

Product	Laser diode
Package	Open CAN-AIN-PD

1.Stem(Basemetal)



Test Report No. 4252261 **Date** : 28-May-2019

Page 1 of 10

Client : [REDACTED]

The following sample(s) was/were submitted and identified by/on behalf of the client as:

Sample Name : SPCC-8D (COLD ROKKED STEEL)
 Manufacturer/Vendor : [REDACTED]
 Country of Origin : Thailand
 Country of Destination : Thailand
 Buyer's Name : [REDACTED]

The following sample(s) was/were identified by SGS as:

SGS Sample No. : [REDACTED]
 Sample Condition : Sample is contained in a plastic bag.
 Quantity Submitted : 1 bag

Sample Receiving Date : 23-May-2019
 Testing Period : 23-May-2019 to 28-May-2019

Test Requested : In accordance with the RoHS Directive 2011/65/EU (Annex II) [amended by Directive (EU) 2015/863] .Selected test (s) as requested by client.

Test Method : (1) IEC 62321-5 edition 1.0 : 2013 for Lead content, Analyzed by ICP-OES.
 (2) IEC 62321-5 edition 1.0 : 2013 for Cadmium content, Analyzed by ICP-OES.
 (3) IEC 62321-4 ,edition 1.1 : 2017 for Mercury Content, Analyzed by ICP-OES.
 (4) IEC 62321-7-1 edition 1.0 : 2015 for Hexavalent Chromium Content, Analyzed by UV/Vis Spectrometry.
 (5) IEC 62321-6 edition 1.0 : 2015 for PBBs/PBDEs content, Analyzed by GC/MS.

Test Results : Please refer to next page.

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Testing 0013
SGS (Thailand) Limited

Test Report No. 4252261

Date : 28-May-2019

Page 2 of 10

CONCLUSION

Based on the performed tests on submitted sample(s), the results of Cadmium, Lead, Mercury, Hexavalent chromium, Polybrominated biphenyls (PBBs), Polybrominated diphenyl ethers (PBDEs) do not exceed the limits as set by RoHS Directive (EU) 2015/863 amending Annex II to Directive 2011/65/EU.

Remark:

On 4 June 2015, Commission Directive (EU) 2015/863 was published in the Official Journal of the European Union (OJEU) to include the phthalates BBP, DBP, DEHP and DIBP into ANNEX II of the Rohs Recast Directive. The new law restricts each phthalate to no more than 0.1% in each homogeneous material of an electrical product.

**Signed for and on behalf of
SGS (Thailand) Limited**

Patcharee T.

**Patcharee Treeporncharoen
Laboratory manager - Chemical**

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NSC-TISI-TIS 17025
Testing 0013
SGS (Thailand) Limited

Test Report No. 4252261

Date : 28-May-2019

Page 3 of 10

TEST RESULTS

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

Test Item (s):	Method (Refer to)	Result (1)	MDL	RoHS Limit
Lead (Pb)	(1)	n.d.	2	1000
Cadmium (Cd)	(2)	n.d.	2	100
Mercury (Hg)	(3)	n.d.	2	1000
Hexavalent Chromium (CrVI) by boiling water extraction # (Unit : (ug/cm2))	(4)	n.d.	0.10	-

Test Part Description
Result (1) metal

Note :

- (a) mg/kg = ppm ; 0.1wt% = 1000 ppm
- (b) ug/cm2 = microgram/centremeter square
- (c) n.d. = Not Detected
- (d) MDL = Method Detection Limit
- (e) # = a. The sample is positive for CrVI if the CrVI concentration is greater than 0.13 ug/cm2. The sample coating is considered to contain CrVI
- b. The sample is negative for CrVI if CrVI is n.d. (concentration less than 0.10 ug/cm2). The coating is considered a non-CrVI based coating
- c. The result between 0.10 ug/cm2 and 0.13 ug/cm2 is considered to be inconclusive - unavoidable coating variations may influence the determination
- (f) "-" = Not regulated
- (g) For corrosion protection coatings on metals: Information on storage conditions and production date of the tested sample is unavailable and thus results of Cr(VI) represent status of the sample at the time of testing represent status of the sample at the time of testing.

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Testing 0013
SGS (Thailand) Limited

Test Report No. 4252261
TEST RESULTS

Date : 28-May-2019

Page 4 of 10

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

Test Item (s):	Method (Refer to)	Result (1)	MDL	RoHS Limit
Sum of PBBs	(5)*	n.d.	-	1000
Monobromobiphenyl		n.d.	5	-
Dibromobiphenyl		n.d.	5	-
Tribromobiphenyl		n.d.	5	-
Tetrabromobiphenyl		n.d.	5	-
Pentabromobiphenyl		n.d.	5	-
Hexabromobiphenyl		n.d.	5	-
Heptabromobiphenyl		n.d.	5	-
Octabromobiphenyl		n.d.	5	-
Nonabromobiphenyl		n.d.	5	-
Decabromobiphenyl		n.d.	5	-

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Testing 0013
SGS (Thailand) Limited

Test Report No. 4252261

Date : 28-May-2019

Page 5 of 10

TEST RESULTS

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

Test Item (s):	Method (Refer to)	Result (1)	MDL	RoHS Limit
Sum of PBDEs	(5)*	n.d.	-	1000
Monobromodiphenyl ether		n.d.	5	-
Dibromodiphenyl ether		n.d.	5	-
Tribromodiphenyl ether		n.d.	5	-
Tetrabromodiphenyl ether		n.d.	5	-
Pentabromodiphenyl ether		n.d.	5	-
Hexabromodiphenyl ether		n.d.	5	-
Heptabromodiphenyl ether		n.d.	5	-
Octabromodiphenyl ether		n.d.	5	-
Nonabromodiphenyl ether		n.d.	5	-
Decabromodiphenyl ether		n.d.	5	-

Test Part Description
Result (1) metal

Note :

- (a) mg/kg = ppm ; 0.1 wt% = 1000 ppm
- (b) n.d. = Not Detected
- (c) MDL = Method Detection Limit
- (d) "-" = Not regulated
- (e) Test done on client submitted sample

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Testing 0013
SGS (Thailand) Limited

Test Report No. 4252261

Date : 28-May-2019

Page 6 of 10

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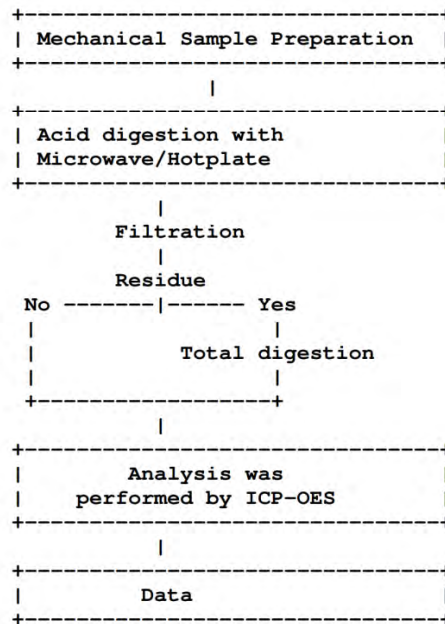
Test Report No. 4252261

Date : 28-May-2019

Page 7 of 10

Flow chart of Pb,Cd,Hg Testing

(Test method : IEC 62321)



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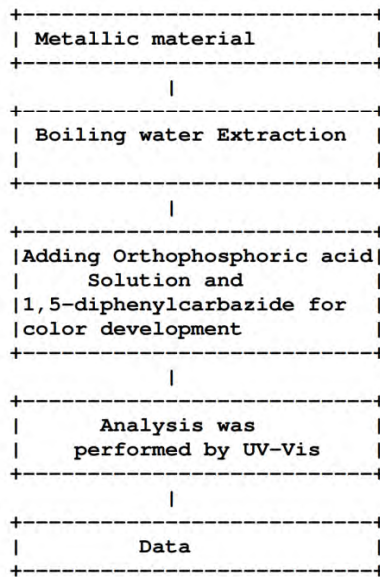
Test Report No. 4252261

Date :28-May-2019

Page 8 of 10

Flow chart of Hexavalent Chromium Testing

(Test method : IEC 62321)



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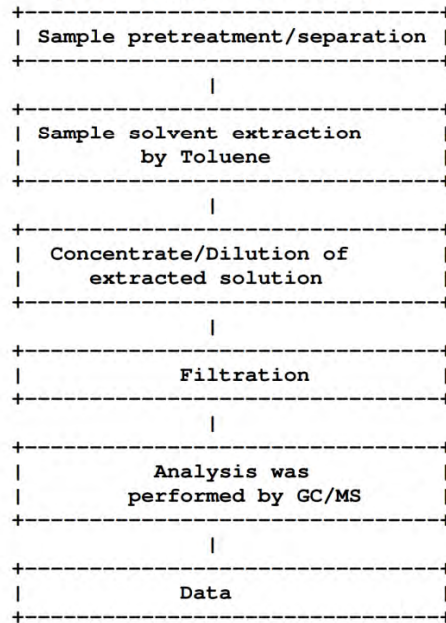
Test Report No. 4252261

Date : 28-May-2019

Page 9 of 10

Flow chart of PBBs,PBDEs Testing

(Test method : IEC 62321)



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Testing 0013
SGS (Thailand) Limited

Test Report No. 4252261

Date : 28-May-2019

Page 10 of 10

SAMPLE/ATTACHMENT PICTURE



***** End of Report *****

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2.Stem S lead



Test Report No. F690101/LF-CTSAYAA19-11807

Issued Date : 2019. 02. 22

Page 1 of 5



The following sample(s) was/were submitted and identified by/on behalf of the client as:-

SGS File No. : AYAA19-11807
 Product Name : 
 Item No./Part No. : N/A
 Received Date : 2019. 02. 15
 Test Period : 2019. 02. 15 to 2019. 02. 22
 Test Results : For further details, please refer to following page(s)

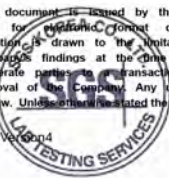
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Jeff Jang / Chemical Lab Mgr

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F401 Version 4



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2.Stem S lead


Test Report No. F690101/LF-CTSAYAA19-11807

Issued Date : 2019. 02. 22

Page 2 of 5

Sample No. : AYAA19-11807.001
Sample Description : XXXXXXXXXX
Item No./Part No. : N/A
Materials : N/A

Heavy Metals

Test Items	Unit	Test Method	MDL	Results
Cadmium (Cd)	mg/kg	With reference to IEC 62321-5:2013 (Determination of Cadmium by ICP-OES)	0.5	N.D.
Lead (Pb)	mg/kg	With reference to IEC 62321-5:2013 (Determination of Lead by ICP-OES)	5	N.D.
Mercury (Hg)	mg/kg	With reference to IEC 62321-4:2013 (Determination of Mercury by ICP-OES)	2	N.D.
Hexavalent Chromium (Cr VI)*	µg/cm ²	With reference to IEC 62321-7-1:2015 (Determination of CrVI by UV-Vis)	0.1	N.D.
Hexavalent Chromium (Cr VI)	mg/kg	With reference to US EPA 3060A(1996), US EPA 7196A(1992), UV	1	N.D.

- NOTE:
- (1) N.D. = Not detected.(<MDL)
 - (2) mg/kg = ppm
 - (3) MDL = Method Detection Limit
 - (4) - = No regulation
 - (5) Negative = Undetectable / Positive = Detectable
 - (6) ** = Qualitative analysis (No Unit)
 - (7) * = a. The sample is positive for CrVI if the CrVI concentration is greater than 0.13 ug/cm2. The sample coating is considered to contain CrVI.
 b. The sample is negative for CrVI if CrVI is n.d. (concentration less than 0.10 ug/cm2). The coating is considered a non-CrVI based coating.
 c. The result between 0.10 ug/cm2 and 0.13 ug/cm2 is considered to be inconclusive - unavoidable coating variations may influence the determination.

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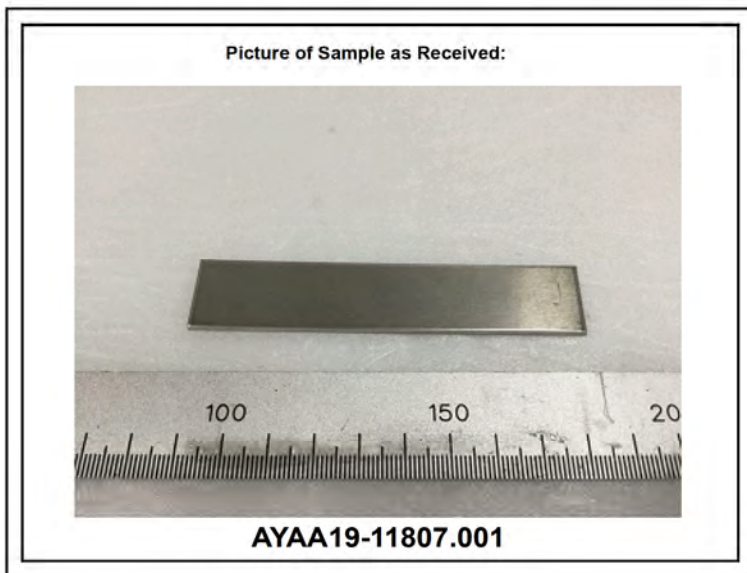
2.Stem S lead



Test Report No. F690101/LF-CTSAYAA19-11807

Issued Date : 2019. 02. 22

Page 3 of 5



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2.Stem S lead

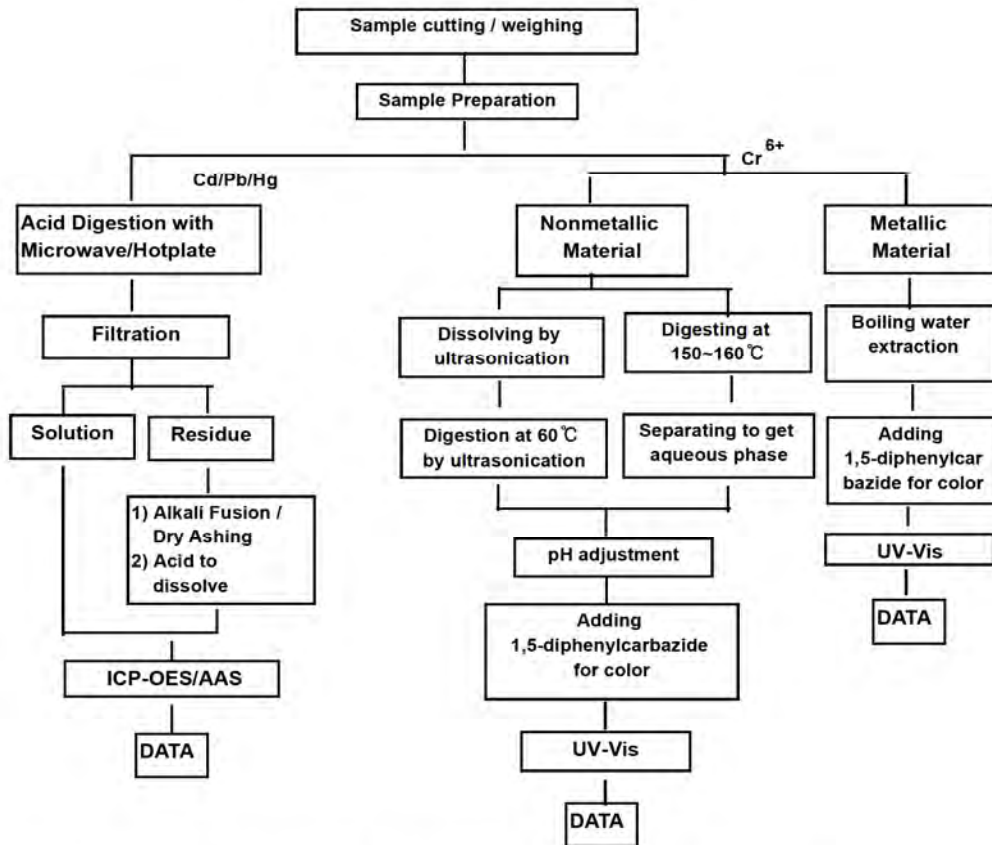


Test Report No. F690101/LF-CTSAYAA19-11807

Issued Date : 2019. 02. 22

Page 4 of 5

Testing Flow Chart for RoHS: Cd/Pb/Hg/Cr⁶⁺ Testing



The samples were dissolved totally at the acid digestion step of the above flow chart for Cd,Pb,Hg
Section Chief : Minkyu Park

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2.Stem S lead

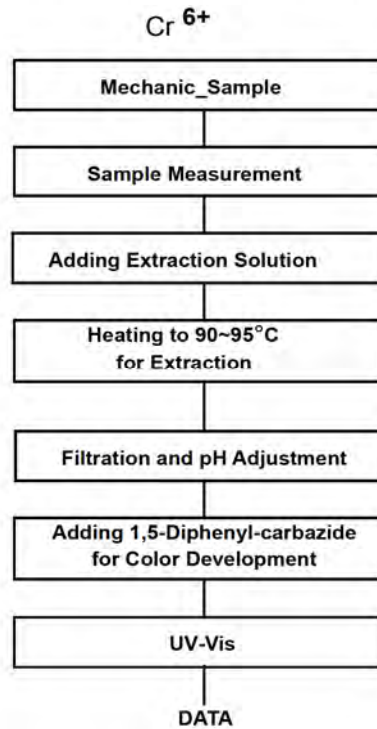


Test Report No. F690101/LF-CTSAYAA19-11807

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Page 5 of 5

Testing Flow Chart for RoHS:Cr⁶⁺ Testing



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3.Stem L lead



Test Report No. F690101/LF-CTSAYAA19-11804

Issued Date : 2019. 02. 22

Page 1 of 5



The following sample(s) was/were submitted and identified by/on behalf of the client as:-

SGS File No. : AYAA19-11804
Product Name : 
Item No./Part No. : N/A
Received Date : 2019. 02. 15
Test Period : 2019. 02. 15 to 2019. 02. 22
Test Results : For further details, please refer to following page(s)

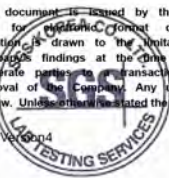
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Jeff Jang / Chemical Lab Mgr

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3.Stem L lead


Test Report No. F690101/LF-CTSAYAA19-11804

Issued Date : 2019. 02. 22

Page 2 of 5

Sample No. : AYAA19-11804.001
Sample Description : XXXXXXXXXX
Item No./Part No. : N/A
Materials : N/A

Heavy Metals

Test Items	Unit	Test Method	MDL	Results
Cadmium (Cd)	mg/kg	With reference to IEC 62321-5:2013 (Determination of Cadmium by ICP-OES)	0.5	N.D.
Lead (Pb)	mg/kg	With reference to IEC 62321-5:2013 (Determination of Lead by ICP-OES)	5	N.D.
Mercury (Hg)	mg/kg	With reference to IEC 62321-4:2013 (Determination of Mercury by ICP-OES)	2	N.D.
Hexavalent Chromium (Cr VI)*	µg/cm ²	With reference to IEC 62321-7-1:2015 (Determination of CrVI by UV-Vis)	0.1	N.D.
Hexavalent Chromium (Cr VI)	mg/kg	With reference to US EPA 3060A(1996), US EPA 7196A(1992), UV	1	N.D.

- NOTE:
- (1) N.D. = Not detected.(<MDL)
 - (2) mg/kg = ppm
 - (3) MDL = Method Detection Limit
 - (4) - = No regulation
 - (5) Negative = Undetectable / Positive = Detectable
 - (6) ** = Qualitative analysis (No Unit)
 - (7) * = a. The sample is positive for CrVI if the CrVI concentration is greater than 0.13 ug/cm2. The sample coating is considered to contain CrVI.
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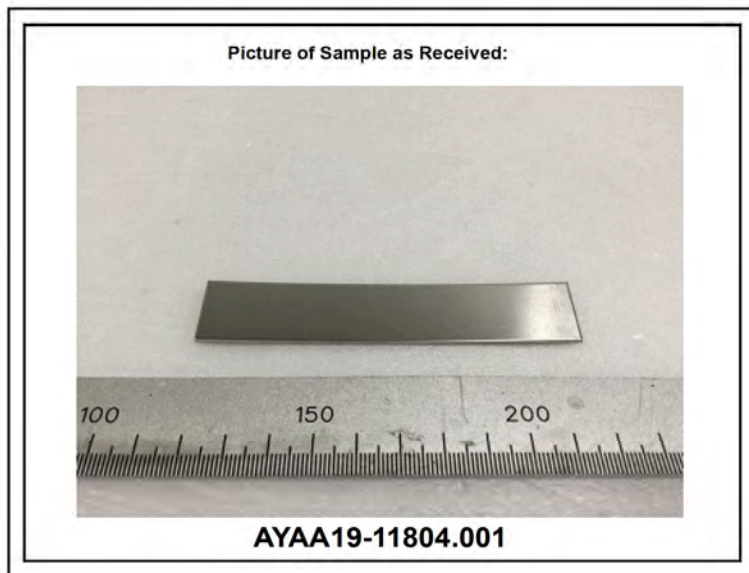
3.Stem L lead



Test Report No. F690101/LF-CTSAYAA19-11804

Issued Date : 2019. 02. 22

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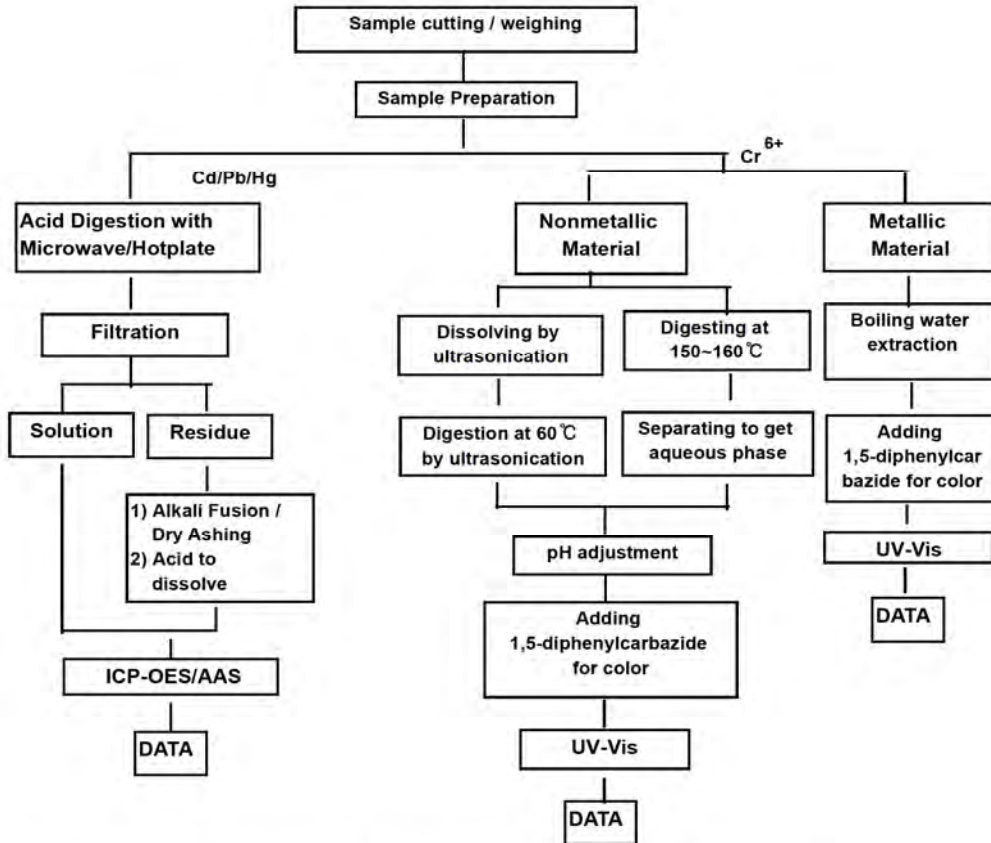


Test Report No. F690101/LF-CTSAYAA19-11804

Issued Date : 2019. 02. 22

Page 4 of 5

Testing Flow Chart for RoHS: Cd/Pb/Hg/Cr⁶⁺ Testing



The samples were dissolved totally at the acid digestion step of the above flow chart for Cd,Pb,Hg
Section Chief : Minkyu Park

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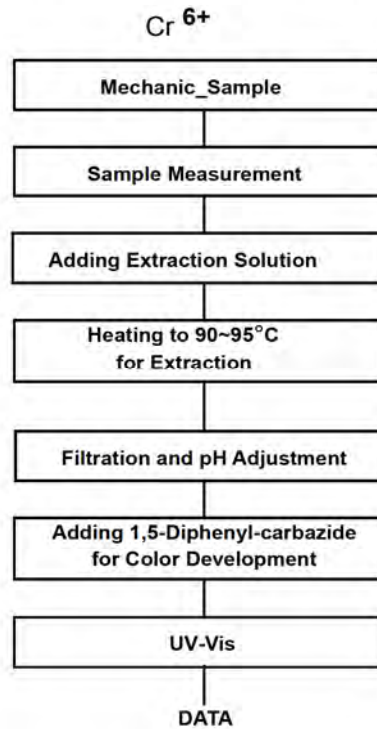


Test Report No. F690101/LF-CTSAYAA19-11804

Issued Date : 2019. 02. 22

Page 5 of 5

Testing Flow Chart for RoHS:Cr⁶⁺ Testing



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4.Stem E lead



Test Report No. F690101/LF-CTSAYAA19-11804

Issued Date : 2019. 02. 22

Page 1 of 5



The following sample(s) was/were submitted and identified by/on behalf of the client as:-

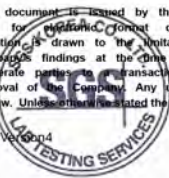
SGS File No. : AYAA19-11804
 Product Name : 
 Item No./Part No. : N/A
 Received Date : 2019. 02. 15
 Test Period : 2019. 02. 15 to 2019. 02. 22
 Test Results : For further details, please refer to following page(s)

SGS Korea Co., Ltd.

Jeff Jang / Chemical Lab Mgr

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4.Stem E lead


Test Report No. F690101/LF-CTSAYAA19-11804

Issued Date : 2019. 02. 22

Page 2 of 5

Sample No. : AYAA19-11804.001
Sample Description : XXXXXXXXXX
Item No./Part No. : N/A
Materials : N/A

Heavy Metals

Test Items	Unit	Test Method	MDL	Results
Cadmium (Cd)	mg/kg	With reference to IEC 62321-5:2013 (Determination of Cadmium by ICP-OES)	0.5	N.D.
Lead (Pb)	mg/kg	With reference to IEC 62321-5:2013 (Determination of Lead by ICP-OES)	5	N.D.
Mercury (Hg)	mg/kg	With reference to IEC 62321-4:2013 (Determination of Mercury by ICP-OES)	2	N.D.
Hexavalent Chromium (Cr VI)*	µg/cm ²	With reference to IEC 62321-7-1:2015 (Determination of CrVI by UV-Vis)	0.1	N.D.
Hexavalent Chromium (Cr VI)	mg/kg	With reference to US EPA 3060A(1996), US EPA 7196A(1992), UV	1	N.D.

- NOTE:
- (1) N.D. = Not detected.(<MDL)
 - (2) mg/kg = ppm
 - (3) MDL = Method Detection Limit
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 - (7) * = a. The sample is positive for CrVI if the CrVI concentration is greater than 0.13 ug/cm2. The sample coating is considered to contain CrVI.
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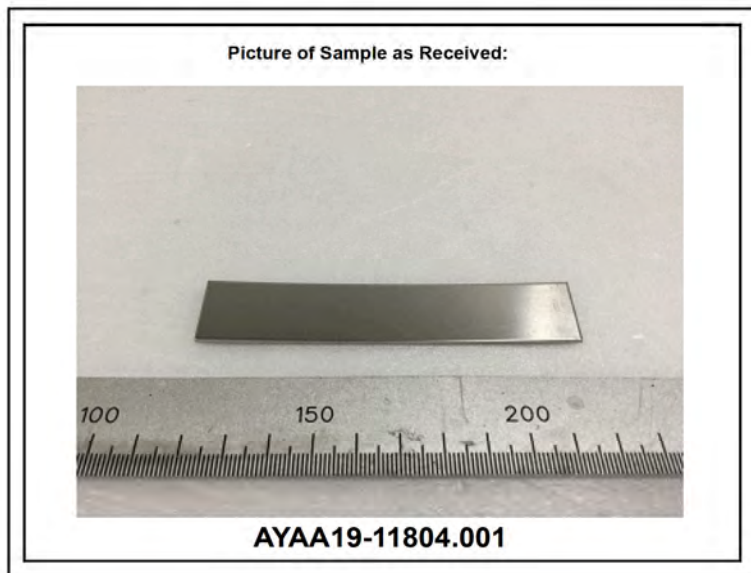
4.Stem E lead



Test Report No. F690101/LF-CTSAYAA19-11804

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4.Stem E lead

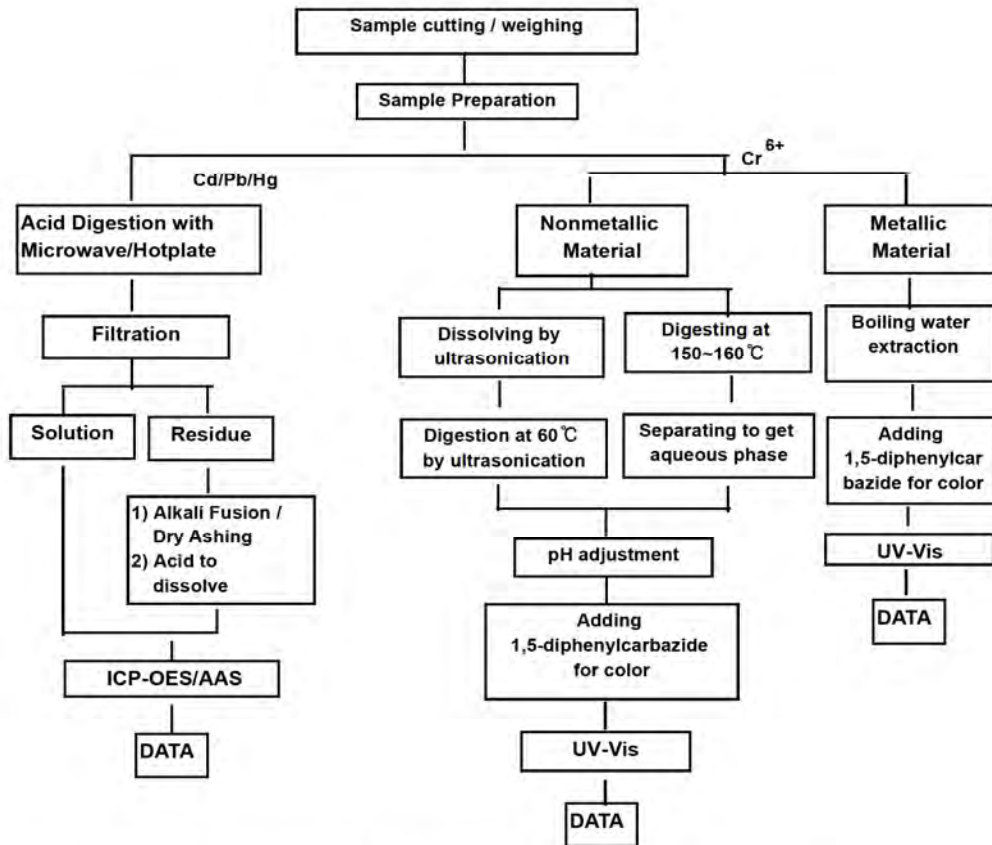


Test Report No. F690101/LF-CTSAYAA19-11804

Issued Date : 2019. 02. 22

Page 4 of 5

Testing Flow Chart for RoHS: Cd/Pb/Hg/Cr⁶⁺ Testing



The samples were dissolved totally at the acid digestion step of the above flow chart for Cd,Pb,Hg
Section Chief : Minkyu Park

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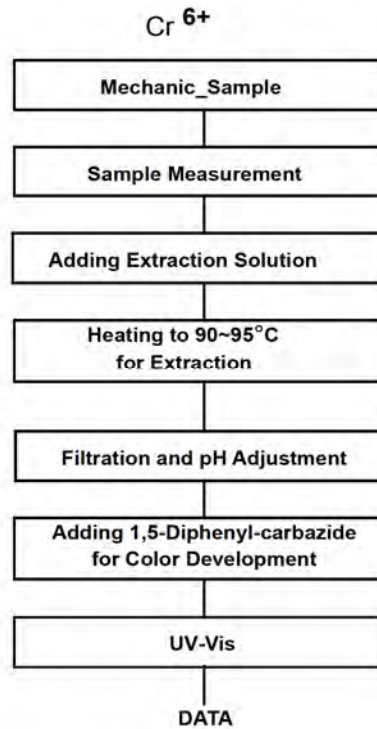
4.Stem E lead



Test Report No. F690101/LF-CTSAYAA19-11804

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Page 5 of 5

Testing Flow Chart for RoHS:Cr⁶⁺ Testing

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5.Stem Ni_Au Plating



NSC TISI-TIS 17025
Testing 0013
SGS (Thailand) Limited

Test Report No. 4206102

Date : 5-Apr-2019

Page 1 of 10

The following sample(s) was/were submitted and identified by/on behalf of the client as:

Sample Name : CE Ni Au Plating
Sample Description : Metal
Part No. : [REDACTED]

The following sample(s) was/were identified by SGS as:

SGS Sample No. : 4349005
Sample Condition : Sample is contained in a plastic bag.
Quantity Submitted : 1 bag

Sample Receiving Date : 29-Mar-2019
Testing Period : 30-Mar-2019 to 05-Apr-2019

Test Requested : In accordance with the RoHS Directive 2011/65/EU (Annex II) [amended by Directive (EU) 2015/863] .Selected test (s) as requested by client.

Test Method : (1) IEC 62321-5 edition 1.0 : 2013 for Lead content, Analyzed by ICP-OES.
(2) IEC 62321-5 edition 1.0 : 2013 for Cadmium content, Analyzed by ICP-OES.
(3) IEC 62321-4 ,edition 1.1 : 2017 for Mercury Content, Analyzed by ICP-OES.
(4) IEC 62321-7-1 edition 1.0 : 2015 for Hexavalent Chromium Content,Analyzed by UV/Vis Spectrometry.
(5) IEC 62321-6 edition 1.0 : 2015 for PBBs/PBDEs content, Analyzed by GC/MS.
(6) IEC 62321-8 edition 1.0 : 2017 for Phthalates content,Analyzed was performed by GC/MS.

Test Results : Please refer to next page.

CONCLUSION

Based on the performed tests on submitted sample(s),the results of Cadmium,Lead,Mercury,Hexavalent chromium,Polybrominated biphenyls (PBBs),Polybrominated diphenyl ethers (PBDEs) and Phthalates such as Bis(2-ethylhexyl) phthalate (DEHP),Butyl benzyl phthalate (BBP),Dibutyl phthalate (DBP) and Diisobutyl phthalate (DIBP) to be in compliance with the limits as set by RoHS Directive (EU) 2015/863 amending Annex II to Directive 2011/65/EU.

**Signed for and on behalf of
SGS (Thailand) Limited**

Patcharee T.

**Patcharee Treeporncharoen
Laboratory manager - Chemical**

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5.Stem Ni_Au Plating



Test Report No. 4206102

Date : 5-Apr-2019

Page 2 of 10

TEST RESULTS

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

Test Item (s):	Method (Refer to)	Result (1)	MDL	RoHS Limit
Lead (Pb)	(1)	n.d.	2	1000
Cadmium (Cd)	(2)	n.d.	2	100
Mercury (Hg)	(3)	n.d.	2	1000
Hexavalent Chromium (CrVI) by boiling water extraction # (Unit : (ug/cm2))	(4)	n.d.	0.10	-

Test Part Description

Result (1) metal with plating

Note :

(a) mg/kg = ppm ; 0.1wt% = 1000 ppm

(b) ug/cm2 = microgram/centremeter square

(c) n.d. = Not Detected

(d) MDL = Method Detection Limit

(e) # = a. The sample is positive for CrVI if the CrVI concentration is greater than 0.13 ug/cm2. The sample coating is considered to contain CrVI

b. The sample is negative for CrVI if CrVI is n.d. (concentration less than 0.10 ug/cm2). The coating is considered a non-CrVI based coating

c. The result between 0.10 ug/cm2 and 0.13 ug/cm2 is considered to be inconclusive - unavoidable coating variations may influence the determination

(f) "-" = Not regulated

(g) For corrosion protection coatings on metals: Information on storage conditions and production date of the tested sample is unavailable and thus results of Cr(VI) represent status of the sample at the time of testing represent status of the sample at the time of testing.

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NSC-TISI-TIS 17025
Testing 0013
SGS (Thailand) Limited

Test Report No. 4206102

Date : 5-Apr-2019

Page 3 of 10

TEST RESULTS

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

Test Item (s):	Method (Refer to)	Result (1)	MDL	RoHS Limit
Sum of PBBs	(5)*	n.d.	-	1000
Monobromobiphenyl		n.d.	5	-
Dibromobiphenyl		n.d.	5	-
Tribromobiphenyl		n.d.	5	-
Tetrabromobiphenyl		n.d.	5	-
Pentabromobiphenyl		n.d.	5	-
Hexabromobiphenyl		n.d.	5	-
Heptabromobiphenyl		n.d.	5	-
Octabromobiphenyl		n.d.	5	-
Nonabromobiphenyl		n.d.	5	-
Decabromobiphenyl		n.d.	5	-

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Test Report No. 4206102

Date : 5-Apr-2019

Page 4 of 10

TEST RESULTS

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

Test Item (s):	Method (Refer to)	Result (1)	MDL	RoHS Limit
Sum of PBDEs	(5)*	n.d.	-	1000
Monobromodiphenyl ether		n.d.	5	-
Dibromodiphenyl ether		n.d.	5	-
Tribromodiphenyl ether		n.d.	5	-
Tetrabromodiphenyl ether		n.d.	5	-
Pentabromodiphenyl ether		n.d.	5	-
Hexabromodiphenyl ether		n.d.	5	-
Heptabromodiphenyl ether		n.d.	5	-
Octabromodiphenyl ether		n.d.	5	-
Nonabromodiphenyl ether		n.d.	5	-
Decabromodiphenyl ether		n.d.	5	-

Test Part Description

Result (1) metal with plating

Note :

(a) mg/kg = ppm ; 0.1 wt% = 1000 ppm

(b) n.d. = Not Detected

(c) MDL = Method Detection Limit

(d) "-" = Not regulated

(e) Test done on client submitted sample

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Test Report No. 4206102

Date : 5-Apr-2019

Page 5 of 10

TEST RESULTS

Phthalates Content for RoHS Directive 2011/65/EU Annex II [amended by Directive (EU) 2015/863], Analysis was performed by GC/MS.

Analysis	Method (refer to 6)	Result (1) (mg/kg)	MDL	RoHS Limit (mg/kg)
DEHP (Di-2-ethylhexyl phthalate)* (CAS No.: 117-81-7)	IEC 62321-8, Edition 1.0, 2017	n.d.	50	1000
BBP (Benzyl butyl phthalate)* (CAS No.: 85-68-7)	IEC 62321-8, Edition 1.0, 2017	n.d.	50	1000
DBP (Di-butyl phthalate)* (CAS No.: 84-74-2)	IEC 62321-8, Edition 1.0, 2017	n.d.	50	1000
DIBP (Di-isobutyl phthalate)* (CAS No.: 84-69-5)	IEC 62321-8, Edition 1.0, 2017	n.d.	50	1000

Note :

- (a) mg/kg = ppm ; 0.1 wt% = 1000 ppm
- (b) n.d. = Not Detected
- (c) MDL = Method Detection Limit
- (d) Result (1) metal with plating
- (e) Test done on client submitted sample

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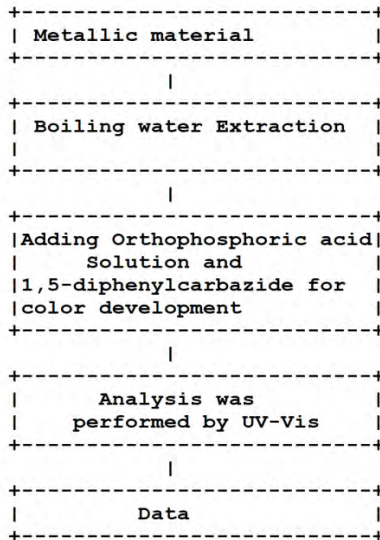
Test Report No. 4206102

Date : 5-Apr-2019

Page 7 of 10

Flow chart of Hexavalent Chromium Testing

(Test method : IEC 62321)



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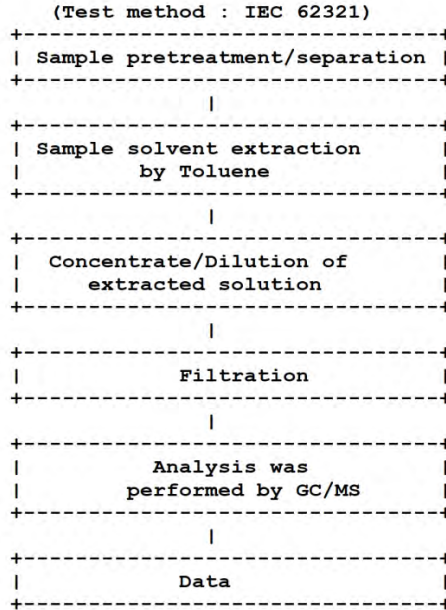
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Testing 0013
SGS (Thailand) Limited

Test Report No. 4206102

Date : 5-Apr-2019

Page 8 of 10

Flow chart of PBBs,PBDEs Testing



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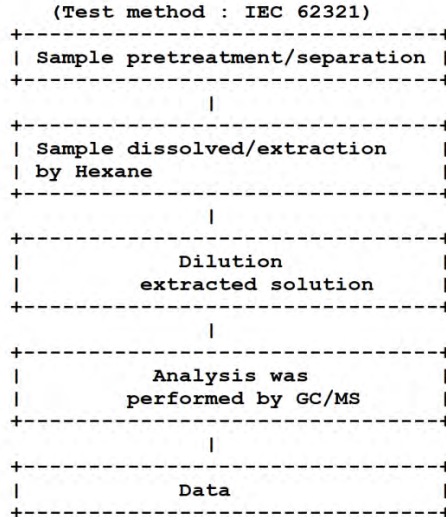


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Date : 5-Apr-2019

Page 9 of 10

Flow chart of Phthalates Testing



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Testing 0013
SGS (Thailand) Limited

Test Report No. 4206102

Date : 5-Apr-2019

Page 10 of 10

SAMPLE/ATTACHMENT PICTURE



***** End of Report *****

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6.Stem(glass)




Test Report

No. : CE/2019/32276

Date : 2019/03/18

Page : 1 of 7

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

Sample Submitted By : 
 Sample Description : GLASS POWDER
 Style/Item No. : 
 Sample Receiving Date : 2019/03/11
 Testing Period : 2019/03/11 to 2019/03/18

=====

Test Requested : As specified by client, with reference to RoHS 2011/65/EU Annex II and amending Directive (EU) 2015/863 to determine Cadmium, Lead, Mercury, Cr(VI), PBBs, PBDEs, DBP, BBP, DEHP, DIBP contents in the submitted sample(s).

Test Method : Please refer to following pages.

Test Result(s) : Please refer to following pages.

Conclusion : Based on the performed tests on submitted sample(s), the test results of Cadmium, Lead, Mercury, Cr(VI), PBBs, PBDEs, DBP, BBP, DEHP, DIBP comply with the limits as set by RoHS Directive (EU) 2015/863 amending Annex II to Directive 2011/65/EU.


 Troy Chang, Manager - Tech
 Signed for and on behalf of
 SGS TAIWAN LTD TAIWAN
 Chemical Laboratory - Taipei

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6.Stem(glass)



Test Report

No. : CE/2019/32276

Date : 2019/03/18

Page : 2 of 7

Test Result(s)

PART NAME No.1 : GRAY POWDER

Test Item(s)	Unit	Method	MDL	Result	Limit
				No.1	
Cadmium (Cd)	mg/kg	With reference to IEC 62321-5 (2013) and performed by ICP-AES.	2	n.d.	100
Lead (Pb)	mg/kg	With reference to IEC 62321-5 (2013) and performed by ICP-AES.	2	n.d.	1000
Mercury (Hg)	mg/kg	With reference to IEC 62321-4 (2013) and performed by ICP-AES.	2	n.d.	1000
Hexavalent Chromium Cr(VI)	mg/kg	With reference to IEC 62321-7-2 (2017) and performed by UV-VIS.	8	n.d.	1000
Sum of PBBs	mg/kg		-	n.d.	1000
Monobromobiphenyl	mg/kg		5	n.d.	-
Dibromobiphenyl	mg/kg		5	n.d.	-
Tribromobiphenyl	mg/kg		5	n.d.	-
Tetrabromobiphenyl	mg/kg		5	n.d.	-
Pentabromobiphenyl	mg/kg		5	n.d.	-
Hexabromobiphenyl	mg/kg		5	n.d.	-
Heptabromobiphenyl	mg/kg		5	n.d.	-
Octabromobiphenyl	mg/kg		5	n.d.	-
Nonabromobiphenyl	mg/kg		5	n.d.	-
Decabromobiphenyl	mg/kg	With reference to IEC 62321-6 (2015) and performed by GC/MS.	5	n.d.	-
Sum of PBDEs	mg/kg		-	n.d.	1000
Monobromodiphenyl ether	mg/kg		5	n.d.	-
Dibromodiphenyl ether	mg/kg		5	n.d.	-
Tribromodiphenyl ether	mg/kg		5	n.d.	-
Tetrabromodiphenyl ether	mg/kg		5	n.d.	-
Pentabromodiphenyl ether	mg/kg		5	n.d.	-
Hexabromodiphenyl ether	mg/kg		5	n.d.	-
Heptabromodiphenyl ether	mg/kg		5	n.d.	-
Octabromodiphenyl ether	mg/kg		5	n.d.	-
Nonabromodiphenyl ether	mg/kg		5	n.d.	-
Decabromodiphenyl ether	mg/kg		5	n.d.	-

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6.Stem(glass)



Test Report

No. : CE/2019/32276

Date : 2019/03/18

Page : 3 of 7



Test Item(s)	Unit	Method	MDL	Result	Limit
				No.1	
DEHP (Di- (2-ethylhexyl) phthalate) (CAS No.: 117-81-7)	mg/kg	With reference to IEC 62321-8 (2017). Analysis was performed by GC/MS.	50	n.d.	1000
BBP (Butyl Benzyl phthalate) (CAS No.: 85-68-7)	mg/kg	With reference to IEC 62321-8 (2017). Analysis was performed by GC/MS.	50	n.d.	1000
DBP (Dibutyl phthalate) (CAS No.: 84-74-2)	mg/kg	With reference to IEC 62321-8 (2017). Analysis was performed by GC/MS.	50	n.d.	1000
DIBP (Di-isobutyl phthalate) (CAS No.: 84-69-5)	mg/kg	With reference to IEC 62321-8 (2017). Analysis was performed by GC/MS.	50	n.d.	1000

Note :

1. mg/kg = ppm : 0.1wt% = 1000ppm
2. MDL = Method Detection Limit
3. n.d. = Not Detected = below MDL
4. " - " = Not Regulated

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6.Stem(glass)



Test Report

No. : CE/2019/32276

Date : 2019/03/18

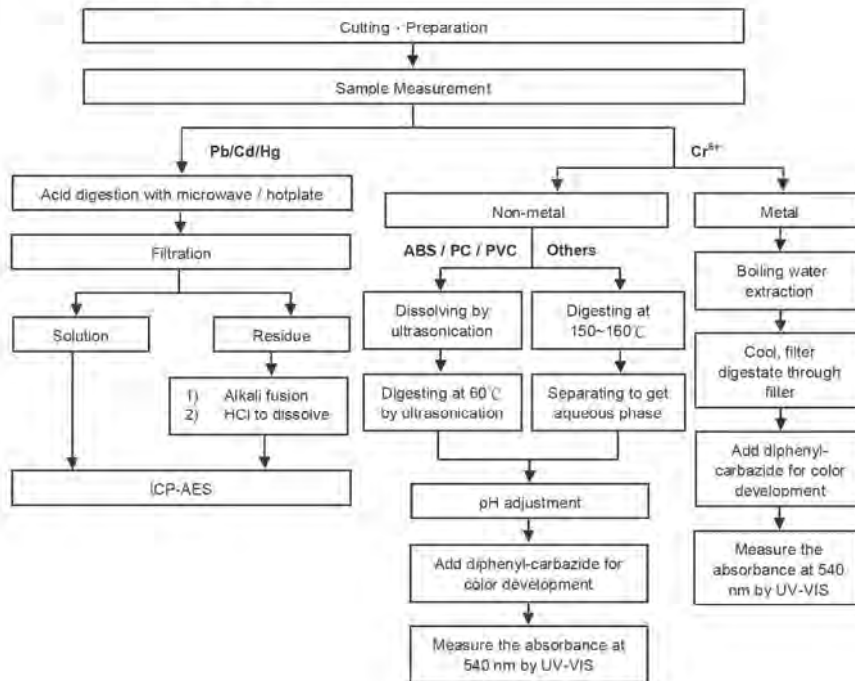
Page : 4 of 7



Analytical flow chart of Heavy Metal

These samples were dissolved totally by pre-conditioning method according to below flow chart. (Cr⁶⁺ test method excluded)

- Technician : Rita Chen
- Supervisor: Troy Chang



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6.Stem(glass)



Test Report

No. : CE/2019/32276

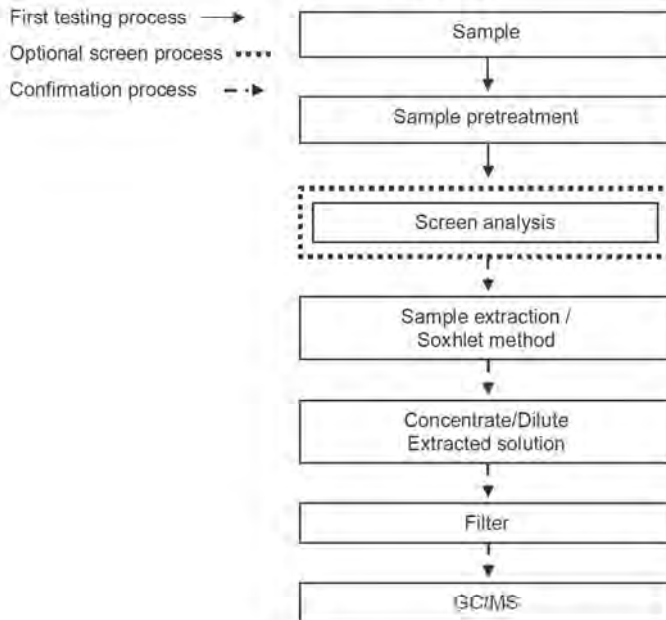
Date : 2019/03/18

Page : 5 of 7



Analytical flow chart – PBB / PBDE

- Technician : Yaling Tu
- Supervisor: Troy Chang



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6.Stem(glass)



Test Report

No. : CE/2019/32276

Date : 2019/03/18

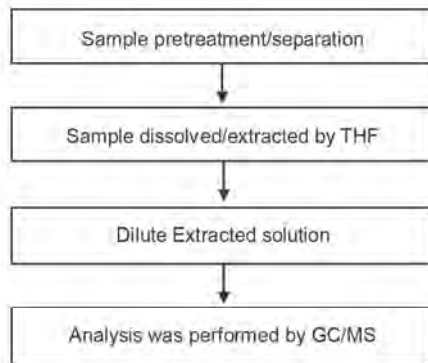
Page : 6 of 7



Analytical flow chart - Phthalate

- Technician: Yaling Tu
- Supervisor: Troy Chang

[Test method: IEC 62321-8]



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6.Stem(glass)



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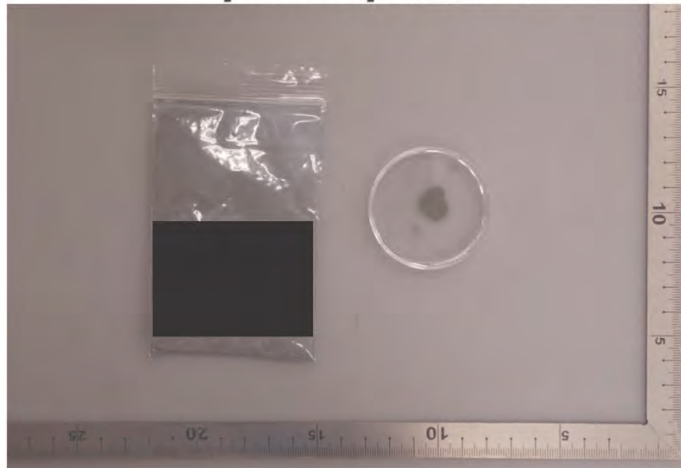
Date : 2019/03/18

Page : 7 of 7



* The tested sample / part is marked by an arrow if it's shown on the photo. *

CE/2019/32276



** End of Report **

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7.Stem (brazing)

2019年3月28日



石福金属興業株式会社 草加工場
〒340-0002 埼玉県草加市青柳 2-12-30
電話(048)931-4581(代表)

件名: 環境負荷物質含有調査

品質保証部

承認			担当	
----	--	--	----	--

拝啓

毎々格別のご愛顧を賜り厚くお礼申し上げます。

さて、首題の件につきまして下記の通りご報告いたしますので、ご検討の程、よろしく
お願い申し上げます。

敬 具

言 己

1. はじめに
ご依頼のありました 環境負荷物質含有調査結果を下記に報告いたします。

2. 前処理方法
硝酸にて自然溶解しました。

3. 測定方法
ICP発光分光分析

4. 測定結果、測定日

分析サンプル	測定結果	分析測定値(ppm)				Lot.No.
		Pb	Cd	Cr	Hg	
①		<5	<1	<1	<5	LL80166
②		<5	<1	<1	<5	GG80143

※Crについては全クロムです。

※当製品は金属材料であり、PBB、PBDE に関しては非含有です。

5. 分析方法フロー
硝酸にて自然溶解→メスアップ(定容)→ICP発光分光分析

以上

8.Cap(Base Material)



TEST REPORT

REPORT NO. JP/2018/111297

DATE: December 3, 2018

PAGE: 1 OF 4

THE FOLLOWING SAMPLE(S) WAS/WERE SUBMITTED AND IDENTIFIED BY/ON BEHALF OF THE CLIENT AS:
 以下のサンプルは顧客により提供され、顧客に代わって確認を行いました:

SAMPLE DESCRIPTION : XXXXXXXXXX
 CLIENT REF.NO : 2018111900209000
 SAMPLE RECEIVED : 2018/11/20
 TESTING DATE : 2018/11/20 TO 2018/11/30

TEST REQUESTED : SELECTED TEST(S) AS REQUESTED BY CLIENT.
 分析項目 : 分析項目は顧客の要求によります。

TEST METHOD(S) : WITH REFERENCE TO LATEST EDITION OF IEC62321 FOR RoHS 6 SUBSTANCES.
 分析方法 : OTHER CHEMICALS WERE TESTED BY EACH APPROPRIATE METHOD.
 RoHS6物質の分析は最新版のIEC62321を参照しました。
 それ以外の化学物質についてはそれぞれに最適な方法で分析を行いました。

TEST RESULT(S) : PLEASE REFER TO THE NEXT PAGE(S).
 分析結果 : 以下のページをご参照願います。

大内 幸弘



Yukihiro Ouchi / Quality Manager
 SGS Japan Inc., Chemical Laboratory

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8.Cap(Base Material)



TEST REPORT

REPORT NO. JP/2018/111297

DATE: December 3, 2018

PAGE: 2 OF 4

TEST RESULT(S)

ITEM(S)	UNIT	RESULT	METHOD	INST./PLACE	MDL
CADMIUM(Cd)	mg/kg	N.D.	IEC62321-5: 2013	ICP-OES	2
LEAD(Pb)	mg/kg	N.D.	IEC62321-5: 2013	ICP-OES	2
MERCURY(Hg)	mg/kg	N.D.	IEC62321-4: 2013	ICP-OES	2
CHROMIUM VI(Cr(VI))	$\mu\text{g}/\text{cm}^2$	N.D.	IEC62321-7-1: 2015	UV/VIS	0.01

NOTES: mg/kg = ppm, N.D. = Not Detected, INST. = INSTRUMENT, MDL = Method Detection Limit

REMARK: Cr(VI) has been tested with regard to the surface area of 10cm².

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8.Cap(Base Material)



TEST REPORT

REPORT NO. JP/2018/111297

DATE: December 3, 2018

PAGE: 3 OF 4



分析フローチャート MEASUREMENT FLOW CHART

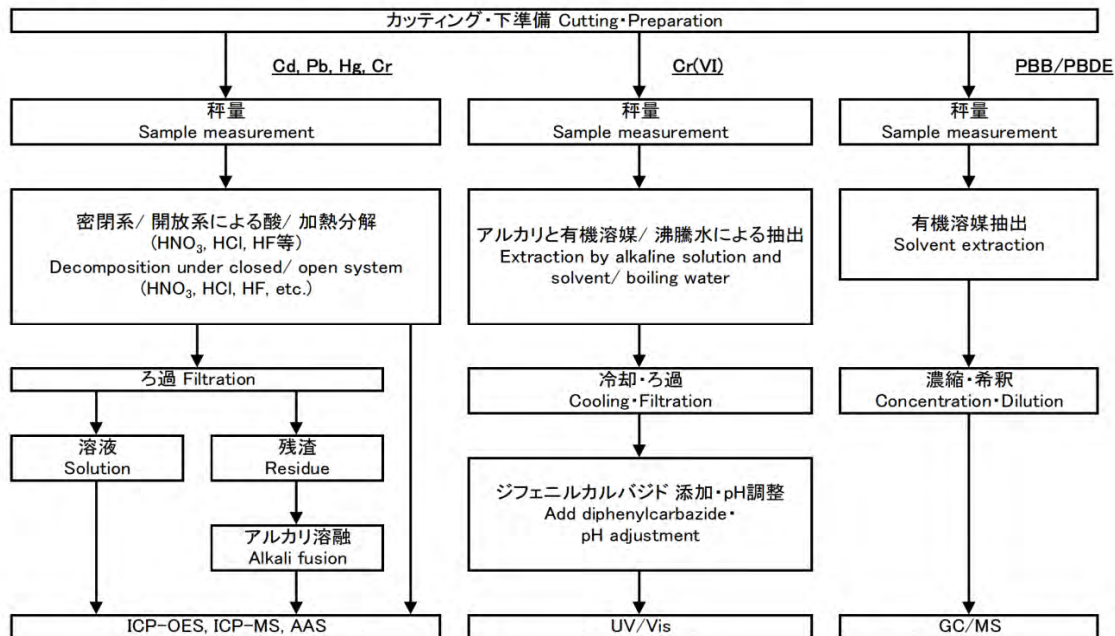
1)酸分解前処理において試料を完全分解しています。

The sample was dissolved/ decomposed totally by acid pre-conditioning method according to below flow chart.

2)Cd, Pb, Hg, Cr, Cr(VI), PBB/PBDE

分析担当者 Name of the person in charge of measurement: 及川 聡子 Satoko Oikawa

3)分析責任者 Name of the person responsible for measurement: 大谷 真由美 Mayumi Otani



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8.Cap(Base Material)



TEST REPORT

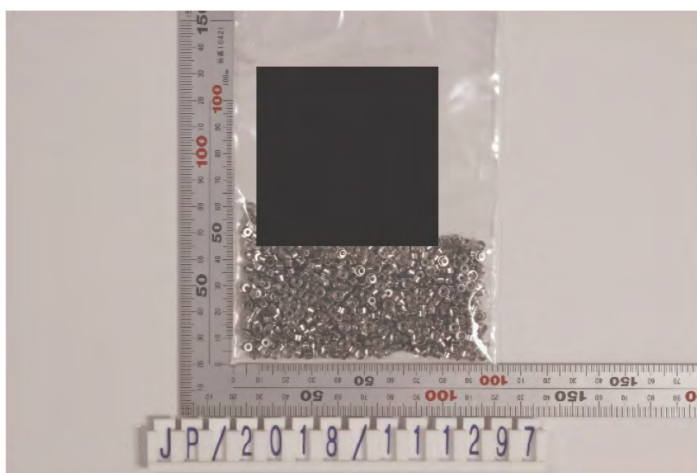
REPORT NO. JP/2018/111297

DATE: December 3, 2018

PAGE: 4 OF 4



SAMPLE IMAGE



<END>

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9.Cap(Ni plating)



TEST REPORT

REPORT NO. JP/2019/080387

DATE: August 20, 2019

PAGE: 1 OF 4

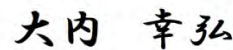
THE FOLLOWING SAMPLE(S) WAS/WERE SUBMITTED AND IDENTIFIED BY/ON BEHALF OF THE CLIENT AS:
 以下のサンプルは顧客により提供され、顧客に代わって確認を行いました。

SAMPLE DESCRIPTION : Ni plating 
 CLIENT REF.NO :
 SAMPLE RECEIVED : 2019/08/07
 TESTING DATE : 2019/08/07 TO 2019/08/20

TEST REQUESTED : SELECTED TEST(S) AS REQUESTED BY CLIENT.
 分析項目 : 分析項目は顧客の要求によります。

TEST METHOD(S) : WITH REFERENCE TO LATEST EDITION OF IEC62321 FOR RoHS 10 SUBSTANCES.
 分析方法 : OTHER CHEMICALS WERE TESTED BY EACH APPROPRIATE METHOD.
 RoHS10物質の分析は最新版のIEC62321を参照しました。
 それ以外の化学物質についてはそれぞれに最適な方法で分析を行いました。

TEST RESULT(S) : PLEASE REFER TO THE NEXT PAGE(S).
 分析結果 : 以下のページをご参照願います。




Yukihiro Ouchi / Quality Manager
 SGS Japan Inc., Chemical Laboratory

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9.Cap(Ni plating)



TEST REPORT

REPORT NO. JP/2019/080387

DATE: August 20, 2019

PAGE: 2 OF 4

TEST RESULT(S)

ITEM(S)	UNIT	RESULT	METHOD	INST./PLACE	MDL
CADMIUM(Cd)	mg/kg	N.D.	IEC62321-5: 2013	ICP-OES	2
LEAD(Pb)	mg/kg	N.D.	IEC62321-5: 2013	ICP-OES	2
MERCURY(Hg)	mg/kg	N.D.	IEC62321-4: 2013+AMD1: 2017	ICP-OES	2
CHROMIUM VI(Cr(VI))	$\mu\text{g}/\text{cm}^2$	N.D.	IEC62321-7-1: 2015	UV/VIS	0.01

NOTES: mg/kg = ppm, N.D. = Not Detected, INST. = INSTRUMENT, MDL = Method Detection Limit

REMARK: Cr(VI) has been tested with regard to the surface area of 10cm².

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9.Cap(Ni plating)



TEST REPORT

REPORT NO. JP/2019/080387

DATE: August 20,2019

PAGE: 3 OF 4



分析フローチャート MEASUREMENT FLOW CHART

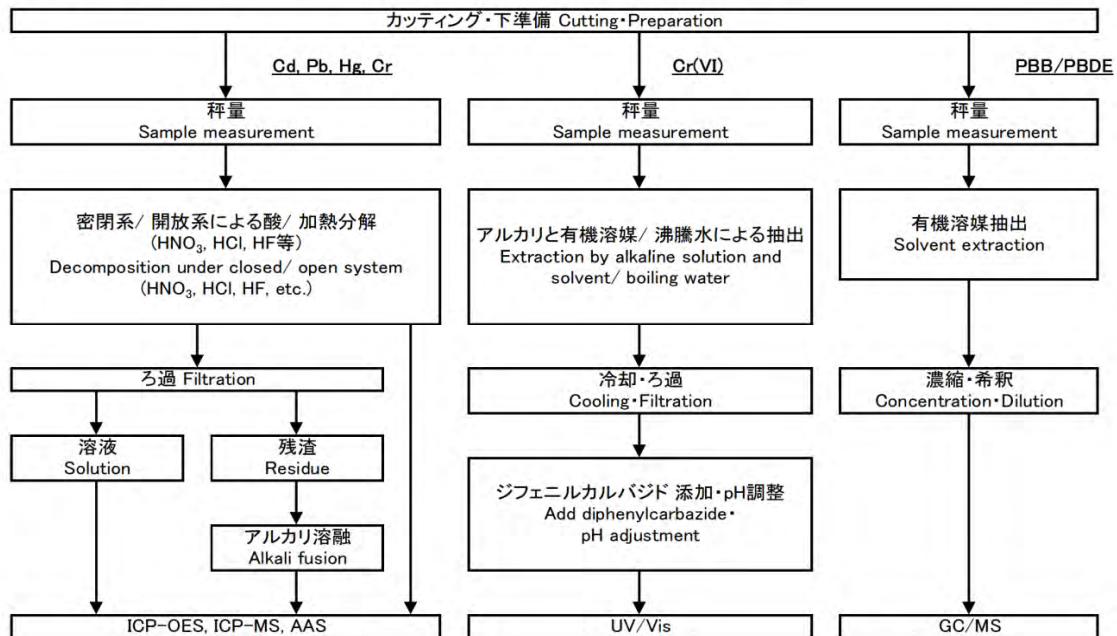
1)酸分解前処理において試料を完全分解しています。

The sample was dissolved/ decomposed totally by acid pre-conditioning method according to below flow chart.

2)Cd, Pb, Hg, Cr, Cr(VI), PBB/PBDE

分析担当者 Name of the person in charge of measurement: 府川 亮平 Ryohei Fukawa

3)分析責任者 Name of the person responsible for measurement: 大谷 真由美 Mayumi Otani



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9.Cap(Ni plating)



TEST REPORT

REPORT NO. JP/2019/080387

DATE: August 20,2019

PAGE: 4 OF 4



SAMPLE IMAGE



<END>

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10.LD CHIP



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For Question, Please
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Test Report

No. : CE/2019/A5280

Date : 2019/11/06

Page : 1 of 11

ROHM CO., LTD.

21, SAIIN MIZOSAKI-CHO, UKYOU-KU, KYOTO 615-8585, JAPAN

The following samples was/were submitted and identified by/on behalf of the applicant as :

Sample Submitted By : ROHM CO., LTD.
Sample Description : LD CHIP
Sample Receiving Date : 2019/10/30
Testing Period : 2019/10/30 to 2019/11/06

Test Requested :

- (1) As specified by client, with reference to RoHS 2011/65/EU Annex II and amending Directive (EU) 2015/863 to determine Cadmium, Lead, Mercury, Cr(VI), PBBs, PBDEs, DBP, BBP, DEHP, DIBP contents in the submitted sample(s).
- (2) Please refer to next pages for the other item(s).

Test Result(s) : Please refer to following pages.

Conclusion : (1) Based on the performed tests on submitted sample(s), the test results of Cadmium, Lead, Mercury, Cr(VI), PBBs, PBDEs, DBP, BBP, DEHP, DIBP comply with the limits as set by RoHS Directive (EU) 2015/863 amending Annex II to Directive 2011/65/EU.

Troy Chang / Manager - Tec
Signed for and behalf of
SGS TAIWAN LTD.
Chemical Laboratory - Taipei



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Test Report

No. : CE/2019/A5280

Date : 2019/11/06

Page : 2 of 11

ROHM CO., LTD.

21, SAIIN MIZOSAKI-CHO, UKYOU-KU, KYOTO 615-8585, JAPAN

Test Result(s)

PART NAME No.1 : WAFER

Test Item(s)	Unit	Method	MDL	Result	Limit
				No.1	
Cadmium (Cd)	mg/kg	With reference to IEC 62321-5 (2013) and performed by ICP-OES.	2	n.d.	100
Lead (Pb)	mg/kg	With reference to IEC 62321-5 (2013) and performed by ICP-OES.	2	n.d.	1000
Mercury (Hg)	mg/kg	With reference to IEC 62321-4:2013+ AMD1:2017 and performed by ICP-OES.	2	n.d.	1000
Hexavalent Chromium Cr(VI)	mg/kg	With reference to IEC 62321-7-2 (2017) and performed by UV-VIS.	8	n.d.	1000
Sum of PBBs	mg/kg		-	n.d.	1000
Monobromobiphenyl	mg/kg		5	n.d.	-
Dibromobiphenyl	mg/kg		5	n.d.	-
Tribromobiphenyl	mg/kg		5	n.d.	-
Tetrabromobiphenyl	mg/kg		5	n.d.	-
Pentabromobiphenyl	mg/kg		5	n.d.	-
Hexabromobiphenyl	mg/kg		5	n.d.	-
Heptabromobiphenyl	mg/kg		5	n.d.	-
Octabromobiphenyl	mg/kg		5	n.d.	-
Nonabromobiphenyl	mg/kg		5	n.d.	-
Decabromobiphenyl	mg/kg	With reference to IEC 62321-6 (2015) and performed by GC/MS.	5	n.d.	-
Sum of PBDEs	mg/kg		-	n.d.	1000
Monobromodiphenyl ether	mg/kg		5	n.d.	-
Dibromodiphenyl ether	mg/kg		5	n.d.	-
Tribromodiphenyl ether	mg/kg		5	n.d.	-
Tetrabromodiphenyl ether	mg/kg		5	n.d.	-
Pentabromodiphenyl ether	mg/kg		5	n.d.	-
Hexabromodiphenyl ether	mg/kg		5	n.d.	-
Heptabromodiphenyl ether	mg/kg		5	n.d.	-
Octabromodiphenyl ether	mg/kg		5	n.d.	-
Nonabromodiphenyl ether	mg/kg		5	n.d.	-
Decabromodiphenyl ether	mg/kg		5	n.d.	-

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Test Report

No. : CE/2019/A5280

Date : 2019/11/06

Page : 3 of 11

ROHM CO., LTD.

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Test Item(s)	Unit	Method	MDL	Result	Limit
				No.1	
BBP (Butyl Benzyl phthalate) (CAS No.: 85-68-7)	mg/kg	With reference to IEC 62321-8 (2017). Analysis was performed by GC/MS.	50	n.d.	1000
DBP (Dibutyl phthalate) (CAS No.: 84-74-2)	mg/kg		50	n.d.	1000
DEHP (Di- (2-ethylhexyl) phthalate) (CAS No.: 117-81-7)	mg/kg		50	n.d.	1000
DIBP (Di-isobutyl phthalate) (CAS No.: 84-69-5)	mg/kg		50	n.d.	1000
DIDP (Di-isodecyl phthalate) (CAS No.: 26761-40-0; 68515-49-1)	mg/kg		50	n.d.	-
DINP (Di-isononyl phthalate) (CAS No.: 28553-12-0; 68515-48-0)	mg/kg		50	n.d.	-
DNOP (Di-n-octyl phthalate) (CAS No.: 117-84-0)	mg/kg		50	n.d.	-
Halogen					
Halogen-Fluorine (F) (CAS No.: 14762-94-8)	mg/kg	With reference to BS EN 14582 (2016). Analysis was performed by IC.	50	n.d.	-
Halogen-Chlorine (Cl) (CAS No.: 22537-15-1)	mg/kg		50	n.d.	-
Halogen-Bromine (Br) (CAS No.: 10097-32-2)	mg/kg		50	n.d.	-
Halogen-Iodine (I) (CAS No.: 14362-44-8)	mg/kg		50	n.d.	-
Perfluorooctane sulfonates (PFOS-Acid, Metal Salt, Amide)	mg/kg	With reference to US EPA 3550C (2007). Analysis was performed by LC/MS.	10	n.d.	-
PFOA (CAS No.: 335-67-1)	mg/kg		10	n.d.	-
Antimony (Sb)	mg/kg	With reference to US EPA 3052 (1996). Analysis was performed by ICP-OES.	2	n.d.	-
Beryllium (Be)	mg/kg		2	n.d.	-
Phosphorus (P)	mg/kg		2	2700	-

Note :

1. mg/kg = ppm ; 0.1wt% = 1000ppm
2. MDL = Method Detection Limit
3. n.d. = Not Detected = less than MDL
4. " - " = Not Regulated

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**Test Report**

No. : CE/2019/A5280

Date : 2019/11/06

Page : 4 of 11

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PFOS Reference Information : POPs - (EU) 2019/1021

Outlawing PFOS as substances or preparations in concentrations above 0.001% (10ppm), in semi-finished products or articles or parts at a level above 0.1%(1000ppm), in textiles or other coated materials above 1µg/m².

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Test Report

No. : CE/2019/A5280

Date : 2019/11/06

Page : 5 of 11

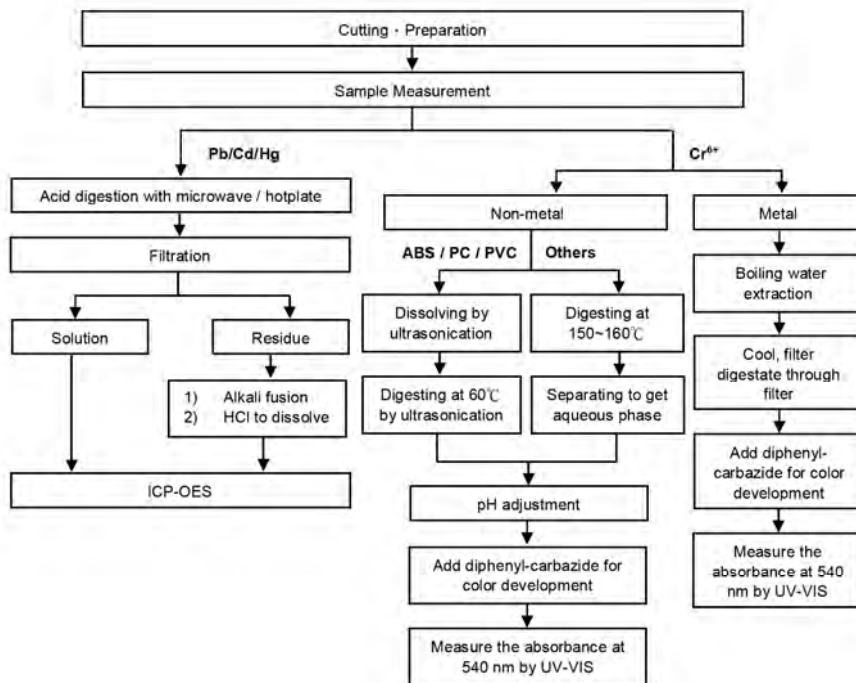
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21, SAIIN MIZOSAKI-CHO, UKYOU-KU, KYOTO 615-8585, JAPAN

Analytical flow chart of Heavy Metal

These samples were dissolved totally by pre-conditioning method according to below flow chart. (Cr⁶⁺ test method excluded)

- Technician : Rita Chen
- Supervisor: Troy Chang



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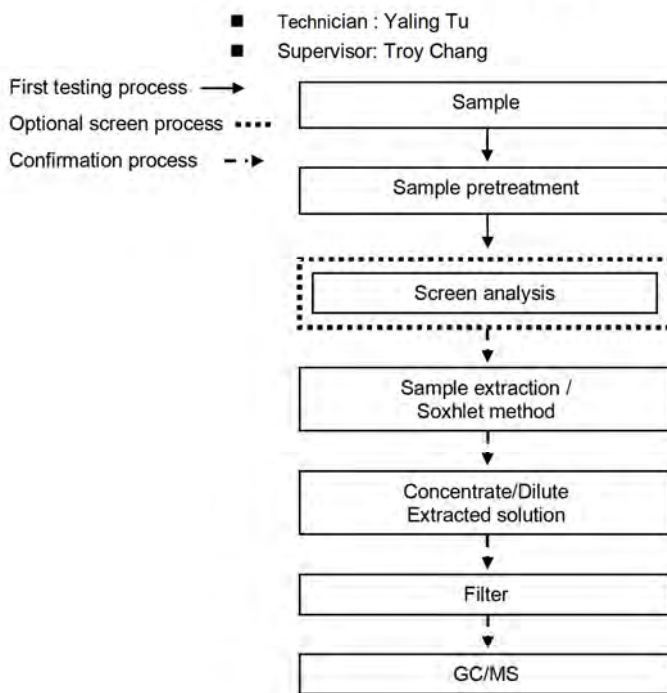
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Page : 6 of 11

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Analytical flow chart – PBB / PBDE



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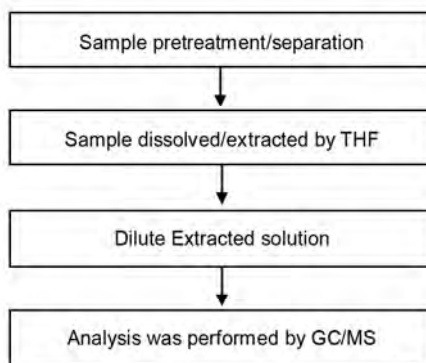
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Analytical flow chart - Phthalate

- Technician: Yaling Tu
- Supervisor: Troy Chang

【Test method: IEC 62321-8】

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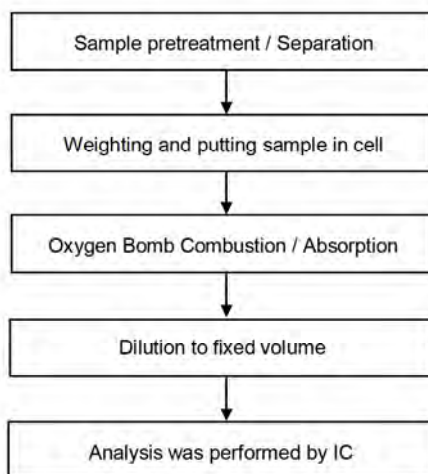
Page : 8 of 11

ROHM CO., LTD.

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Analytical flow chart - Halogen

- Technician: Rita Chen
- Supervisor: Troy Chang



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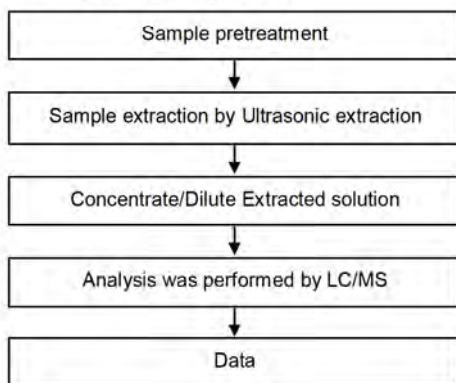
Page : 9 of 11

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21, SAIIN MIZOSAKI-CHO, UKYOU-KU, KYOTO 615-8585, JAPAN

Analytical flow chart - PFOA/PFOS

- Technician: Yaling Tu
- Supervisor: Troy Chang



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10.LD CHIP



Test Report

No. : CE/2019/A5280

Date : 2019/11/06

Page : 10 of 11

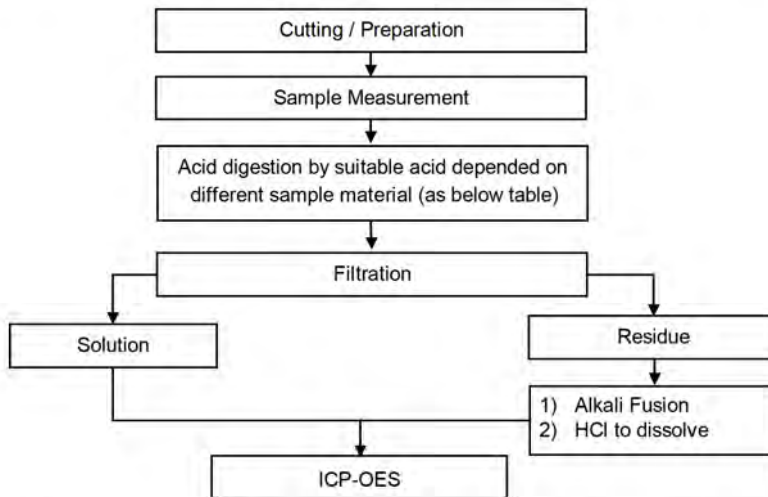
ROHM CO., LTD.

21, SAIIN MIZOSAKI-CHO, UKYOU-KU, KYOTO 615-8585, JAPAN

These samples were dissolved totally by pre-conditioning method according to below flow chart.

- Technician: Rita Chen
- Supervisor: Troy Chang

Flow Chart of digestion for the elements analysis performed by ICP-OES



Steel, copper, aluminum, solder	Aqua regia, HNO ₃ , HCl, HF, H ₂ O ₂
Glass	HNO ₃ /HF
Gold, platinum, palladium, ceramic	Aqua regia
Silver	HNO ₃
Plastic	H ₂ SO ₄ , H ₂ O ₂ , HNO ₃ , HCl
Others	Added appropriate reagent to total digestion

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Test Report

No. : CE/2019/A5280

Date : 2019/11/06

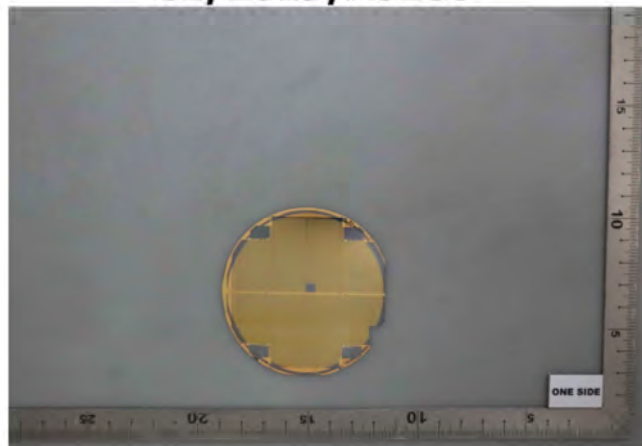
Page : 11 of 11

ROHM CO., LTD.

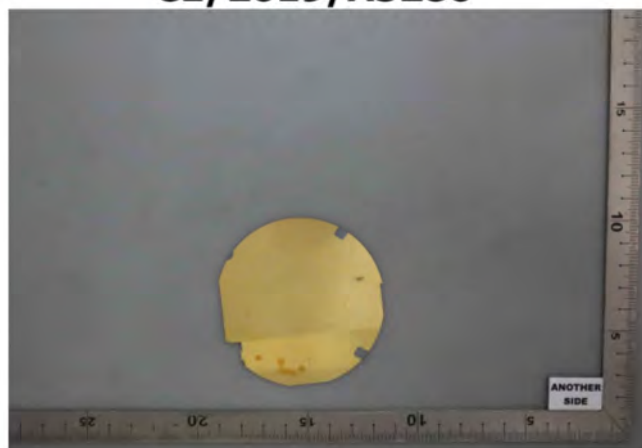
21, SAIIN MIZOSAKI-CHO, UKYOU-KU, KYOTO 615-8585, JAPAN

* The tested sample / part is marked by an arrow if it's shown on the photo. *

CE/2019/A5280



CE/2019/A5280



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11.AIN-Submount



TEST REPORT

REPORT NO. JP/2019/030760

DATE: March 25, 2019

PAGE: 1 OF 4



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以下のサンプルは顧客により提供され、顧客に代わって確認を行いました:

SAMPLE DESCRIPTION : AIN Lot.190311HA

CLIENT REF.NO :

SAMPLE RECEIVED : 2019/03/12

TESTING DATE : 2019/03/12 TO 2019/03/22

TEST REQUESTED : SELECTED TEST(S) AS REQUESTED BY CLIENT.
分析項目 : 分析項目は顧客の要求によります。

TEST METHOD(S) : WITH REFERENCE TO LATEST EDITION OF IEC62321 FOR RoHS 6 SUBSTANCES.
分析方法 : OTHER CHEMICALS WERE TESTED BY EACH APPROPRIATE METHOD.
RoHS6物質の分析は最新版のIEC62321を参照しました。
それ以外の化学物質についてはそれぞれに最適な方法で分析を行いました。

TEST RESULT(S) : PLEASE REFER TO THE NEXT PAGE(S).
分析結果 : 以下のページをご参照願います。

大内 幸弘



Yukihiro Ouchi / Quality Manager
SGS Japan Inc., Chemical Laboratory

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11.AIN-Submount



TEST REPORT

REPORT NO. JP/2019/030760

DATE: March 25, 2019

PAGE: 2 OF 4

TEST RESULT(S)

ITEM(S)	UNIT	RESULT	METHOD	INST./PLACE	MDL
CADMIUM(Cd)	mg/kg	N.D.	IEC62321-5: 2013	ICP-OES	2
LEAD(Pb)	mg/kg	N.D.	IEC62321-5: 2013	ICP-OES	2
MERCURY(Hg)	mg/kg	N.D.	IEC62321-4: 2013	ICP-OES	2
CHROMIUM VI(Cr(VI))	mg/kg	N.D.	IEC62321-7-2: 2017	UV/VIS	8

NOTES: mg/kg = ppm, N.D. = Not Detected, INST. = INSTRUMENT, MDL = Method Detection Limit

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TEST REPORT

REPORT NO. JP/2019/030760

DATE: March 25, 2019

PAGE: 3 OF 4

分析フローチャート MEASUREMENT FLOW CHART

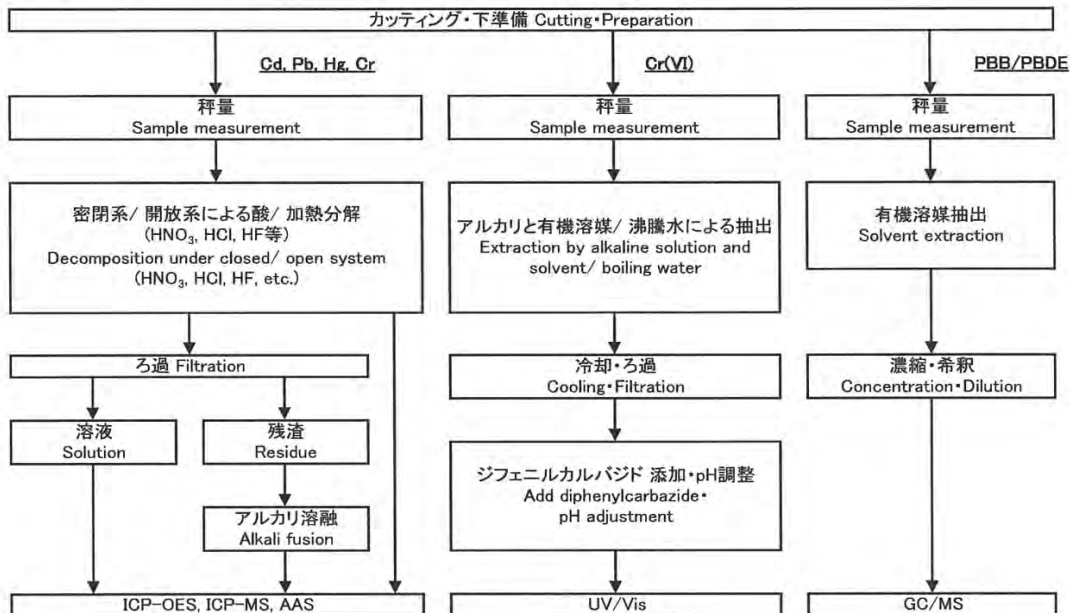
1)酸分解前処理において試料を完全分解しています。

The sample was dissolved/ decomposed totally by acid pre-conditioning method according to below flow chart.

2)Cd, Pb, Hg, Cr, Cr(VI), PBB/PBDE

分析担当者 Name of the person in charge of measurement: 及川 聡子 Satoko Oikawa

3)分析責任者 Name of the person responsible for measurement: 大谷 真由美 Mayumi Otani



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11.AIN-Submount_Au



TEST REPORT

REPORT NO. JP/2019/030758

DATE: March 25, 2019

PAGE: 1 OF 4

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以下のサンプルは顧客により提供され、顧客に代わって確認を行いました:

SAMPLE DESCRIPTION : Au Lot.2514072
CLIENT REF.NO :
SAMPLE RECEIVED : 2019/03/12
TESTING DATE : 2019/03/12 TO 2019/03/22

TEST REQUESTED : SELECTED TEST(S) AS REQUESTED BY CLIENT.
分析項目 : 分析項目は顧客の要求によります。

TEST METHOD(S) : WITH REFERENCE TO LATEST EDITION OF IEC62321 FOR RoHS 6 SUBSTANCES.
分析手法 : OTHER CHEMICALS WERE TESTED BY EACH APPROPRIATE METHOD.
RoHS6物質の分析は最新版のIEC62321を参照しました。
それ以外の化学物質についてはそれぞれに最適な方法で分析を行いました。

TEST RESULT(S) : PLEASE REFER TO THE NEXT PAGE(S).
分析結果 : 以下のページをご参照願います。

大内 幸弘



Yukihiko Ouchi / Quality Manager
SGS Japan Inc., Chemical Laboratory

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11.AIN-Submount_Au



TEST REPORT

REPORT NO. JP/2019/030758

DATE: March 25, 2019

PAGE: 2 OF 4

TEST RESULT(S)

ITEM(S)	UNIT	RESULT	METHOD	INST./PLACE	MDL
CADMIUM(Cd)	mg/kg	N.D.	IEC62321-5: 2013	ICP-OES	2
LEAD(Pb)	mg/kg	N.D.	IEC62321-5: 2013	ICP-OES	2
MERCURY(Hg)	mg/kg	N.D.	IEC62321-4: 2013	ICP-OES	2
CHROMIUM VI(Cr(VI))	$\mu\text{g}/\text{cm}^2$	N.D.	IEC62321-7-1: 2015	UV/VIS	0.01

NOTES: mg/kg = ppm, N.D. = Not Detected, INST. = INSTRUMENT, MDL = Method Detection Limit

REMARK: Cr(VI) has been tested with regard to the surface area of 5cm².

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TEST REPORT

REPORT NO. JP/2019/030758

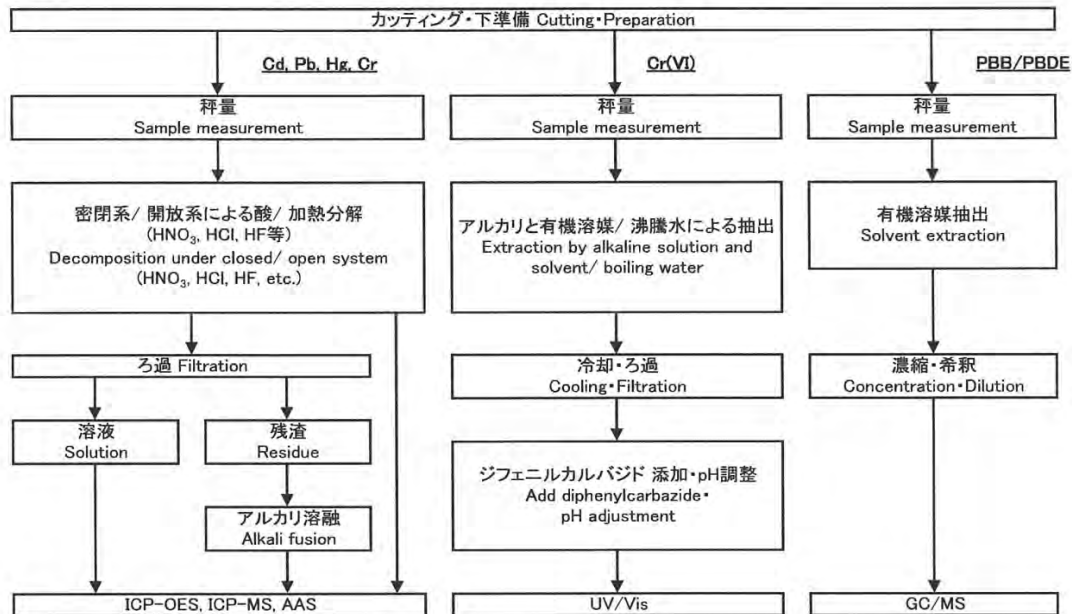
DATE: March 25, 2019

PAGE: 3 OF 4



分析フローチャート MEASUREMENT FLOW CHART

- 1)酸分解前処理において試料を完全分解しています。
The sample was dissolved/ decomposed totally by acid pre-conditioning method according to below flow chart.
- 2)Cd, Pb, Hg, Cr, Cr(VI), PBB/PBDE
- 分析担当者 Name of the person in charge of measurement: 及川 聡子 Satoko Oikawa
- 3)分析責任者 Name of the person responsible for measurement: 大谷 真由美 Mayumi Otani



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11.AIN-Submount_Pt



TEST REPORT

REPORT NO. JP/2019/030757

DATE: March 25, 2019

PAGE: 1 OF 4

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SAMPLE DESCRIPTION : Pt Lot.3116721
CLIENT REF.NO :
SAMPLE RECEIVED : 2019/03/12
TESTING DATE : 2019/03/12 TO 2019/03/22

TEST REQUESTED : SELECTED TEST(S) AS REQUESTED BY CLIENT.
分析項目 : 分析項目は顧客の要求によります。

TEST METHOD(S) : WITH REFERENCE TO LATEST EDITION OF IEC62321 FOR RoHS 6 SUBSTANCES.
分析手法 : OTHER CHEMICALS WERE TESTED BY EACH APPROPRIATE METHOD.
RoHS6物質の分析は最新版のIEC62321を参照しました。
それ以外の化学物質についてはそれぞれに最適な方法で分析を行いました。

TEST RESULT(S) : PLEASE REFER TO THE NEXT PAGE(S).
分析結果 : 以下のページをご参照願います。

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Yukihiko Ouchi / Quality Manager
SGS Japan Inc., Chemical Laboratory

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11.AIN-Submount_Pt



TEST REPORT

REPORT NO. JP/2019/030757

DATE: March 25, 2019

PAGE: 2 OF 4



TEST RESULT(S)

ITEM(S)	UNIT	RESULT	METHOD	INST./PLACE	MDL
CADMIUM(Cd)	mg/kg	N.D.	IEC62321-5: 2013	ICP-OES	2
LEAD(Pb)	mg/kg	N.D.	IEC62321-5: 2013	ICP-OES	2
MERCURY(Hg)	mg/kg	N.D.	IEC62321-4: 2013	ICP-OES	2
CHROMIUM VI(Cr(VI))	$\mu\text{g}/\text{cm}^2$	N.D.	IEC62321-7-1: 2015	UV/VIS	0.01

NOTES: mg/kg = ppm, N.D. = Not Detected, INST. = INSTRUMENT, MDL = Method Detection Limit

REMARK: Cr(VI) has been tested with regard to the surface area of 5cm².

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TEST REPORT

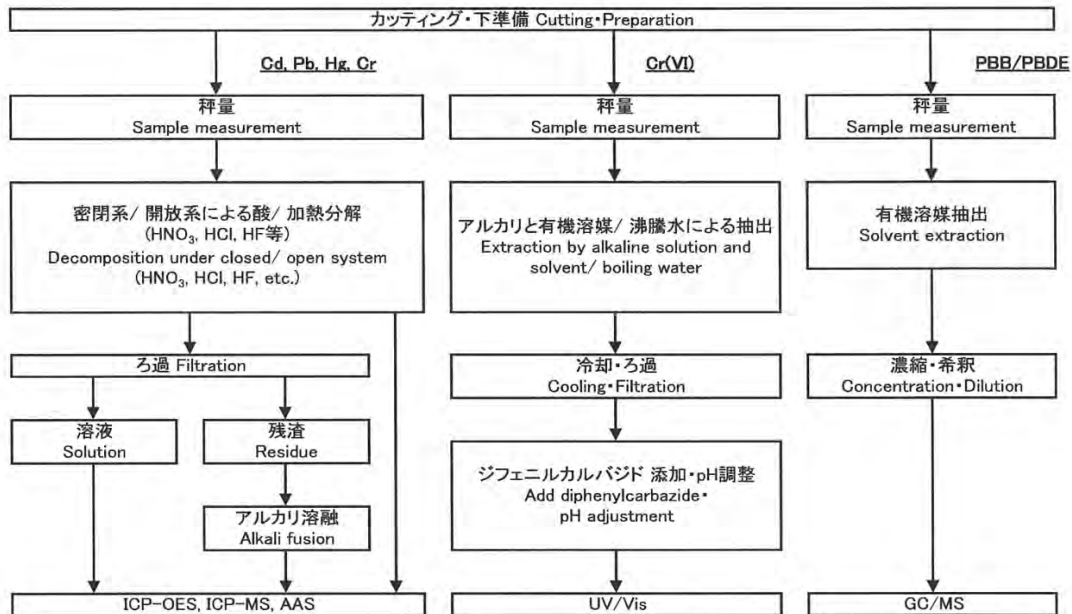
REPORT NO. JP/2019/030757

DATE: March 25, 2019

PAGE: 3 OF 4

分析フローチャート MEASUREMENT FLOW CHART

- 1)酸分解前処理において試料を完全分解しています。
The sample was dissolved/ decomposed totally by acid pre-conditioning method according to below flow chart.
- 2)Cd, Pb, Hg, Cr, Cr(VI), PBB/PBDE
- 分析担当者 Name of the person in charge of measurement: 及川 聡子 Satoko Oikawa
- 3)分析責任者 Name of the person responsible for measurement: 大谷 真由美 Mayumi Otani



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11.AIN-Submount_Sn



TEST REPORT

REPORT NO. JP/2019/030759

DATE: March 25, 2019

PAGE: 1 OF 4



THE FOLLOWING SAMPLE(S) WAS/WERE SUBMITTED AND IDENTIFIED BY/ON BEHALF OF THE CLIENT AS:

以下のサンプルは顧客により提供され、顧客に代わって確認を行いました。

SAMPLE DESCRIPTION : Sn Lot.M44129

CLIENT REF.NO :

SAMPLE RECEIVED : 2019/03/12

TESTING DATE : 2019/03/12 TO 2019/03/22

TEST REQUESTED : SELECTED TEST(S) AS REQUESTED BY CLIENT.

分析項目 : 分析項目は顧客の要求によります。

TEST METHOD(S) : WITH REFERENCE TO LATEST EDITION OF IEC62321 FOR RoHS 6 SUBSTANCES.

分析方法 : OTHER CHEMICALS WERE TESTED BY EACH APPROPRIATE METHOD.
RoHS6物質の分析は最新版のIEC62321を参照しました。
それ以外の化学物質についてはそれぞれに最適な方法で分析を行いました。

TEST RESULT(S) : PLEASE REFER TO THE NEXT PAGE(S).

分析結果 : 以下のページをご参照願います。

大内 幸弘



Yukihiro Ouchi / Quality Manager
SGS Japan Inc., Chemical Laboratory

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11.AIN-Submount_Sn



TEST REPORT

REPORT NO. JP/2019/030759

DATE: March 25, 2019

PAGE: 2 OF 4



TEST RESULT(S)

ITEM(S)	UNIT	RESULT	METHOD	INST./PLACE	MDL
CADMIUM(Cd)	mg/kg	N.D.	IEC62321-5: 2013	ICP-OES	2
LEAD(Pb)	mg/kg	N.D.	IEC62321-5: 2013	ICP-OES	2
MERCURY(Hg)	mg/kg	N.D.	IEC62321-4: 2013	ICP-OES	2
CHROMIUM VI(Cr(VI))	mg/kg	N.D.	IEC62321-7-1: 2015	UV/VIS	2

NOTES: mg/kg = ppm, N.D. = Not Detected, INST. = INSTRUMENT, MDL = Method Detection Limit

REMARK: The content of Cr(VI) has been calculated with regard to the sample weight as specified by client.

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11.AIN-Submount_Sn



TEST REPORT

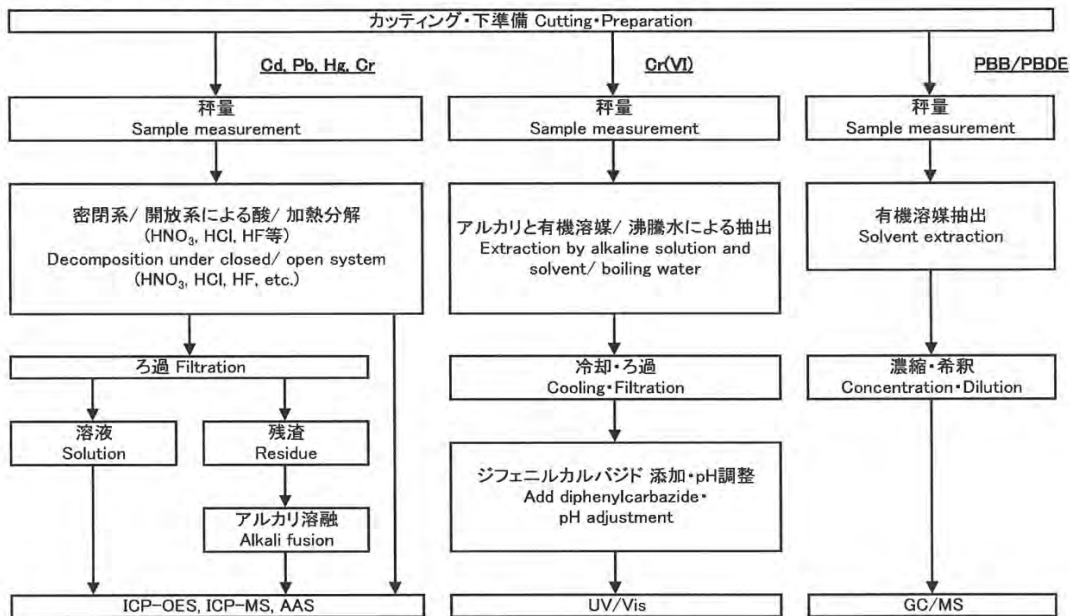
REPORT NO. JP/2019/030759

DATE: March 25, 2019

PAGE: 3 OF 4

分析フローチャート MEASUREMENT FLOW CHART

- 1)酸分解前処理において試料を完全分解しています。
The sample was dissolved/ decomposed totally by acid pre-conditioning method according to below flow chart.
- 2)Cd, Pb, Hg, Cr, Cr(VI), PBB/PBDE
- 分析担当者 Name of the person in charge of measurement: 及川 聡子 Satoko Oikawa
- 3)分析責任者 Name of the person responsible for measurement: 大谷 真由美 Mayumi Otani



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11.AIN-Submount_Ti



TEST REPORT

REPORT NO. JP/2019/030756

DATE: March 25, 2019

PAGE: 1 OF 4

THE FOLLOWING SAMPLE(S) WAS/WERE SUBMITTED AND IDENTIFIED BY/ON BEHALF OF THE CLIENT AS:
以下のサンプルは顧客により提供され、顧客に代わって確認を行いました:

SAMPLE DESCRIPTION : Ti Lot.4770971
CLIENT REF.NO :
SAMPLE RECEIVED : 2019/03/12
TESTING DATE : 2019/03/12 TO 2019/03/22

TEST REQUESTED : SELECTED TEST(S) AS REQUESTED BY CLIENT.
分析項目 : 分析項目は顧客の要求によります。

TEST METHOD(S) : WITH REFERENCE TO LATEST EDITION OF IEC62321 FOR RoHS 6 SUBSTANCES.
分析手法 : OTHER CHEMICALS WERE TESTED BY EACH APPROPRIATE METHOD.
RoHS6物質の分析は最新版のIEC62321を参照しました。
それ以外の化学物質についてはそれぞれに最適な方法で分析を行いました。

TEST RESULT(S) : PLEASE REFER TO THE NEXT PAGE(S).
分析結果 : 以下のページをご参照願います。

大内 幸弘



Yukihiko Ouchi / Quality Manager
SGS Japan Inc., Chemical Laboratory

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11.AIN-Submount_Ti



TEST REPORT

REPORT NO. JP/2019/030756

DATE: March 25, 2019

PAGE: 2 OF 4

TEST RESULT(S)

ITEM(S)	UNIT	RESULT	METHOD	INST./PLACE	MDL
CADMIUM(Cd)	mg/kg	N.D.	IEC62321-5: 2013	ICP-OES	2
LEAD(Pb)	mg/kg	N.D.	IEC62321-5: 2013	ICP-OES	2
MERCURY(Hg)	mg/kg	N.D.	IEC62321-4: 2013	ICP-OES	2
CHROMIUM VI(Cr(VI))	$\mu\text{g}/\text{cm}^2$	N.D.	IEC62321-7-1: 2015	UV/VIS	0.01

NOTES: mg/kg = ppm, N.D. = Not Detected, INST. = INSTRUMENT, MDL = Method Detection Limit

REMARK: Cr(VI) has been tested with regard to the surface area of 12cm².

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11.AIN-Submount_Ti



TEST REPORT

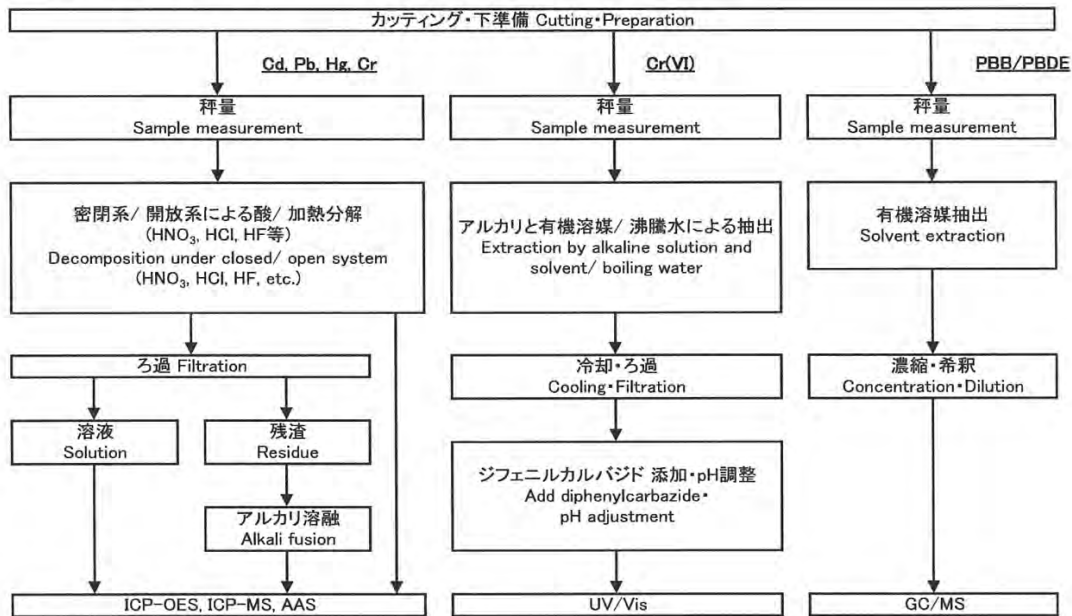
REPORT NO. JP/2019/030756

DATE: March 25, 2019

PAGE: 3 OF 4

分析フローチャート MEASUREMENT FLOW CHART

- 1)酸分解前処理において試料を完全分解しています。
The sample was dissolved/ decomposed totally by acid pre-conditioning method according to below flow chart.
- 2)Cd, Pb, Hg, Cr, Cr(VI), PBB/PBDE
- 分析担当者 Name of the person in charge of measurement: 及川 聡子 Satoko Oikawa
- 3)分析責任者 Name of the person responsible for measurement: 大谷 真由美 Mayumi Otani



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12.PD



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For Question, Please
Contact with SGS
www.sgs.com.tw

Test Report No. : CE/2019/A5277 Date : 2019/11/06 Page : 1 of 11

ROHM CO., LTD.
21, SAIIN MIZOSAKI-CHO, UKYOU-KU, KYOTO 615-8585, JAPAN

The following samples was/were submitted and identified by/on behalf of the applicant as :

Sample Submitted By : ROHM CO., LTD.
Sample Description : PD (PHOTO DIODE)
Sample Receiving Date : 2019/10/30
Testing Period : 2019/10/30 to 2019/11/06


Test Requested :

- (1) As specified by client, with reference to RoHS 2011/65/EU Annex II and amending Directive (EU) 2015/863 to determine Cadmium, Lead, Mercury, Cr(VI), PBBs, PBDEs, DBP, BBP, DEHP, DIBP contents in the submitted sample(s).
- (2) Please refer to next pages for the other item(s).

Test Result(s) : Please refer to following pages.

Conclusion : (1) Based on the performed tests on submitted sample(s), the test results of Cadmium, Lead, Mercury, Cr(VI), PBBs, PBDEs, DBP, BBP, DEHP, DIBP comply with the limits as set by RoHS Directive (EU) 2015/863 amending Annex II to Directive 2011/65/EU.

Troy Chang
 Troy Chang / Manager - Tec
 Signed for and behalf of
 SGS TAIWAN LTD.
 Chemical Laboratory - Taipei



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Test Report

No. : CE/2019/A5277

Date : 2019/11/06

Page : 2 of 11

ROHM CO., LTD.

21, SAIIN MIZOSAKI-CHO, UKYOU-KU, KYOTO 615-8585, JAPAN

Test Result(s)

PART NAME No.1 : WAFER

Test Item(s)	Unit	Method	MDL	Result	Limit
				No.1	
Cadmium (Cd)	mg/kg	With reference to IEC 62321-5 (2013) and performed by ICP-OES.	2	n.d.	100
Lead (Pb)	mg/kg	With reference to IEC 62321-5 (2013) and performed by ICP-OES.	2	n.d.	1000
Mercury (Hg)	mg/kg	With reference to IEC 62321-4:2013+ AMD1:2017 and performed by ICP-OES.	2	n.d.	1000
Hexavalent Chromium Cr(VI)	mg/kg	With reference to IEC 62321-7-2 (2017) and performed by UV-VIS.	8	n.d.	1000
Sum of PBBs	mg/kg		-	n.d.	1000
Monobromobiphenyl	mg/kg		5	n.d.	-
Dibromobiphenyl	mg/kg		5	n.d.	-
Tribromobiphenyl	mg/kg		5	n.d.	-
Tetrabromobiphenyl	mg/kg		5	n.d.	-
Pentabromobiphenyl	mg/kg		5	n.d.	-
Hexabromobiphenyl	mg/kg		5	n.d.	-
Heptabromobiphenyl	mg/kg		5	n.d.	-
Octabromobiphenyl	mg/kg		5	n.d.	-
Nonabromobiphenyl	mg/kg		5	n.d.	-
Decabromobiphenyl	mg/kg	With reference to IEC 62321-6 (2015) and performed by GC/MS.	5	n.d.	-
Sum of PBDEs	mg/kg		-	n.d.	1000
Monobromodiphenyl ether	mg/kg		5	n.d.	-
Dibromodiphenyl ether	mg/kg		5	n.d.	-
Tribromodiphenyl ether	mg/kg		5	n.d.	-
Tetrabromodiphenyl ether	mg/kg		5	n.d.	-
Pentabromodiphenyl ether	mg/kg		5	n.d.	-
Hexabromodiphenyl ether	mg/kg		5	n.d.	-
Heptabromodiphenyl ether	mg/kg		5	n.d.	-
Octabromodiphenyl ether	mg/kg		5	n.d.	-
Nonabromodiphenyl ether	mg/kg		5	n.d.	-
Decabromodiphenyl ether	mg/kg		5	n.d.	-

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12.PD



Test Report

No. : CE/2019/A5277

Date : 2019/11/06

Page : 3 of 11

ROHM CO., LTD.

21, SAIIN MIZOSAKI-CHO, UKYOU-KU, KYOTO 615-8585, JAPAN

Test Item(s)	Unit	Method	MDL	Result	Limit
				No.1	
BBP (Butyl Benzyl phthalate) (CAS No.: 85-68-7)	mg/kg	With reference to IEC 62321-8 (2017). Analysis was performed by GC/MS.	50	n.d.	1000
DBP (Dibutyl phthalate) (CAS No.: 84-74-2)	mg/kg		50	n.d.	1000
DEHP (Di- (2-ethylhexyl) phthalate) (CAS No.: 117-81-7)	mg/kg		50	n.d.	1000
DIBP (Di-isobutyl phthalate) (CAS No.: 84-69-5)	mg/kg		50	n.d.	1000
DIDP (Di-isodecyl phthalate) (CAS No.: 26761-40-0; 68515-49-1)	mg/kg		50	n.d.	-
DINP (Di-isononyl phthalate) (CAS No.: 28553-12-0; 68515-48-0)	mg/kg		50	n.d.	-
DNOP (Di-n-octyl phthalate) (CAS No.: 117-84-0)	mg/kg		50	n.d.	-
Halogen					
Halogen-Fluorine (F) (CAS No.: 14762-94-8)	mg/kg	With reference to BS EN 14582 (2016). Analysis was performed by IC.	50	n.d.	-
Halogen-Chlorine (Cl) (CAS No.: 22537-15-1)	mg/kg		50	n.d.	-
Halogen-Bromine (Br) (CAS No.: 10097-32-2)	mg/kg		50	n.d.	-
Halogen-Iodine (I) (CAS No.: 14362-44-8)	mg/kg		50	n.d.	-
Perfluorooctane sulfonates (PFOS-Acid, Metal Salt, Amide)	mg/kg	With reference to US EPA 3550C (2007). Analysis was performed by LC/MS.	10	n.d.	-
PFOA (CAS No.: 335-67-1)	mg/kg		10	n.d.	-
Antimony (Sb)	mg/kg	With reference to US EPA 3052 (1996). Analysis was performed by ICP-OES.	2	125	-
Beryllium (Be)	mg/kg		2	n.d.	-
Phosphorus (P)	mg/kg		2	11.7	-

Note :

1. mg/kg = ppm ; 0.1wt% = 1000ppm
2. MDL = Method Detection Limit
3. n.d. = Not Detected = less than MDL
4. " - " = Not Regulated

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**Test Report**

No. : CE/2019/A5277

Date : 2019/11/06

Page : 4 of 11

ROHM CO., LTD.

21, SAIIN MIZOSAKI-CHO, UKYOU-KU, KYOTO 615-8585, JAPAN

PFOS Reference Information : POPs - (EU) 2019/1021

Outlawing PFOS as substances or preparations in concentrations above 0.001% (10ppm), in semi-finished products or articles or parts at a level above 0.1%(1000ppm), in textiles or other coated materials above 1µg/m².

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Test Report

No. : CE/2019/A5277

Date : 2019/11/06

Page : 5 of 11

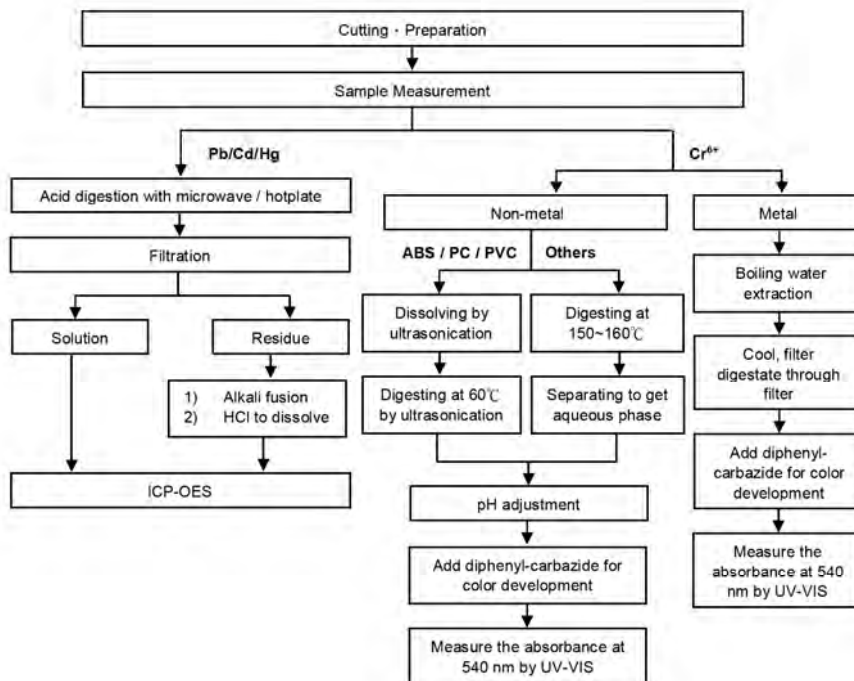
ROHM CO., LTD.

21, SAIIN MIZOSAKI-CHO, UKYOU-KU, KYOTO 615-8585, JAPAN

Analytical flow chart of Heavy Metal

These samples were dissolved totally by pre-conditioning method according to below flow chart. (Cr⁶⁺ test method excluded)

- Technician : Rita Chen
- Supervisor: Troy Chang



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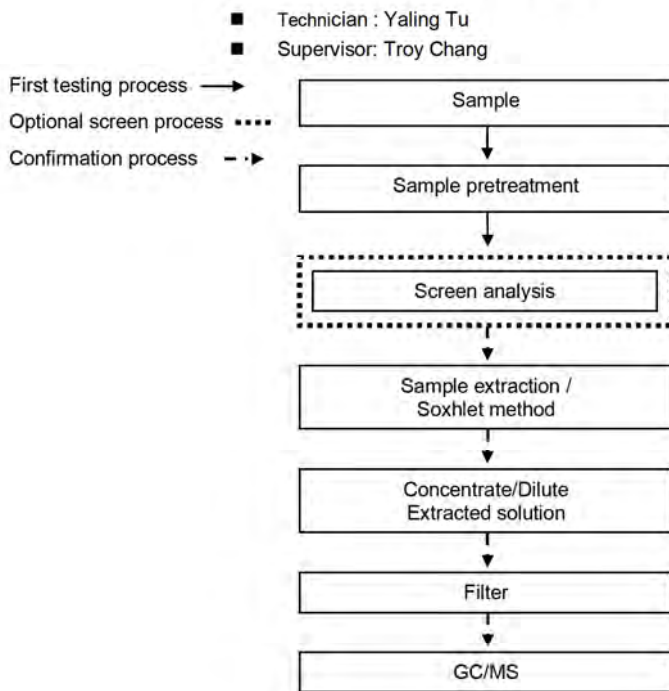
Date : 2019/11/06

Page : 6 of 11

ROHM CO., LTD.

21, SAIIN MIZOSAKI-CHO, UKYOU-KU, KYOTO 615-8585, JAPAN

Analytical flow chart – PBB / PBDE



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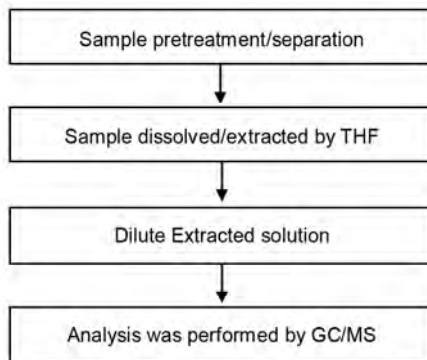
Page : 7 of 11

ROHM CO., LTD.

21, SAIIN MIZOSAKI-CHO, UKYOU-KU, KYOTO 615-8585, JAPAN

Analytical flow chart - Phthalate

- Technician: Yaling Tu
- Supervisor: Troy Chang

【Test method: IEC 62321-8】

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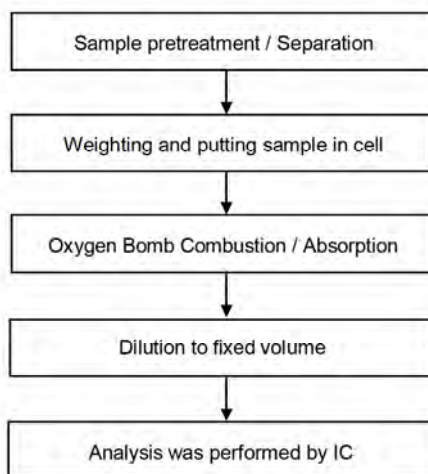
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ROHM CO., LTD.

21, SAIIN MIZOSAKI-CHO, UKYOU-KU, KYOTO 615-8585, JAPAN

Analytical flow chart - Halogen

- Technician: Rita Chen
- Supervisor: Troy Chang



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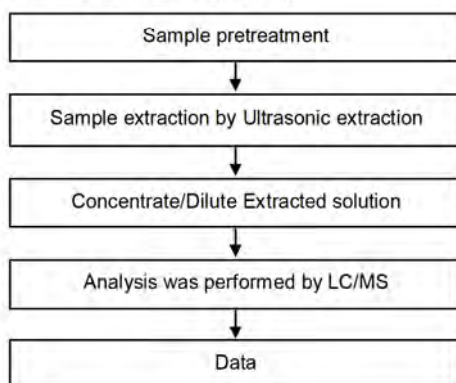
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ROHM CO., LTD.

21, SAIIN MIZOSAKI-CHO, UKYOU-KU, KYOTO 615-8585, JAPAN

Analytical flow chart - PFOA/PFOS

- Technician: Yaling Tu
- Supervisor: Troy Chang



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Date : 2019/11/06

Page : 10 of 11

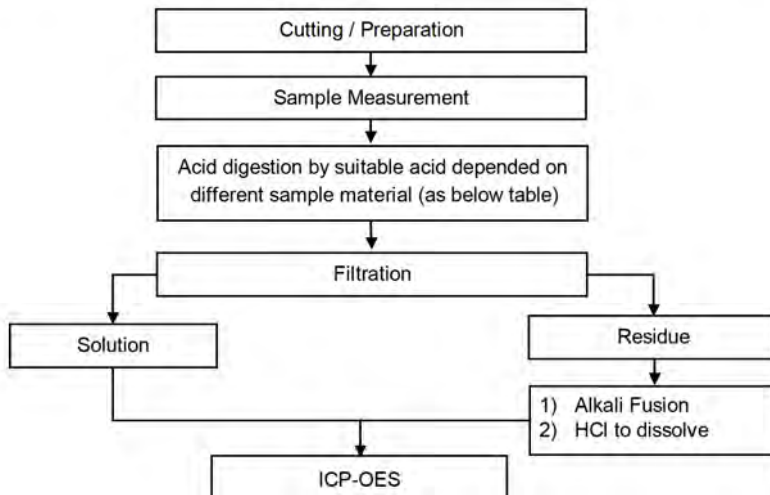
ROHM CO., LTD.

21, SAIIN MIZOSAKI-CHO, UKYOU-KU, KYOTO 615-8585, JAPAN

These samples were dissolved totally by pre-conditioning method according to below flow chart.

- Technician: Rita Chen
- Supervisor: Troy Chang

Flow Chart of digestion for the elements analysis performed by ICP-OES



Steel, copper, aluminum, solder	Aqua regia, HNO ₃ , HCl, HF, H ₂ O ₂
Glass	HNO ₃ /HF
Gold, platinum, palladium, ceramic	Aqua regia
Silver	HNO ₃
Plastic	H ₂ SO ₄ , H ₂ O ₂ , HNO ₃ , HCl
Others	Added appropriate reagent to total digestion

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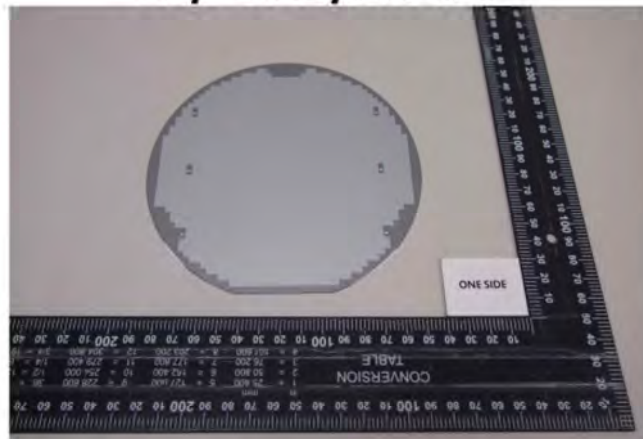
Page : 11 of 11

ROHM CO., LTD.

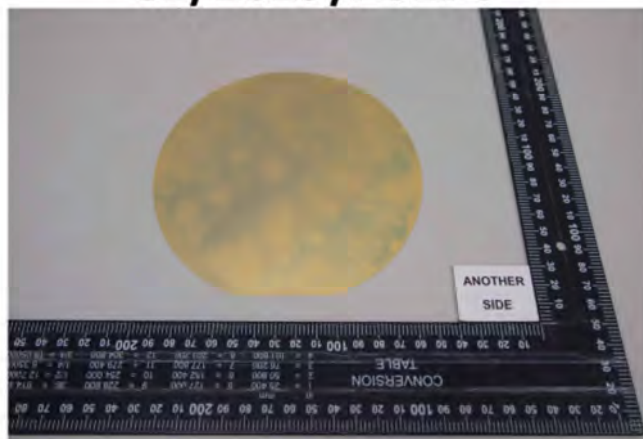
21, SAIIN MIZOSAKI-CHO, UKYOU-KU, KYOTO 615-8585, JAPAN

* The tested sample / part is marked by an arrow if it's shown on the photo. *

CE/2019/A5276



CE/2019/A5276



** End of Report **

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Test Report

No. SHAEC1822492901

Date: 16 Oct 2018

Page 1 of 6

The following sample(s) was/were submitted and identified on behalf of the clients as : [REDACTED]

SGS Job No. : SP18-033708 - SH
 Composition : Bisphenol F type epoxy resins
 Date of Sample Received : 09 Oct 2018
 Testing Period : 09 Oct 2018 - 15 Oct 2018
 Test Requested : Selected test(s) as requested by client.
 Test Method : Please refer to next page(s).
 Test Results : Please refer to next page(s).
 Conclusion : Based on the performed tests on submitted sample(s), the results of Cadmium, Lead, Mercury, Hexavalent chromium, Polybrominated biphenyls (PBBs), Polybrominated diphenyl ethers (PBDEs) and Phthalates such as Bis(2-ethylhexyl) phthalate (DEHP), Butyl benzyl phthalate (BBP), Dibutyl phthalate (DBP) and Diisobutyl phthalate (DIBP) comply with the limits as set by RoHS Directive (EU) 2015/863 amending Annex II to Directive 2011/65/EU.

Signed for and on behalf of
 SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd.

Dora Hu

Dora Hu
 Approved Signatory



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**Test Report**

No. SHAEC1822492901

Date: 16 Oct 2018

Page 2 of 6

Test Results :

Test Part Description :

Specimen No.	SGS Sample ID	Description
SN1	SHA18-224929.001	Beige mud

Remarks :

- (1) 1 mg/kg = 0.0001%
- (2) MDL = Method Detection Limit
- (3) ND = Not Detected (< MDL)
- (4) "-" = Not Regulated

RoHS Directive (EU) 2015/863 amending Annex II to Directive 2011/65/EU

Test Method : With reference to IEC 62321-4:2013+AMD1:2017, IEC62321-5:2013, IEC62321-7-2:2017, IEC 62321-6:2015 and IEC62321-8:2017, analyzed by ICP-OES, UV-Vis and GC-MS.

Test Item(s)	Limit	Unit	MDL	001
Cadmium (Cd)	100	mg/kg	2	ND
Lead (Pb)	1000	mg/kg	2	ND
Mercury (Hg)	1000	mg/kg	2	ND
Hexavalent Chromium (Cr(VI))	1000	mg/kg	8	ND
Sum of PBBs	1000	mg/kg	-	ND
Monobromobiphenyl	-	mg/kg	5	ND
Dibromobiphenyl	-	mg/kg	5	ND
Tribromobiphenyl	-	mg/kg	5	ND
Tetrabromobiphenyl	-	mg/kg	5	ND
Pentabromobiphenyl	-	mg/kg	5	ND
Hexabromobiphenyl	-	mg/kg	5	ND
Heptabromobiphenyl	-	mg/kg	5	ND
Octabromobiphenyl	-	mg/kg	5	ND
Nonabromobiphenyl	-	mg/kg	5	ND
Decabromobiphenyl	-	mg/kg	5	ND
Sum of PBDEs	1000	mg/kg	-	ND
Monobromodiphenyl ether	-	mg/kg	5	ND
Dibromodiphenyl ether	-	mg/kg	5	ND
Tribromodiphenyl ether	-	mg/kg	5	ND
Tetrabromodiphenyl ether	-	mg/kg	5	ND



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No. SHAEC1822492901

Date: 16 Oct 2018

Page 3 of 6

Test Item(s)	Limit	Unit	MDL	001
Pentabromodiphenyl ether	-	mg/kg	5	ND
Hexabromodiphenyl ether	-	mg/kg	5	ND
Heptabromodiphenyl ether	-	mg/kg	5	ND
Octabromodiphenyl ether	-	mg/kg	5	ND
Nonabromodiphenyl ether	-	mg/kg	5	ND
Decabromodiphenyl ether	-	mg/kg	5	ND
Di-butyl Phthalate (DBP)	1000	mg/kg	50	ND
Benzyl Butyl Phthalate (BBP)	1000	mg/kg	50	ND
Di-2-Ethyl Hexyl Phthalate (DEHP)	1000	mg/kg	50	ND
Diisobutyl Phthalates (DIBP)	1000	mg/kg	50	ND

Notes :

- (1)The maximum permissible limit is quoted from RoHS Directive (EU) 2015/863. IEC 62321 series is equivalent to EN 62321 series
http://www.cenelec.eu/dyn/www/f?p=104:30:1742232870351101:::FSP_ORG_ID,FSP_LANG_ID:1258637,25
- (2)On 4 June 2015, Commission Directive (EU) 2015/863 was published in the Official Journal of the European Union (OJEU) to include the phthalates BBP, DBP, DEHP and DIBP into ANNEX II of the Rohs Recast Directive. The new law restricts each phthalate to no more than 0.1% in each homogeneous material of an electrical product.
- (3)The restriction of DEHP, BBP, DBP and DIBP shall apply to medical devices, including in vitro medical devices, and monitoring and control instruments, including industrial monitoring and control instruments, from 22 July 2021.
- (4)The restriction of DEHP, BBP, DBP and DIBP shall not apply to cables or spare parts for the repair, the reuse, the updating of functionalities or upgrading of capacity of EEE placed on the market before 22 July 2019, and of medical devices, including in vitro medical devices, and monitoring and control instruments, including industrial monitoring and control instruments, placed on the market before 22 July 2021.
- (5)The restriction of DEHP, BBP and DBP shall not apply to toys which are already subject to the restriction of DEHP, BBP and DBP through entry 51 of Annex XVII to Regulation (EC) No 1907/2006.



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No. SHAEC1822492901

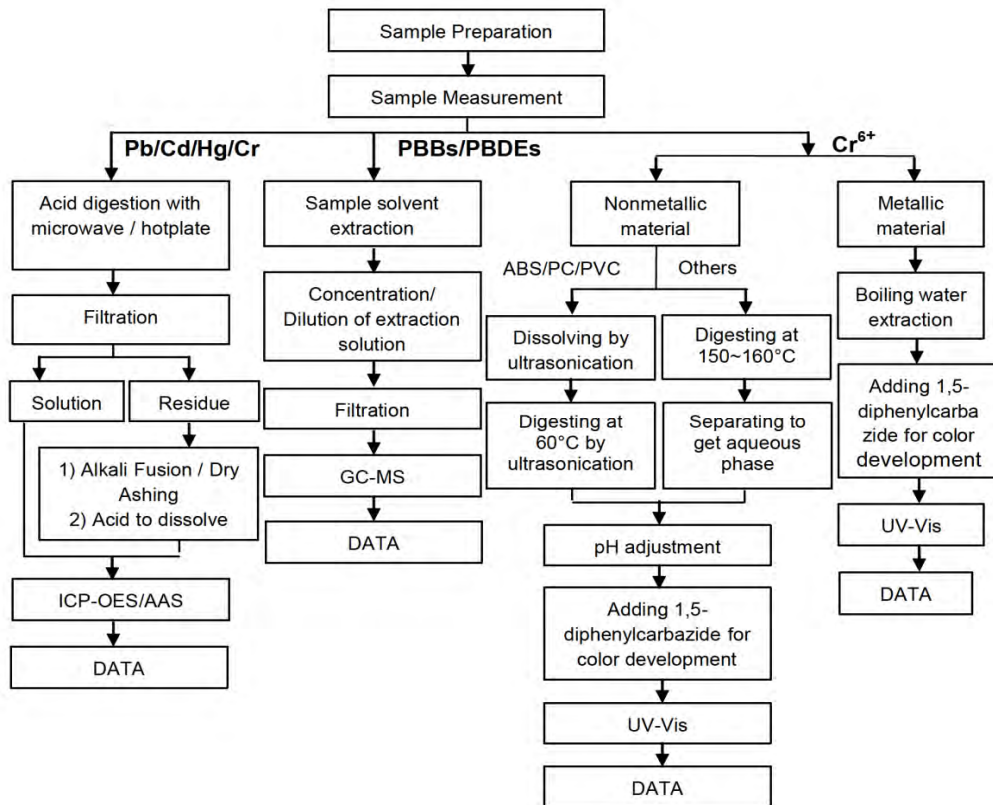
Date: 16 Oct 2018

Page 4 of 6

ATTACHMENTS

Pb/Cd/Hg/Cr⁶⁺/PBBs/PBDEs Testing Flow Chart

1) These samples were dissolved totally by pre-conditioning method according to below flow chart. (Cr⁶⁺ and PBBs/PBDEs test method excluded)



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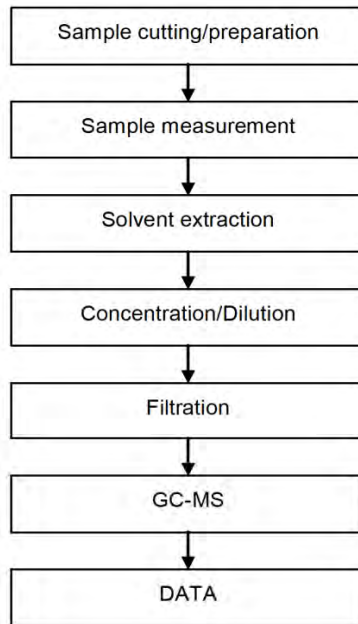
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Phthalates Testing Flow Chart



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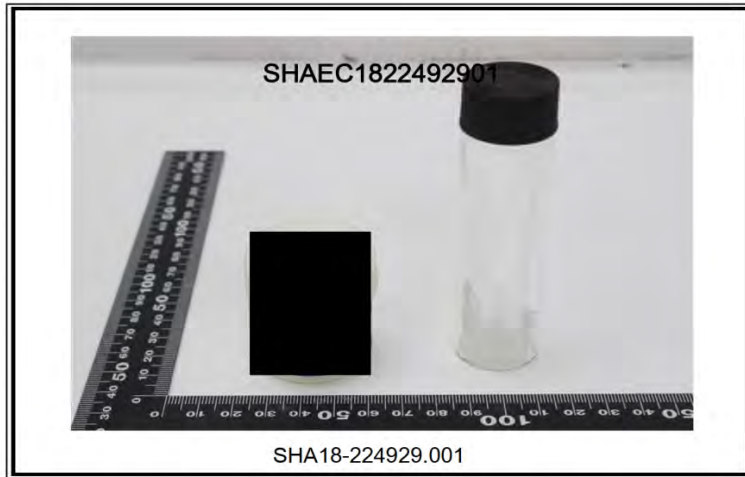
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Sample photo:



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05-Nov-19

ROHM Co., LtdAssurance of analytical data

The analysis data on the attached sheet has passed more than a year since the date of analysis in November 2019, but there has been no change regarding the inclusion of environmentally hazardous substances.

Therefore, [REDACTED] guarantees the content of this analysis data continuously. In addition, we will inform you in advance of any changes related to the inclusion of environmentally hazardous substances.

Attached analysis data are as follows.

Attachment 1: TK PASTE	[REDACTED]	(RoHS 10 restricted substances)
Attachment 2: TK PASTE	[REDACTED]	(Halogen 4 restricted substances)
Attachment 3: TK PASTE	[REDACTED]	(RoHS 10 restricted substances)
Attachment 4: TK PASTE	[REDACTED]	(Halogen 4 restricted substances)

14.Die Attach



Test Report

No. SHAEC1822489102

Date: 16 Oct 2018

Page 1 of 6

The following sample(s) was/were submitted and identified on behalf of the clients as : TK PASTE [REDACTED]

SGS Job No. : SP18-033696 - SH
 Composition : conductive adhesive
 Date of Sample Received : 09 Oct 2018
 Testing Period : 09 Oct 2018 - 15 Oct 2018
 Test Requested : Selected test(s) as requested by client.
 Test Method : Please refer to next page(s).
 Test Results : Please refer to next page(s).
 Conclusion : Based on the performed tests on submitted sample(s), the results of Cadmium, Lead, Mercury, Hexavalent chromium, Polybrominated biphenyls (PBBs), Polybrominated diphenyl ethers (PBDEs) and Phthalates such as Bis(2-ethylhexyl) phthalate (DEHP), Butyl benzyl phthalate (BBP), Dibutyl phthalate (DBP) and Diisobutyl phthalate (DIBP) comply with the limits as set by RoHS Directive (EU) 2015/863 amending Annex II to Directive 2011/65/EU.

Signed for and on behalf of
 SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd.

Helen Liu
 Approved Signatory



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**Test Report**

No. SHAEC1822489102

Date: 16 Oct 2018

Page 2 of 6

Test Results :

Test Part Description :

Specimen No.	SGS Sample ID	Description
SN1	SHA18-224891.001	Grey mud

Remarks :

- (1) 1 mg/kg = 0.0001%
- (2) MDL = Method Detection Limit
- (3) ND = Not Detected (< MDL)
- (4) "-" = Not Regulated

RoHS Directive (EU) 2015/863 amending Annex II to Directive 2011/65/EU

Test Method : With reference to IEC 62321-4:2013+AMD1:2017, IEC62321-5:2013, IEC62321-7-2:2017, IEC 62321-6:2015 and IEC62321-8:2017, analyzed by ICP-OES, UV-Vis and GC-MS.

Test Item(s)	Limit	Unit	MDL	001
Cadmium (Cd)	100	mg/kg	2	ND
Lead (Pb)	1000	mg/kg	2	ND
Mercury (Hg)	1000	mg/kg	2	ND
Hexavalent Chromium (Cr(VI))	1000	mg/kg	8	ND
Sum of PBBs	1000	mg/kg	-	ND
Monobromobiphenyl	-	mg/kg	5	ND
Dibromobiphenyl	-	mg/kg	5	ND
Tribromobiphenyl	-	mg/kg	5	ND
Tetrabromobiphenyl	-	mg/kg	5	ND
Pentabromobiphenyl	-	mg/kg	5	ND
Hexabromobiphenyl	-	mg/kg	5	ND
Heptabromobiphenyl	-	mg/kg	5	ND
Octabromobiphenyl	-	mg/kg	5	ND
Nonabromobiphenyl	-	mg/kg	5	ND
Decabromobiphenyl	-	mg/kg	5	ND
Sum of PBDEs	1000	mg/kg	-	ND
Monobromodiphenyl ether	-	mg/kg	5	ND
Dibromodiphenyl ether	-	mg/kg	5	ND
Tribromodiphenyl ether	-	mg/kg	5	ND
Tetrabromodiphenyl ether	-	mg/kg	5	ND



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Test Report

No. SHAEC1822489102

Date: 16 Oct 2018

Page 3 of 6

Test Item(s)	Limit	Unit	MDL	001
Pentabromodiphenyl ether	-	mg/kg	5	ND
Hexabromodiphenyl ether	-	mg/kg	5	ND
Heptabromodiphenyl ether	-	mg/kg	5	ND
Octabromodiphenyl ether	-	mg/kg	5	ND
Nonabromodiphenyl ether	-	mg/kg	5	ND
Decabromodiphenyl ether	-	mg/kg	5	ND
Di-butyl Phthalate (DBP)	1000	mg/kg	50	ND
Benzyl Butyl Phthalate (BBP)	1000	mg/kg	50	ND
Di-2-Ethyl Hexyl Phthalate (DEHP)	1000	mg/kg	50	ND
Diisobutyl Phthalates (DIBP)	1000	mg/kg	50	ND

Notes :

- (1)The maximum permissible limit is quoted from RoHS Directive (EU) 2015/863. IEC 62321 series is equivalent to EN 62321 series
http://www.cenelec.eu/dyn/www/f?p=104:30:1742232870351101:::FSP_ORG_ID,FSP_LANG_ID:1258637,25
- (2)On 4 June 2015, Commission Directive (EU) 2015/863 was published in the Official Journal of the European Union (OJEU) to include the phthalates BBP, DBP, DEHP and DIBP into ANNEX II of the Rohs Recast Directive. The new law restricts each phthalate to no more than 0.1% in each homogeneous material of an electrical product.
- (3)The restriction of DEHP, BBP, DBP and DIBP shall apply to medical devices, including in vitro medical devices, and monitoring and control instruments, including industrial monitoring and control instruments, from 22 July 2021.
- (4)The restriction of DEHP, BBP, DBP and DIBP shall not apply to cables or spare parts for the repair, the reuse, the updating of functionalities or upgrading of capacity of EEE placed on the market before 22 July 2019, and of medical devices, including in vitro medical devices, and monitoring and control instruments, including industrial monitoring and control instruments, placed on the market before 22 July 2021.
- (5)The restriction of DEHP, BBP and DBP shall not apply to toys which are already subject to the restriction of DEHP, BBP and DBP through entry 51 of Annex XVII to Regulation (EC) No 1907/2006.



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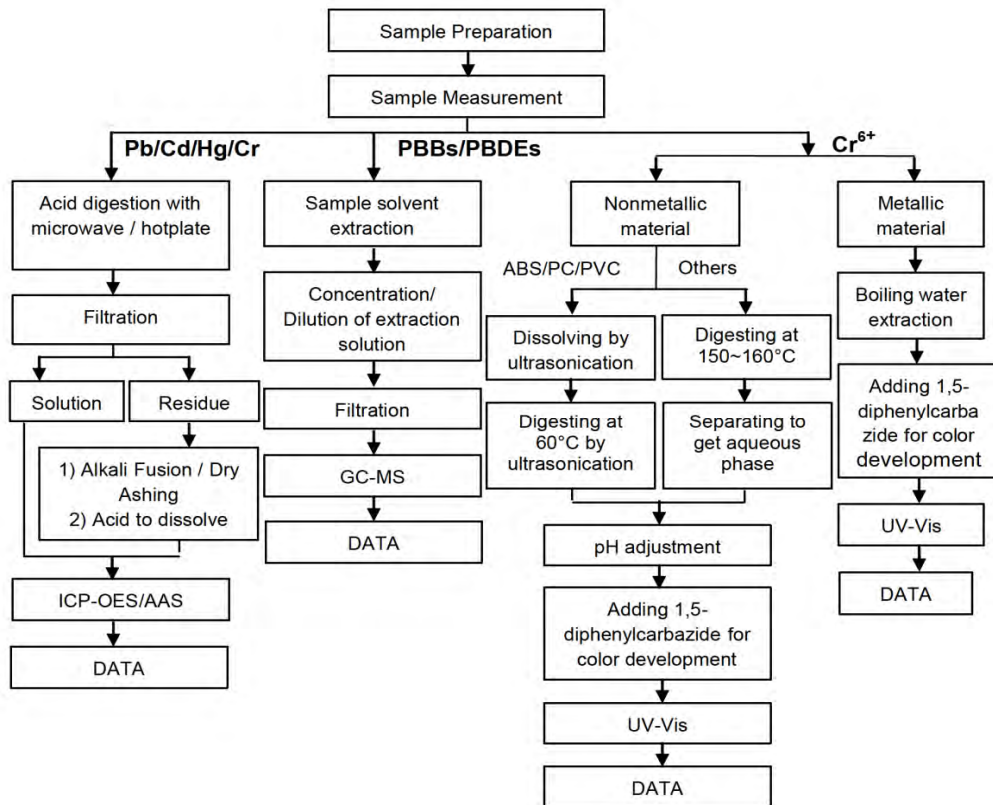
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Page 4 of 6

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Pb/Cd/Hg/Cr⁶⁺/PBBs/PBDEs Testing Flow Chart

1) These samples were dissolved totally by pre-conditioning method according to below flow chart. (Cr⁶⁺ and PBBs/PBDEs test method excluded)



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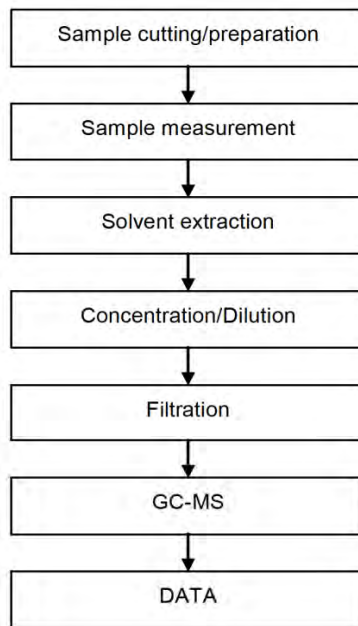
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Phthalates Testing Flow Chart



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15.Au Wire

Signature Not Verified
For Question Please
Contact with SGS
www.sgs.com.tw



Test Report

No. : KA/2019/B0080A-02

Date : 2019/11/08

Page: 1 of 14



The following sample(s) was/were submitted and identified by/on behalf of the client as :

Sample Submitted By :

Sample Description :

Style/Item No. : Au WIRE

Color : GOLD

Sample Receiving Date : 2019/11/01

Testing Period : 2019/11/01 to 2019/11/08

=====
Test Requested : (1) As specified by client, with reference to RoHS 2011/65/EU Annex II and amending Directive (EU) 2015/863 to determine Cadmium, Lead, Mercury, Cr(VI), PBBs, PBDEs, DBP, BBP, DEHP, DIBP contents in the submitted sample(s).
 (2) Please refer to next pages for the other item(s).
Test Result(s) : Please refer to next page(s).
Conclusion : (1) Based on the performed tests on submitted sample(s), the test results of Cadmium, Lead, Mercury, Cr(VI), PBBs, PBDEs, DBP, BBP, DEHP, DIBP comply with the limits as set by RoHS Directive (EU) 2015/863 amending Annex II to Directive 2011/65/EU.

Ray Chang Ph.D. / Manager
 Signed for and on behalf of
 SGS Taiwan Limited
 Chemical Laboratory-Kaohsiung

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15.Au Wire



Test Report

No. : KA/2019/B0080A-02

Date : 2019/11/08

Page: 2 of 14

Test Result(s)

PART NAME NO.1 : Au BONDING WIRE

Test Item (s)	Unit	Method	MDL	Result	Limit
				No.1	
Cadmium (Cd)	mg/kg	With reference to IEC 62321-5: 2013 and performed by ICP-OES.	2	n.d.	100
Lead (Pb)	mg/kg	With reference to IEC 62321-5: 2013 and performed by ICP-OES.	2	n.d.	1000
Mercury (Hg)	mg/kg	With reference to IEC 62321-4:2013+AMD1:2017 and performed by ICP-OES.	2	n.d.	1000
Hexavalent Chromium Cr(VI)(#2)	µg/cm ²	With reference to IEC 62321-7-1:2015 and performed by UV-VIS.	0.10	n.d.	-
Sum of PBBs	mg/kg	With reference to IEC 62321-6:2015 and performed by GC/MS.	-	n.d.	1000
Monobromobiphenyl	mg/kg		5	n.d.	-
Dibromobiphenyl	mg/kg		5	n.d.	-
Tribromobiphenyl	mg/kg		5	n.d.	-
Tetrabromobiphenyl	mg/kg		5	n.d.	-
Pentabromobiphenyl	mg/kg		5	n.d.	-
Hexabromobiphenyl	mg/kg		5	n.d.	-
Heptabromobiphenyl	mg/kg		5	n.d.	-
Octabromobiphenyl	mg/kg		5	n.d.	-
Nonabromobiphenyl	mg/kg		5	n.d.	-
Decabromobiphenyl	mg/kg		5	n.d.	-
Sum of PBDEs	mg/kg		With reference to IEC 62321-6:2015 and performed by GC/MS.	-	n.d.
Monobromodiphenyl ether	mg/kg	5		n.d.	-
Dibromodiphenyl ether	mg/kg	5		n.d.	-
Tribromodiphenyl ether	mg/kg	5		n.d.	-
Tetrabromodiphenyl ether	mg/kg	5		n.d.	-
Pentabromodiphenyl ether	mg/kg	5		n.d.	-
Hexabromodiphenyl ether	mg/kg	5		n.d.	-
Heptabromodiphenyl ether	mg/kg	5		n.d.	-
Octabromodiphenyl ether	mg/kg	5		n.d.	-
Nonabromodiphenyl ether	mg/kg	5		n.d.	-
Decabromodiphenyl ether	mg/kg	5	n.d.	-	

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Test Report

No. : KA/2019/B0080A-02

Date : 2019/11/08

Page: 3 of 14

Test Item (s)	Unit	Method	MDL	Result	Limit
				No.1	
DIBP (Di-isobutyl phthalate) (CAS No.: 84-69-5)	mg/kg	With reference to IEC 62321-8:2017. Analysis was performed by GC/MS.	50	n.d.	1000
DBP (Dibutyl phthalate) (CAS No.: 84-74-2)	mg/kg	With reference to IEC 62321-8:2017. Analysis was performed by GC/MS.	50	n.d.	1000
BBP (Butyl Benzyl phthalate) (CAS No.: 85-68-7)	mg/kg	With reference to IEC 62321-8:2017. Analysis was performed by GC/MS.	50	n.d.	1000
DEHP (Di- (2-ethylhexyl) phthalate) (CAS No.: 117-81-7)	mg/kg	With reference to IEC 62321-8:2017. Analysis was performed by GC/MS.	50	n.d.	1000
DNOP (Di-n-octyl phthalate) (CAS No.: 117-84-0)	mg/kg	With reference to IEC 62321-8:2017. Analysis was performed by GC/MS.	50	n.d.	-
DINP (Di-isononyl phthalate) (CAS No.: 28553-12-0, 68515-48-0)	mg/kg	With reference to IEC 62321-8:2017. Analysis was performed by GC/MS.	50	n.d.	-
DIDP (Di-isodecyl phthalate) (CAS No.: 26761-40-0, 68515-49-1)	mg/kg	With reference to IEC 62321-8:2017. Analysis was performed by GC/MS.	50	n.d.	-
Hexavalent Chromium Cr(VI)	mg/kg	With reference to IEC 62321-7-2:2017 and performed by UV-VIS.	8	n.d.	-
Hexabromocyclododecane (HBCDD) and all major diastereoisomers identified (α - HBCDD, β - HBCDD, γ - HBCDD) (CAS No.: 25637-99-4 and 3194-55-6 (134237-51-7, 134237-50- 6, 134237-52-8))	mg/kg	With reference to IEC 62321: 2008. Analysis was performed by GC/MS.	5	n.d.	-
Halogen					
Halogen-Fluorine (F) (CAS No.: 14762-94-8)	mg/kg	With reference to BS EN 14582:2016. Analysis was performed by IC.	50	n.d.	-
Halogen-Chlorine (Cl) (CAS No.: 22537-15-1)	mg/kg	With reference to BS EN 14582:2016. Analysis was performed by IC.	50	n.d.	-
Halogen-Bromine (Br) (CAS No.: 10097-32-2)	mg/kg	With reference to BS EN 14582:2016. Analysis was performed by IC.	50	n.d.	-
Halogen-Iodine (I) (CAS No.: 14362-44-8)	mg/kg	With reference to BS EN 14582:2016. Analysis was performed by IC.	50	n.d.	-
Perfluorooctane sulfonates (PFOS- Acid, Metal Salt, Amide)	mg/kg	With reference to US EPA 3550C: 2007. Analysis was performed by LC/MS.	10	n.d.	-
PFOA (CAS No.: 335-67-1)	mg/kg	With reference to US EPA 3550C: 2007. Analysis was performed by LC/MS.	10	n.d.	-

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Test Report

No. : KA/2019/B0080A-02

Date : 2019/11/08

Page: 4 of 14

Test Item (s)	Unit	Method	MDL	Result	Limit
				No.1	
Dimethyl Fumarate (CAS No.: 624-49-7)	mg/kg	With reference to US EPA 3550C: 2007. Analysis was performed by GC/MS.	0.1	n.d.	-
PVC	**	Analysis was performed by FTIR and FLAME Test.	-	Negative	-
Antimony (Sb)	mg/kg	With reference to US EPA 3052: 1996. Analysis was performed by ICP-OES.	2	n.d.	-
Phosphorus (P)	mg/kg	With reference to US EPA 3052: 1996. Analysis was performed by ICP-OES.	2	n.d.	-

Note :

1. mg/kg = ppm ; 0.1wt% = 1000ppm
2. n.d. = Not Detected
3. MDL = Method Detection Limit
4. " - " = Not Regulated
5. (#2) =
 - a. The sample is positive for Cr(VI) if the Cr(VI) concentration is greater than 0.13 $\mu\text{g}/\text{cm}^2$. The sample coating is considered to contain Cr(VI)
 - b. The sample is negative for Cr(VI) if Cr(VI) is n.d. (concentration less than 0.10 $\mu\text{g}/\text{cm}^2$). The coating is considered a non-Cr(VI) based coating
 - c. The result between 0.10 $\mu\text{g}/\text{cm}^2$ and 0.13 $\mu\text{g}/\text{cm}^2$ is considered to be inconclusive - unavoidable coating variations may influence the determination.
6. ** = Qualitative analysis (No Unit)
7. Negative = Undetectable / Positive = Detectable
8. This is the additional test report of KA/2019/B0080 which was issued on 2019/11/08.

PFOS Reference Information : POPs - (EU) 2019/1021

Outlawing PFOS as substances or preparations in concentrations above 0.001% (10ppm), in semi-finished products or articles or parts at a level above 0.1%(1000ppm), in textiles or other coated materials above 1 $\mu\text{g}/\text{m}^2$.

PFOS refer 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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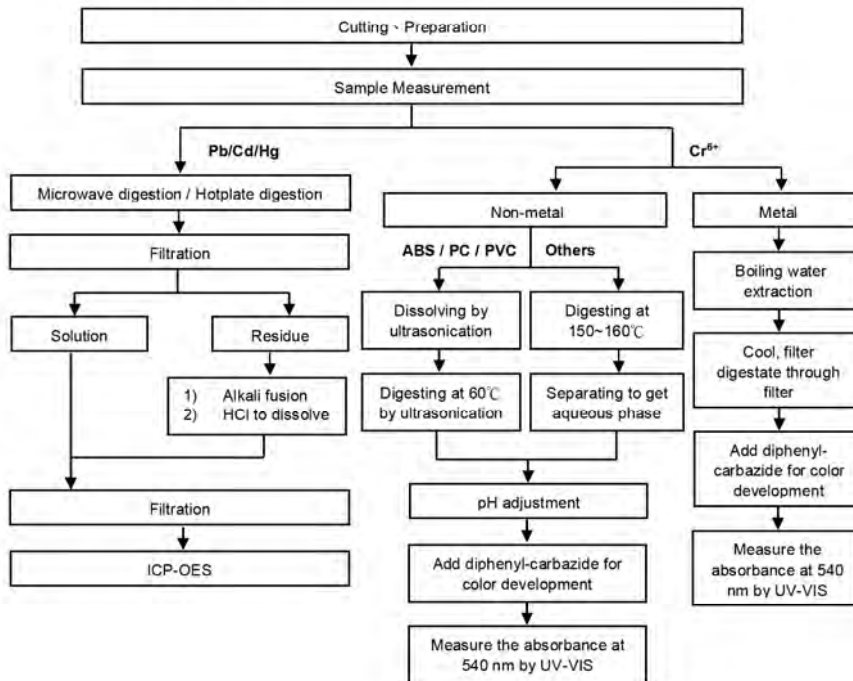
Page: 5 of 14



Analytical flow chart of Heavy Metal

These samples were dissolved totally by pre-conditioning method according to below flow chart. (Cr⁶⁺ test method excluded)

- Technician: Jony Liu
- Supervisor: Ray Chang



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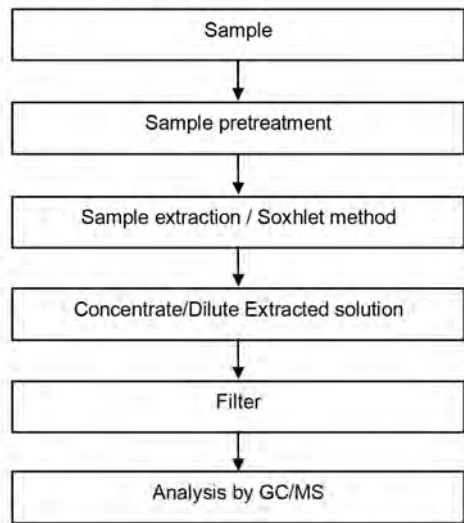
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PBB/PBDE analytical FLOW CHART

- Technician : Dorothy Chen
- Supervisor: Ray Chang



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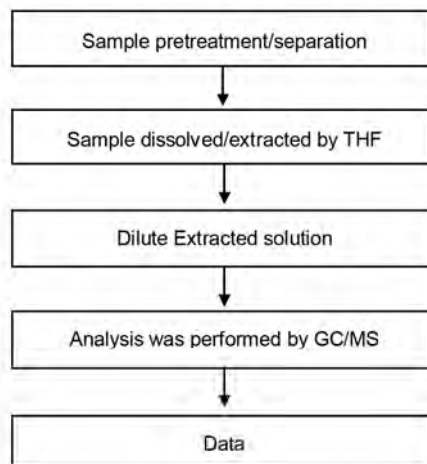
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Page: 7 of 14

Analytical flow chart of phthalate content

- Technician: Dorothy Chen
- Supervisor: Ray Chang

【 Test method: IEC 62321-8】



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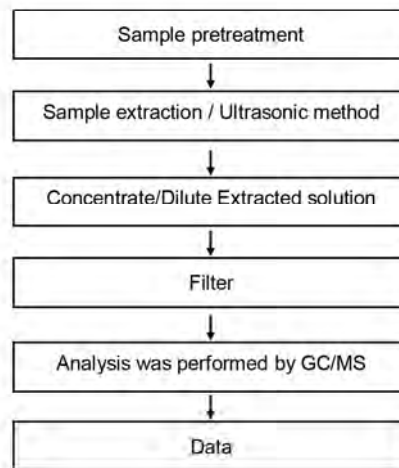
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Date : 2019/11/08

Page: 8 of 14

HBCDD analytical flow chart

- Technician : Dorothy Chen
- Supervisor: Ray Chang



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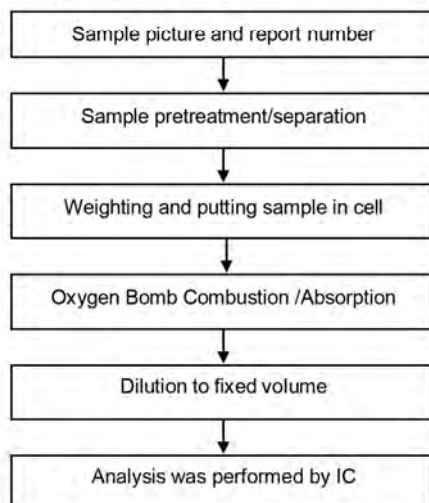
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Analytical flow chart of halogen content

- Technician : Jean Hung
- Supervisor: Ray Chang



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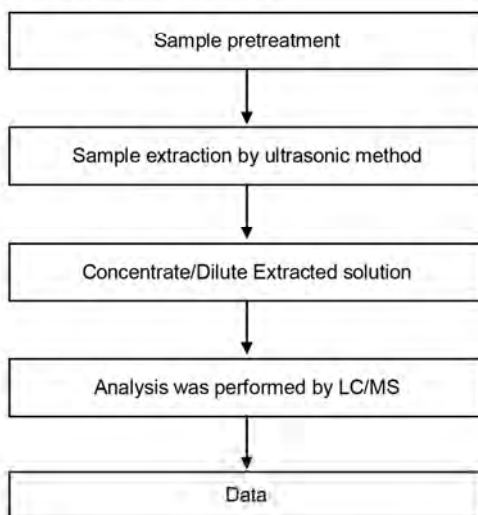
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Page: 10 of 14



Analytical flow chart of PFOA/PFOS content

- Technician : Ginny Huang
- Supervisor: Ray Chang



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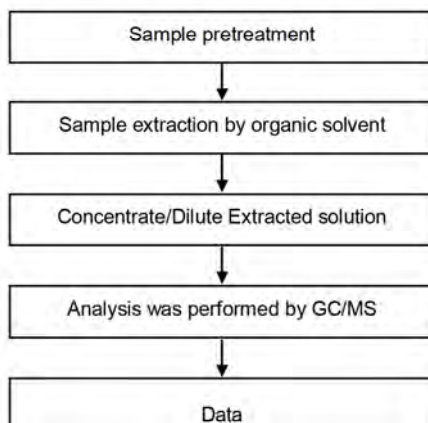
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Page: 11 of 14



Analytical flow chart of Dimethyl Fumarate content

- Technician: Dorothy Chen
- Supervisor: Ray Chang



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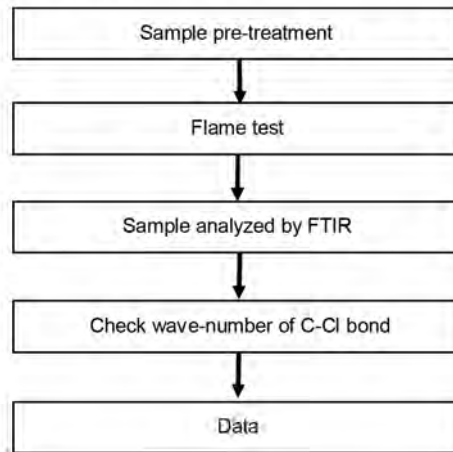
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Page: 12 of 14

Analysis flow chart for determination of PVC in polymer material

- Technician: Hannah Tai
- Supervisor: Roger Lin



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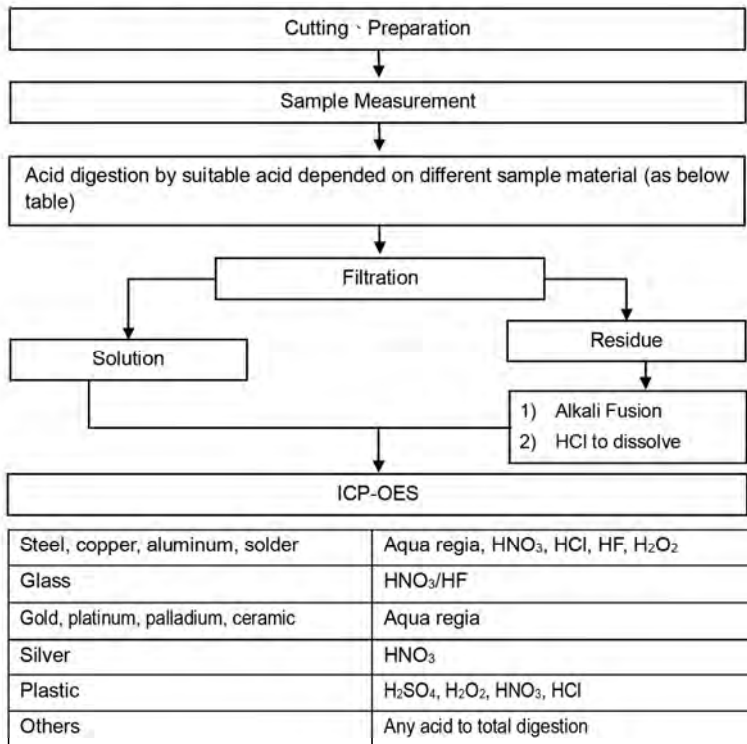
Page: 13 of 14



Flow Chart of digestion for the elements analysis performed by ICP-OES

These samples were dissolved totally by pre-conditioning method according to below flow chart.

- Technician: Jony Liu
- Supervisor: Ray Chang



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Test Report

No. : KA/2019/B0080A-02

Date : 2019/11/08

Page: 14 of 14



* The tested sample / part is marked by an arrow if it's shown on the photo. *

KA/2019/B0080



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