir 2015/863 (EU), valid from 22/JUL/2019

Test Report

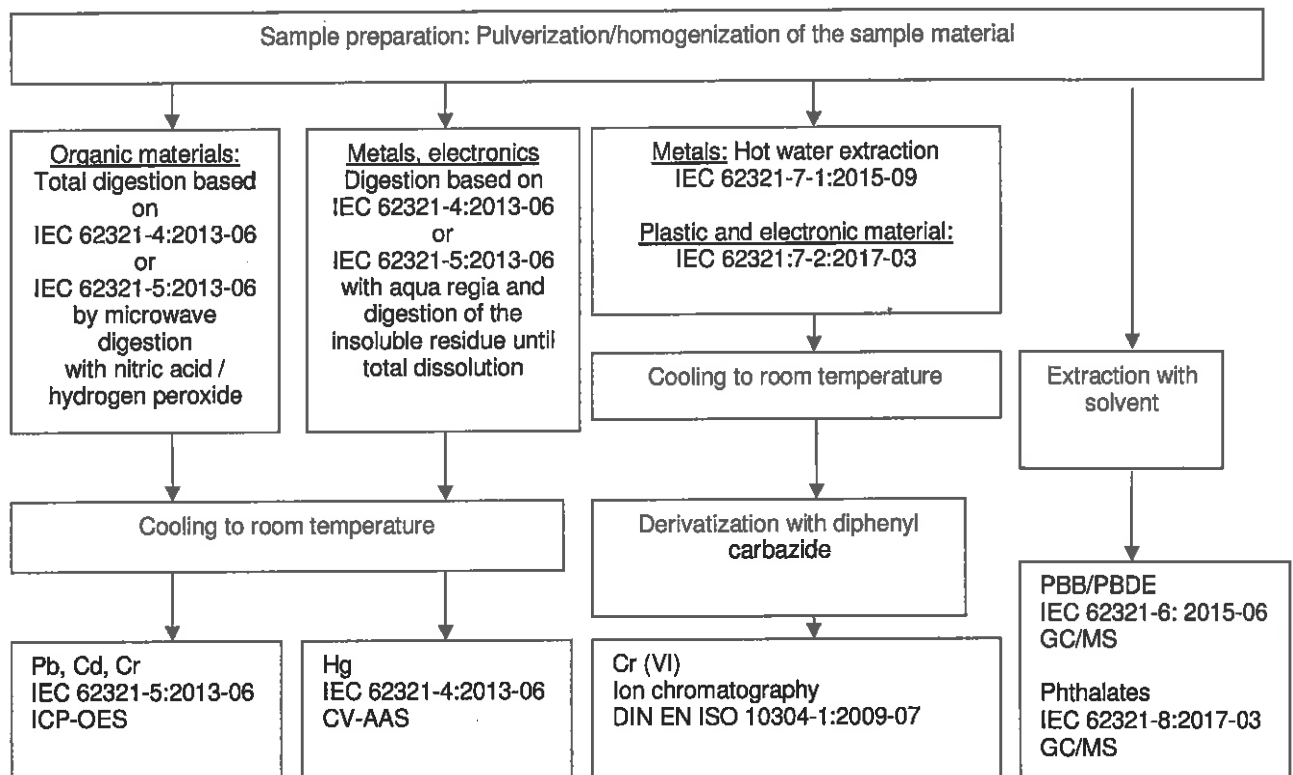
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Flow Chart for the working flow of the performed analysis



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 GERMANY

Sample Photo(s)



End of Report

The test results refer exclusively to the examined test items and the date of the test under the test specifications. Written acknowledgement for publication and duplication of our analytical reports for promotional purpose, as well as fractional use for other purposes are mandatory. Numbers following „<“ represent limits of quantification. Determination of parameters marked with * was performed with a cooperation partner.

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We would like to point out that measurement uncertainties are not taken into account for conclusions. On request, we can provide measurement uncertainties and take them into account for conclusions upon consultation.

**TEST REPORT:**

No. CPSA/210256772-CA57409

REPORTED DATE: 18-February-2021

Job Ref. C&P/2021-02-09-023

UMICORE GALVANOTECHNIK GMBHKLARENBERGSTR. 53-79, 73535
SCHWAEBISCH GMUEND, GERMANY.

The following sample(s) was/were submitted and identified by applicant as:

SAMPLE DESCRIPTION : UMICORE PALLUNA PALLADIUM SOLUTION 460

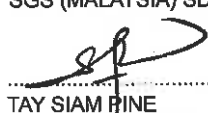
SAMPLE RECEIVED : 09-February-2021

TESTING PERIOD : 09-February-2021 to 16-February-2021

TEST REQUESTED : Selected test(s) as requested by customer

TEST METHOD : -PLEASE REFER TO NEXT PAGE(S)-

TEST RESULTS : -PLEASE REFER TO NEXT PAGE(S)-

SIGNED FOR AND ON BEHALF OF
SGS (MALAYSIA) SDN BHD
TAY SIAM PINE
TECHNICAL MANAGER
IKM No. M/3452/6047/11/12

Test Report Form No.: SGS/TR/CP/013, Ver: 1.0, Effective Date: 04/02/2021

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**TEST REPORT:**

No. CPSA/210256772-CA57409
Job Ref. C&P/2021-02-09-023

REPORTED DATE: 18-February-2021**TEST RESULTS BY CHEMICAL METHOD:****Test Part Description**

Sample Description: -PLEASE REFER TO PAGE 1-

Test Parameter(s):	Unit	Test Method	Result	MDL
Beryllium (Be)	mg/kg	With reference to EPA Method 3051A, and performed by ICP-OES.	N.D.	2
Antimony (Sb)	mg/kg	With reference to EPA Method 3051A, and performed by ICP-OES.	N.D.	2
Halogen	-	-	-	-
Halogen-Fluorine (F)	mg/kg	With reference to BS EN 14582:2016, analysis performed by IC method for Fluorine content.	N.D.	50
Halogen-Chlorine (Cl)	mg/kg	With reference to BS EN 14582:2016, analysis performed by IC method for Chlorine content.	59265	50
Halogen-Bromine (Br)	mg/kg	With reference to BS EN 14582:2016, analysis performed by IC method for Bromine content.	N.D.	50
Halogen-Iodine (I)	mg/kg	With reference to BS EN 14582:2016, analysis performed by IC method for Iodine content.	N.D.	50

Note : (a) mg/kg = ppm ; ug/kg = ppb (0.01 mg/kg = 10 ug/kg); 0.1wt% = 1000ppm

(b) N.D. = Not Detected

(c) MDL = Method Detection Limit

(d) Negative = Undetectable / Positive = Detectable

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TEST REPORT:

No. CPSA/210256772-CA57409

REPORTED DATE: 18-February-2021

Job Ref. C&P/2021-02-09-023

TEST RESULTS:

Test Part Description

Sample Description:

-PLEASE REFER TO PAGE 1-

Test Method:

With reference to CEN/TS 15968:2010. Analysis was performed by LC-MS

Test Parameter(s):	Result (%)	Max. Limit (µg/m²) (Textile/Coated material)	Max.Limit(%) (Plastic)	Max. Limit(%) (Substances/ in mixtures)
Perfluorooctanesulfonic acid (PFOS)	N.D.	1	0.1	0.001
Perfluorooctanoic acid (PFOA) (CAS No. 335-67-1)	N.D.	/	/	/
Conclusion	PASS			

Note: (a) N.D. = Not Detected

(b) Detection limit = 1 µg/m² for Textile / Coated Material

= 0.001% for Plastic, substances or mixtures

(c) Recommended requirement with reference to Commission Regulation (EU) 2019/1021 on Persistent Organic Pollutant.

(d) PFOS refers to Perfluorooctanesulfonic acid and its derivatives including Perfluorooctanesulfonic acid, Perfluorooctane sulfonamide, N-Methylperfluorooctane sulfonamide, N-Ethylperfluorooctane sulfonamide, N-Methylperfluorooctane sulfonamidoethanol and N-Ethylperfluorooctane sulfonamidoethanol.

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TEST REPORT:

No. CPSA/210256772-CA57409
Job Ref. C&P/2021-02-09-023

REPORTED DATE: 18-February-2021

Test Part Description :

Sample Description: -PLEASE REFER TO PAGE 1-



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TECHNICAL MANAGER
IKM No. M/3452/6047/11/12



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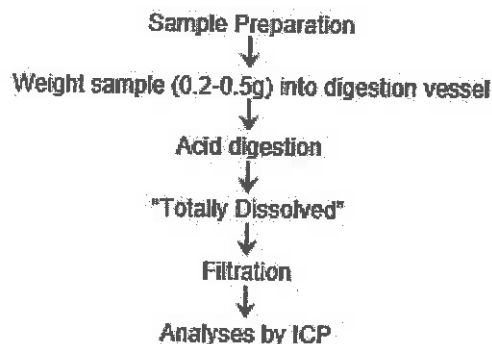
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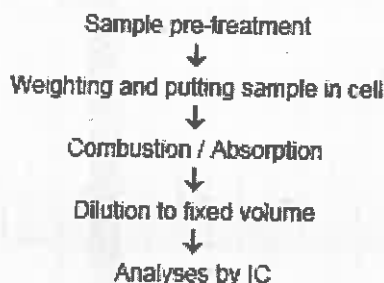
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REPORTED DATE: 18-February-2021

MICROWAVE ASSISTED ACID DIGESTION OF ORGANICALLY BASED METRICES BY US EPA 3051A



DETERMINATION OF HALOGEN CONTENT



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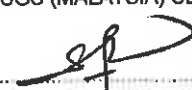
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Job Ref. C&P/2021-02-09-023

REPORTED DATE: 18-February-2021

DETERMINATION OF PFOS AND PFOA CONTENTS

Sample pre-treatment / separation
↓
Solvent extraction
↓
Concentrate / Dilute extracted solution
↓
Sample filtration
↓
Analysis performed by LC/MS
↓
Data

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