



## ICP Test Report Certification Packet

Company Name: Littelfuse, Inc.  
Product Type: Surface Mount Varistors  
Product Series: **MHS/MLE/ML/AUML Series (except size 2220)**  
Issue Date: February 25, 2013

It is hereby certified by Littelfuse, Inc. that there is neither RoHS (Directive 2011/65/EU)-restricted substance nor such use, for materials to be used for unit parts, for packing/package materials, and for additives and the like in the manufacturing processes. And it is certified by Littelfuse, Inc. that the series products listed above are compliant with LF Halogen Free Standard (Cl≤800ppm, Br≤800ppm, Cl +Br≤1000ppm).

In addition, it is hereby reported to you that the parts and sub-materials, the materials to be used for unit parts, the packing/package materials, and the additives and the like in the manufacturing processes, are all composed of the following components.

Issued by: *David Huang*  
< DGLF Environmental, Health & Safety Engineer >

(1) Parts, sub-materials and unit parts

This document covers the Surface Mount Varistors MHS/MLE/ML/AUML (except size 2220) compliant series products manufactured by Littelfuse, Inc.

Please see Table 1 for raw materials used.

(2) The ICP data on all measurable substances

Please see appropriate pages as identified in Table 1

Remarks:

Lead contained in MS208 termination is under the following exemption:

Pb (lead) contained in glass of electronic components and is categorized as exempt under section 7(c)-I of the RoHS Annex.



Table 1: List of Raw Materials covered by this report

<b>Parts</b>	<b>P/N</b>	<b>Raw Material Description</b>	<b>Page</b>
<b>1</b>	<b>N/A</b>	<b>BLACK CHIP, except size 2220</b>	<b>3-7</b>
<b>2</b>	<b>N/A</b>	<b>5450T or 2257D(MS208) TERMINATIONS</b>	<b>8-25</b>
<b>3</b>	<b>N/A</b>	<b>NICKEL PLATE</b>	<b>26-29</b>
<b>4</b>	<b>N/A</b>	<b>TIN PLATE</b>	<b>30-33</b>



**Test Report**

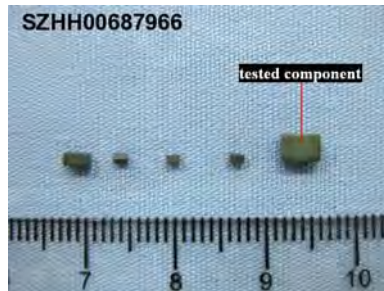
Number: SZ HH00687966

Applicant: LITTELFUSE, INC  
8755 WEST HIGGINS ROAD SUITE  
500CHICAGO IL 60631 USA

Date: May 15, 2012

Attn: KRISTEEN BACILA/ARSENIO CESISTA JR.

Sample Description:  
One (1) submitted sample said to be **black chip**.  
Tested component: grey ceramic.



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Tests conducted:  
As requested by the applicant, refer to attached page(s) for details.

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Conclusion:		
<u>Tested Samples Stan</u>	<u>ard Res</u>	<u>ult</u>
Tested component of submitted sample	Restriction of the use of certain hazardous substance in electrical electronic and equipment (RoHS Direction 2002/95/EC and supersedure 2011/65/EU)	Pass

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Authorized by:  
For Intertek Testing Services  
Shenzhen Ltd.


Ben N.L. Lin  
General Manager



**Test Report**

Number: SZ HH00687966

Tests Conducted

RoHS Chemical Test

(A) Test Result Summary:

Testing Item	Result
Cadmium (Cd) Content (mg/kg)	ND(<2)
Lead (Pb) Content (mg/kg)	832
Mercury (Hg) Content (mg/kg)	ND(<2)
Chromium (VI)(Cr <sup>6+</sup> ) Content (mg/kg)	11
Polybrominated Biphenyls (PBBs)(mg/kg)	
Monobromobiphenyl (MonoBB)	ND(<5)
Dibromobiphenyl (DiBB)	ND(<5)
Tribromobiphenyl (TriBB)	ND(<5)
Tetrabromobiphenyl (TetraBB)	ND(<5)
Pentabromobiphenyl (PentaBB)	ND(<5)
Hexabromobiphenyl (HexaBB)	ND(<5)
Heptabromobiphenyl (HeptaBB)	ND(<5)
Octabromobiphenyl (OctaBB)	ND(<5)
Nonabromobiphenyl (NonaBB)	ND(<5)
Decabromobiphenyl (DecaBB)	ND(<5)
Polybrominated Diphenyl Ethers (PBDEs)(mg/kg)	
Monobromodiphenyl Ether (MonoBDE)	ND(<5)
Dibromodiphenyl Ether (DiBDE)	ND(<5)
Tribromodiphenyl Ether (TriBDE)	ND(<5)
Tetrabromodiphenyl Ether (TetraBDE)	ND(<5)
Pentabromodiphenyl Ether (PentaBDE)	ND(<5)
Hexabromodiphenyl Ether (HexaBDE)	ND(<5)
Heptabromodiphenyl Ether (HeptaBDE)	ND(<5)
Octabromodiphenyl Ether (OctaBDE)	ND(<5)
Nonabromodiphenyl Ether (NonaBDE)	ND(<5)
Decabromodiphenyl Ether (DecaBDE)	ND(<5)

Chemist: Wang Haijun/ Zeng Guoliang

mg/kg = milligram per kilogram = ppm

< = Less than

ND = Not detected

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Tests Conducted

(B) RoHS Requirement:

Restricted Substances	Limits
Cadmium (Cd)	0.01% (100 mg/kg)
Lead (Pb)	0.1% (1000 mg/kg)
Mercury (Hg)	0.1% (1000 mg/kg)
Chromium (VI) (Cr <sup>6+</sup> )	0.1% (1000 mg/kg)
Polybrominated Biphenyls (PBBs)	0.1% (1000 mg/kg)
Polybrominated Diphenyl Ethers (PBDEs)	0.1% (1000 mg/kg)

The above limits were quoted from 2002/95/EC and supersedure 2011/65/EU for homogeneous material.

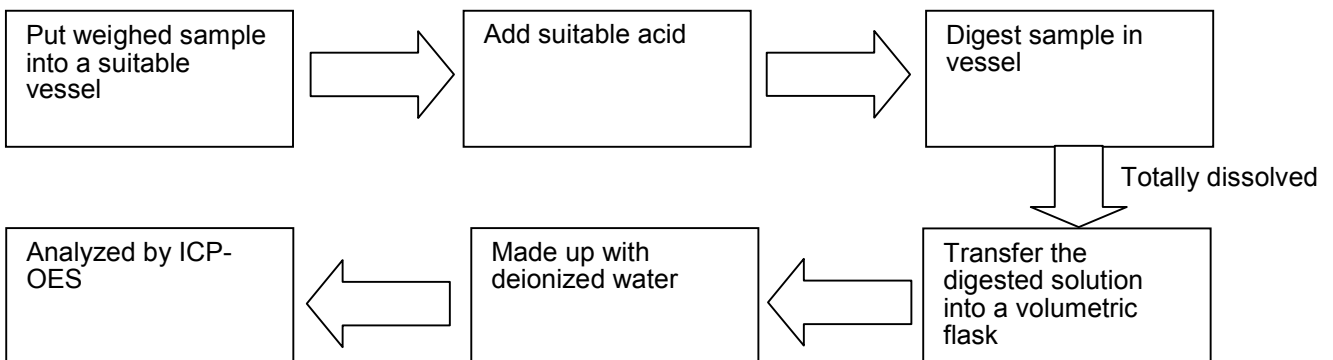
(C) Test Method:

Testing Item	Testing Method	Reporting Limit
Cadmium (Cd) Content	With reference to IEC 62321 Edition 1.0:2008, by acid digestion and determined by ICP - OES	2 mg/kg
Lead (Pb) Content	With reference to IEC 62321 Edition 1.0:2008, by acid digestion and determined by ICP - OES	2 mg/kg
Mercury (Hg) Content	With reference to IEC 62321 Edition 1.0:2008, by acid digestion and determined by ICP - OES	2 mg/kg
Chromium (VI)(Cr <sup>6+</sup> ) Content	With reference to IEC 62321 Edition 1.0:2008, by alkaline digestion and determined by UV-VIS Spectrophotometer	1 mg/kg
Polybrominated Biphenyls (PBBs)& Polybrominated Diphenyl Ethers (PBDEs)	With reference to IEC 62321 Edition 1.0:2008, by solvent extraction and determined by GC/MS and further HPLC confirmation when necessary	5 mg/kg

Date sample received: May 08, 2012  
 Testing period: May 08, 2012 to May 14, 2012

(D) Measurement Flowchart:

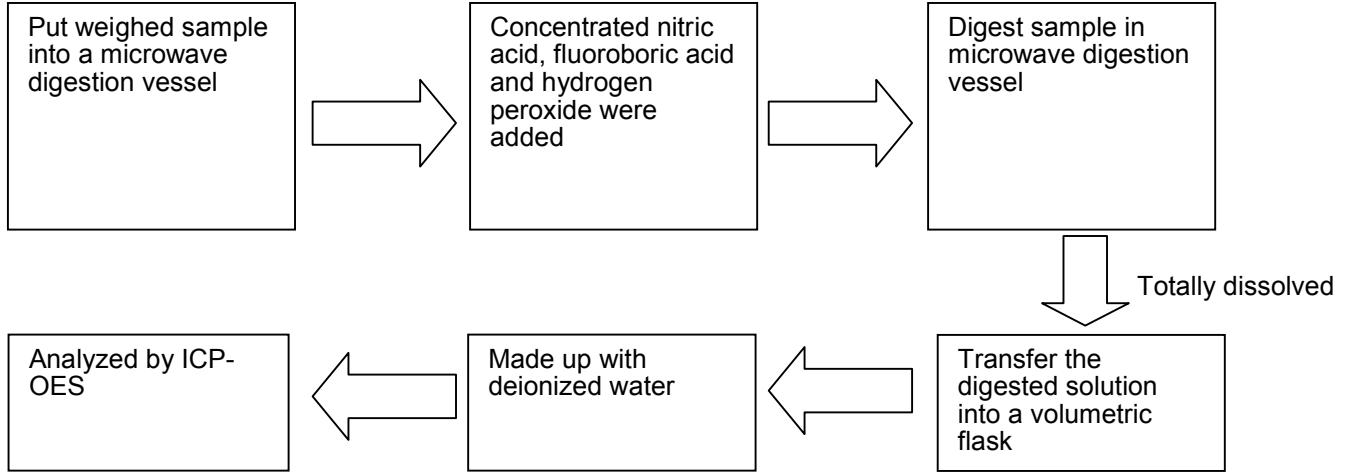
1. Test for Cd/Pb Contents



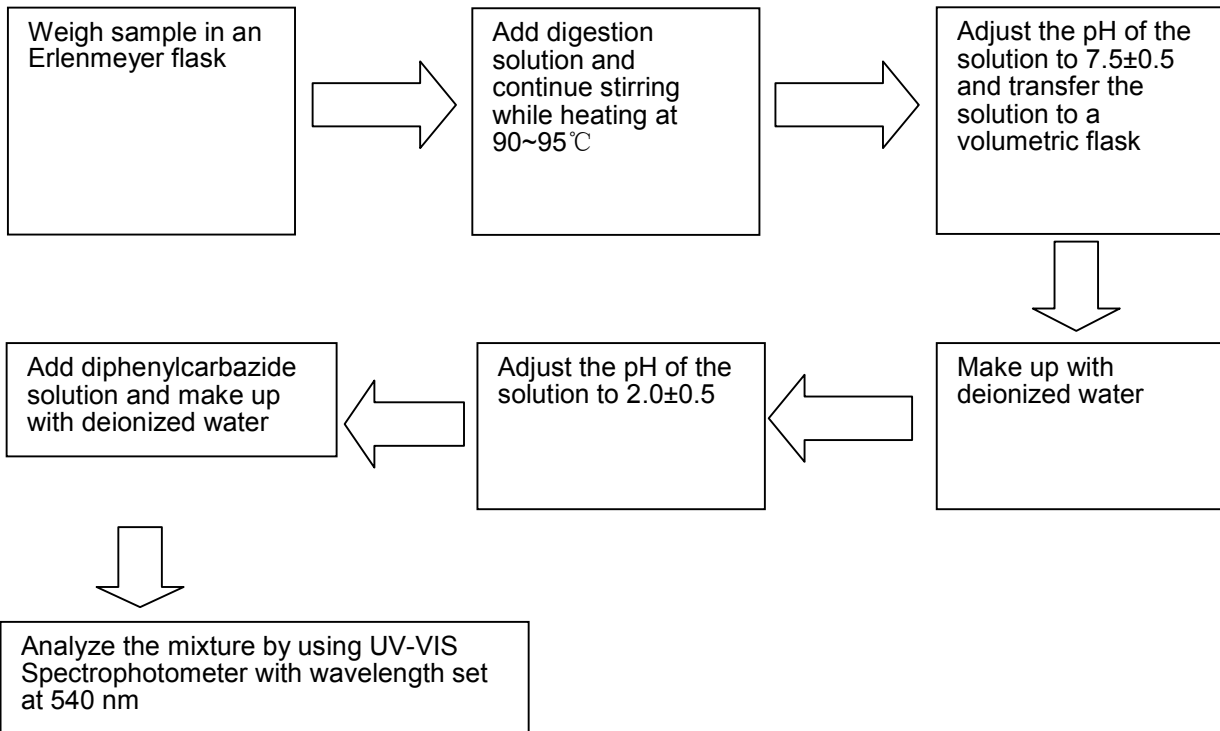
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Tests Conducted

2. Test for Hg Content



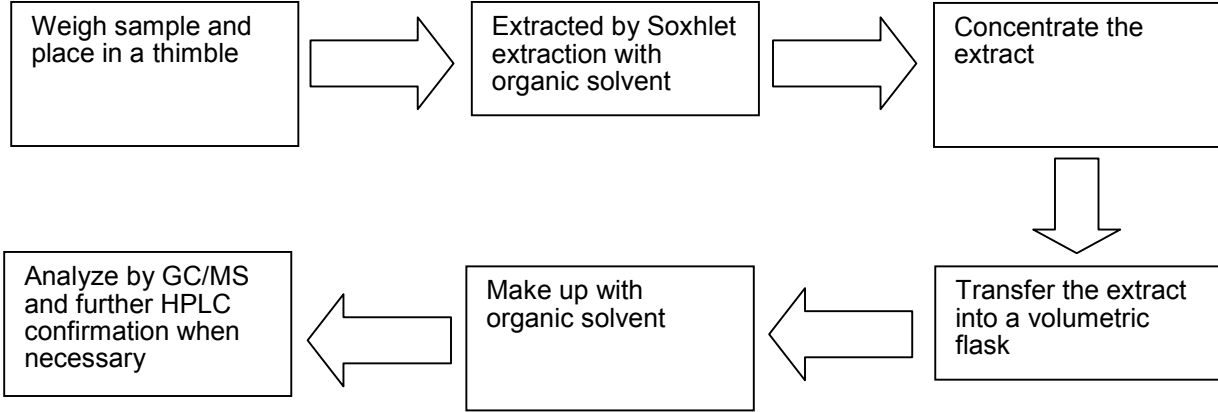
3. Test for Chromium (VI) (Cr<sup>6+</sup>) Content (Alkaline Digestion)



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Tests Conducted

4. Test for PBBs/PBDEs Contents



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End of report



**Test Report**

Number: S ZHH00724048

Applicant: LITTELFUSE, INC  
8755 WEST HIGGINS ROAD SUITE  
500CHICAGO IL 60631 USA

Date: Sep 05, 2012

Attn: KRISTEEN BACILA/ARSENIO CESISTA JR.

Sample Description:

One (1) submitted sample said to be **silver-grey paste (silver paste)**.  
Part No. : 5450T.



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Tests conducted:

As requested by the applicant, refer to attached page(s) for details.

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To be continued

Authorized by:  
For Intertek Testing Services  
Shenzhen Ltd.



Ben N.L. Lin  
General Manager





**Test Report**

Number: S ZHH00724048

**Conclusion:**

Tested Samples S  
Submitted sample

Standard  
Restriction of the use of certain hazardous substance in electrical and electronic equipment (RoHS Directive 2002/95/EC and superseding 2011/65/EU)

Result  
See test conducted

Phthalates content requirement in Annex XVII Items 51 & 52 of the REACH Regulation (EC) No. 1907/2006 & Amendment No. 552/2009 (formerly known as Directive 2005/84/EC) (DEHP, DBP & BBP)

Pass

Test Item

Test Item  
Hexabromocyclododecane Content

See test conducted

Halogen (F, Cl, Br, I) Content

See test conducted

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Authorized by:  
For Intertek Testing Services  
Shenzhen Ltd.



Ben N.L. Lin  
General Manager



**Test Report**

Number: S ZHH00724048

Tests Conducted

1 RoHS Chemical Test

(A) Test Result Summary:

Testing Item	Result
Cadmium (Cd) Content (mg/kg)	ND(<2)
Lead (Pb) Content (mg/kg)	ND(<2)
Mercury (Hg) Content (mg/kg)	ND(<2)
Chromium (VI)(Cr <sup>6+</sup> ) Content (mg/kg)	ND(<1)
Polybrominated Biphenyls (PBBs)(mg/kg)	
Monobromobiphenyl (MonoBB)	ND(<5)
Dibromobiphenyl (DiBB)	ND(<5)
Tribromobiphenyl (TriBB)	ND(<5)
Tetrabromobiphenyl (TetraBB)	ND(<5)
Pentabromobiphenyl (PentaBB)	ND(<5)
Hexabromobiphenyl (HexaBB)	ND(<5)
Heptabromobiphenyl (HeptaBB)	ND(<5)
Octabromobiphenyl (OctaBB)	ND(<5)
Nonabromobiphenyl (NonaBB)	ND(<5)
Decabromobiphenyl (DecaBB)	ND(<5)
Polybrominated Diphenyl Ethers (PBDEs)(mg/kg)	
Monobromodiphenyl Ether (MonoBDE)	ND(<5)
Dibromodiphenyl Ether (DiBDE)	ND(<5)
Tribromodiphenyl Ether (TriBDE)	ND(<5)
Tetrabromodiphenyl Ether (TetraBDE)	ND(<5)
Pentabromodiphenyl Ether (PentaBDE)	ND(<5)
Hexabromodiphenyl Ether (HexaBDE)	ND(<5)
Heptabromodiphenyl Ether (HeptaBDE)	ND(<5)
Octabromodiphenyl Ether (OctaBDE)	ND(<5)
Nonabromodiphenyl Ether (NonaBDE)	ND(<5)
Decabromodiphenyl Ether (DecaBDE)	ND(<5)

Chemist: Wang Haijun/Zeng Guoliang

mg/kg = milligram per kilogram based on dry weight of sample = ppm

< = Less than

ND = Not detected

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**Test Report**

Number: S ZHH00724048

Tests Conducted

(B) RoHS Requirement:

Restricted Substances	Limits
Cadmium (Cd)	0.01% (100 mg/kg)
Lead (Pb)	0.1% (1000 mg/kg)
Mercury (Hg)	0.1% (1000 mg/kg)
Chromium (VI) (Cr <sup>6+</sup> )	0.1% (1000 mg/kg)
Polybrominated Biphenyls (PBBs)	0.1% (1000 mg/kg)
Polybrominated Diphenyl Ethers (PBDEs)	0.1% (1000 mg/kg)

The above limits were quoted from 2002/95/EC and superseding 2011/65/EU for homogeneous material.

(C) Test Method:

Testing Item	Testing Method	Reporting Limit
Cadmium (Cd) Content	With reference to IEC 62321 Edition 1.0:2008, by acid digestion and determined by ICP - OES	2 mg/kg
Lead (Pb) Content	With reference to IEC 62321 Edition 1.0:2008, by acid digestion and determined by ICP - OES	2 mg/kg
Mercury (Hg) Content	With reference to IEC 62321 Edition 1.0:2008, by acid digestion and determined by ICP - OES	2 mg/kg
Chromium (VI)(Cr <sup>6+</sup> ) Content	With reference to IEC 62321 Edition 1.0:2008, by alkaline digestion and determined by UV-VIS Spectrophotometer	1 mg/kg
Polybrominated Biphenyls (PBBs)& Polybrominated Diphenyl Ethers (PBDEs)	With reference to IEC 62321 Edition 1.0:2008, by solvent extraction and determined by GC/MS and further HPLC confirmation when necessary	5 mg/kg

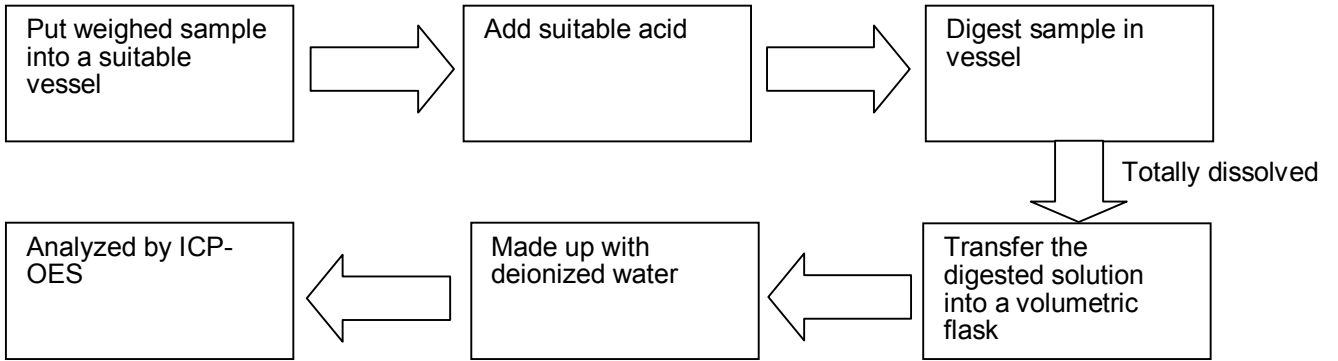
Date sample received : Aug 30, 2012  
Testing period : Aug 30, 2012 to Sep 01, 2012

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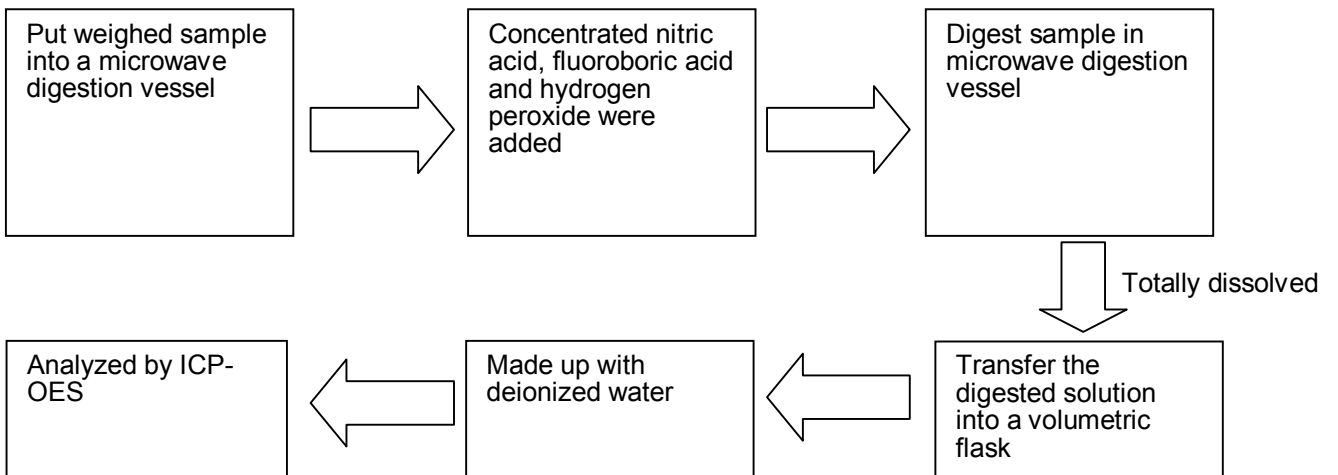
Tests Conducted

( D) Measurement Flowchart:

1. Test for Cd/Pb Contents



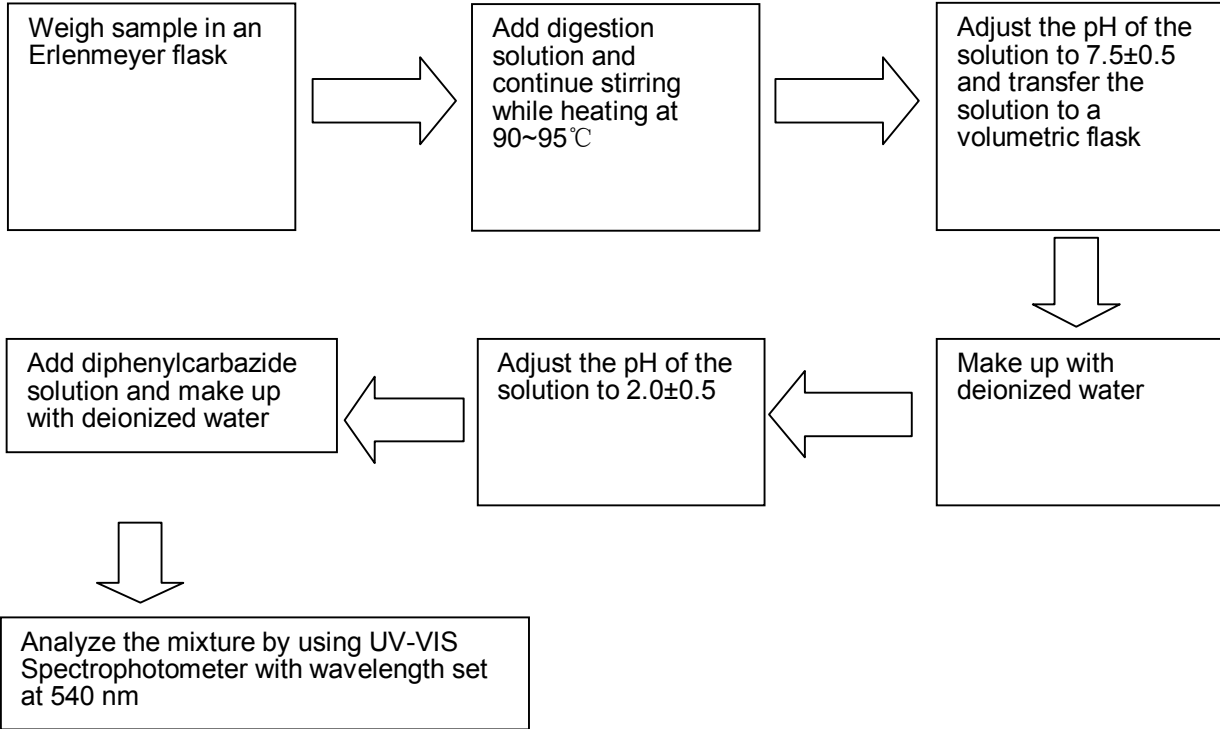
2. Test for Hg Content



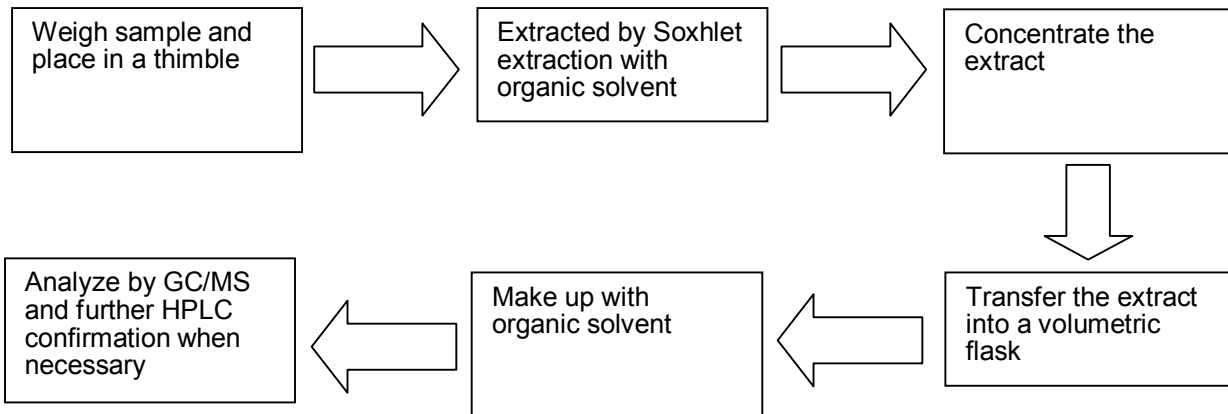
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Tests Conducted

3. Test for Chromium (VI) ( $Cr^{6+}$ ) Content (Alkaline Digestion)



4. Test for PBBs/PBDEs Contents



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**Test Report**

Number: S ZHH00724048

Tests Conducted

2 P Phthalate Content

With reference to EN14372, by Gas chromatographic-Mass Spectrometric (GC-MS) analysis.

	<u>Result (%)</u>
Dibutyl phthalate (DBP)	<0.01
Di-(2-ethyl hexyl) phthalate (DEHP)	<0.01
Benzyl butyl phthalate (BBP)	<0.01
Sum of three phthalates	<0.01
Limit 0.	1 %

The above limit was quoted according to Annex XVII Items 51 & 52 of the REACH Regulation (EC) No. 1907/2006 & Amendment No. 552/2009(formerly known as Directive 2005/84/EC) for phthalate content in toys and children articles.

< = Less than  
% = Percentage based on dry weight of sample

Remark : As per client's request, only DBP, DEHP and BBP were tested for the submitted sample.

Date sample received : Aug 30, 2012  
Testing period : Aug 30, 2012 to Sep 04, 2012

3 Hexabromocyclododecane (HBCDD) Content:

By solvent extraction followed by Gas Chromatographic - Mass Spectrometric (GC-MS) analysis.

Result : Less than 10 mg/kg

mg/kg = milligram per kilogram based on dry weight of sample

Date sample received : Aug 30, 2012  
Testing period : Aug 30, 2012 to Aug 31, 2012

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**Test Report**

Number: S ZHH00724048

Tests Conducted

4 Hal ogen Content

( I ) Test Result Summary:

<u>Testing Item</u>	<u>Result (mg/kg)</u>
Fluorine (F) Content	ND
Chlorine (Cl) Content	ND
Bromine (Br) Content	ND
Iodine (I) Content	ND

mg/kg = milligram per kilogram based on dry weight of sample = ppm  
ND = Not detected

( II ) Test Method:

<u>Testing Item</u> T	<u>esting Method</u> Repor	<u>ting Limit</u>
Halogen (F, Cl, Br, I) Content	With reference to BS EN 14582:2007, by calorimetric bomb and determined by Ion Chromatography	50 mg/kg

Reporting limit = Quantitation limit of analyte in sample

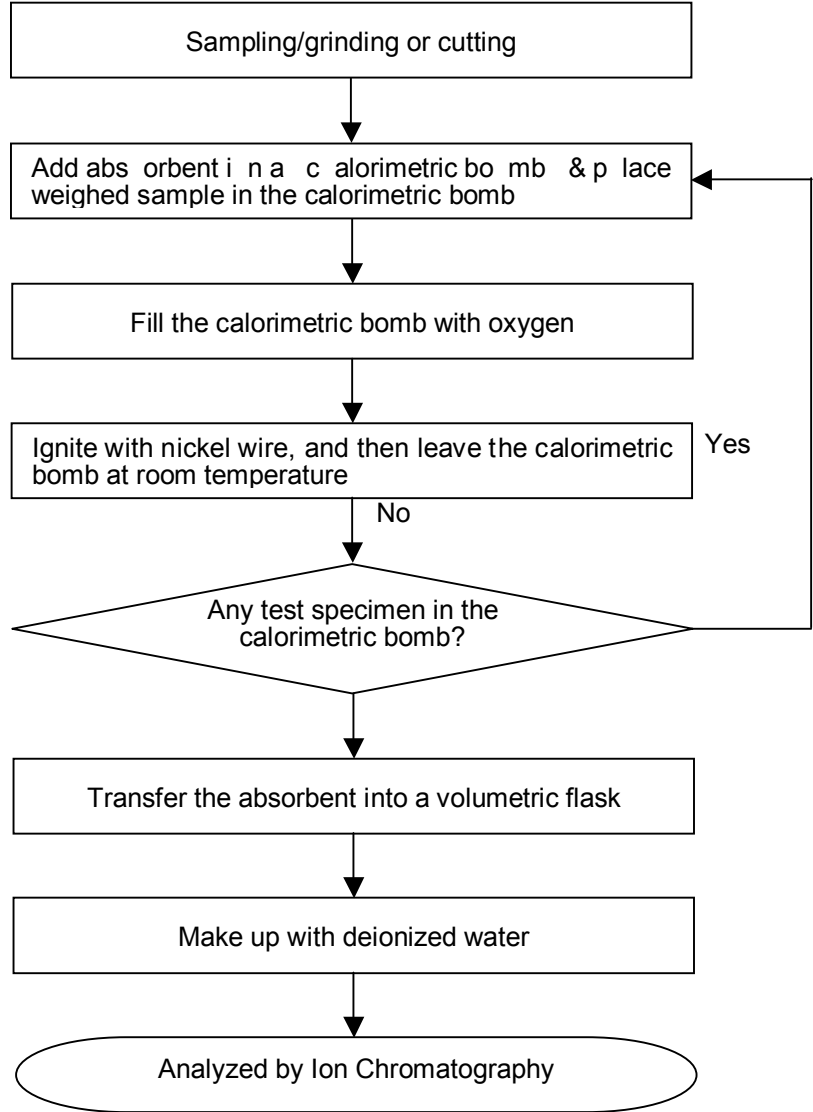
Date sample received : Aug 30, 2012  
Testing period : Aug 30, 2012 to Sep 01, 2012

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Tests Conducted

(III) Measurement Flowchart:

Test for Halogen Content (Reference Method: BS EN 14582:2007)



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End of report

*This report is made solely on the basis of your instructions and/or information and materials supplied by you. It is not intended to be a recommendation for any particular course of action. Intertek does not accept a duty of care or any other responsibility to any person other than the Client in respect of this report and only accepts liability to the Client insofar as is expressly contained in the terms and conditions governing Intertek's provision of services to you. Intertek makes no warranties or representations either express or implied with respect to this report save as provided for in those terms and conditions. We have aimed to conduct the Review on a diligent and careful basis and we do not accept any liability to you for any loss arising out of or in connection with this report, in contract, tort, by statute or otherwise, except in the event of our gross negligence or wilful misconduct.*





**Test Report**

Number: SZ HH00687971S1

Applicant: LITTELFUSE, INC  
8755 WEST HIGGINS ROAD SUITE  
500CHICAGO IL 60631 USA

Date: Jun 27, 2012

Attn: KRISTEEN BACILA/ARSENIO CESISTA JR.

*This is to supersede Report No. SZHH00687971 dated May 15, 2012*

Sample Description:

One (1) submitted sample said to be **silver-grey paste (terminations)**.  
Part No. : MS208.



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Tests conducted:

As requested by the applicant, refer to attached page(s) for details.

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To be continued

Authorized by:  
For Intertek Testing Services  
Shenzhen Ltd.



Ben N.L. Lin  
General Manager



**Test Report**

Number: SZ HH00687971S1

Conclusion:

Tested Samples Stan  
Submitted sample

Standard  
Restriction of the use of certain hazardous substance in electrical electronic and equipment (RoHS Direction 2002/95/EC and supersedure 2011/65/EU)

Result  
See Test  
Conducted

Phthalates content requirement in Annex XVII Items 51 & 52 of the REACH Regulation (EC) No. 1907/2006 & Amendment No. 552/2009 (formerly known as Directive 2005/84/EC) (DEHP, DBP & BBP)

P ass

T  
Hex

Test Item  
abromocyclododecane Content

See Test  
Conducted

Halogen (F, Cl, Br, I) Content

See Test  
Conducted

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Authorized by:  
For Intertek Testing Services  
Shenzhen Ltd.



Ben N.L. Lin  
General Manager



**Test Report**

Number: SZ HH00687971S1

Tests Conducted

1 RoHS Chemical Test

(A) Test Result Summary:

Testing Item	Result
Cadmium (Cd) Content (mg/kg)	ND(<2)
Lead (Pb) Content (mg/kg)	1940
Mercury (Hg) Content (mg/kg)	ND(<2)
Chromium (VI)(Cr <sup>6+</sup> ) Content (mg/kg)	ND(<1)
Polybrominated Biphenyls (PBBs)(mg/kg)	
Monobromobiphenyl (MonoBB)	ND(<5)
Dibromobiphenyl (DiBB)	ND(<5)
Tribromobiphenyl (TriBB)	ND(<5)
Tetrabromobiphenyl (TetraBB)	ND(<5)
Pentabromobiphenyl (PentaBB)	ND(<5)
Hexabromobiphenyl (HexaBB)	ND(<5)
Heptabromobiphenyl (HeptaBB)	ND(<5)
Octabromobiphenyl (OctaBB)	ND(<5)
Nonabromobiphenyl (NonaBB)	ND(<5)
Decabromobiphenyl (DecaBB)	ND(<5)
Polybrominated Diphenyl Ethers (PBDEs)(mg/kg)	
Monobromodiphenyl Ether (MonoBDE)	ND(<5)
Dibromodiphenyl Ether (DiBDE)	ND(<5)
Tribromodiphenyl Ether (TriBDE)	ND(<5)
Tetrabromodiphenyl Ether (TetraBDE)	ND(<5)
Pentabromodiphenyl Ether (PentaBDE)	ND(<5)
Hexabromodiphenyl Ether (HexaBDE)	ND(<5)
Heptabromodiphenyl Ether (HeptaBDE)	ND(<5)
Octabromodiphenyl Ether (OctaBDE)	ND(<5)
Nonabromodiphenyl Ether (NonaBDE)	ND(<5)
Decabromodiphenyl Ether (DecaBDE)	ND(<5)

Chemist: Wang Haijun/Zeng Guoliang

mg/kg = milligram per kilogram based on dry weight of sample = ppm  
 < = Less than  
 ND = Not detected

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**Test Report**

Number: SZ HH00687971S1

Tests Conducted

(B) RoHS Requirement:

Restricted Substances	Limits
Cadmium (Cd)	0.01% (100 mg/kg)
Lead (Pb)	0.1% (1000 mg/kg)
Mercury (Hg)	0.1% (1000 mg/kg)
Chromium (VI) (Cr <sup>6+</sup> )	0.1% (1000 mg/kg)
Polybrominated Biphenyls (PBBs)	0.1% (1000 mg/kg)
Polybrominated Diphenyl Ethers (PBDEs)	0.1% (1000 mg/kg)

The above limits were quoted from 2002/95/EC and supersedure 2011/65/EU for homogeneous material.

(C) Test Method:

Testing Item	Testing Method	Reporting Limit
Cadmium (Cd) Content	With reference to IEC 62321 Edition 1.0:2008, by acid digestion and determined by ICP - OES	2 mg/kg
Lead (Pb) Content	With reference to IEC 62321 Edition 1.0:2008, by acid digestion and determined by ICP - OES	2 mg/kg
Mercury (Hg) Content	With reference to IEC 62321 Edition 1.0:2008, by acid digestion and determined by ICP - OES	2 mg/kg
Chromium (VI)(Cr <sup>6+</sup> ) Content	With reference to IEC 62321 Edition 1.0:2008, by alkaline digestion and determined by UV-VIS Spectrophotometer	1 mg/kg
Polybrominated Biphenyls (PBBs)& Polybrominated Diphenyl Ethers (PBDEs)	With reference to IEC 62321 Edition 1.0:2008, by solvent extraction and determined by GC/MS and further HPLC confirmation when necessary	5 mg/kg

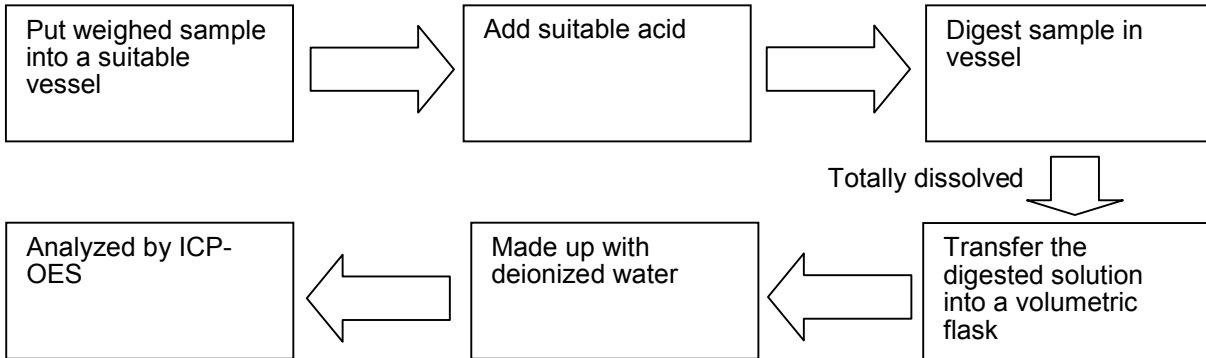
Date sample received: May 09, 2012  
Testing period: May 09, 2012 to May 11, 2012

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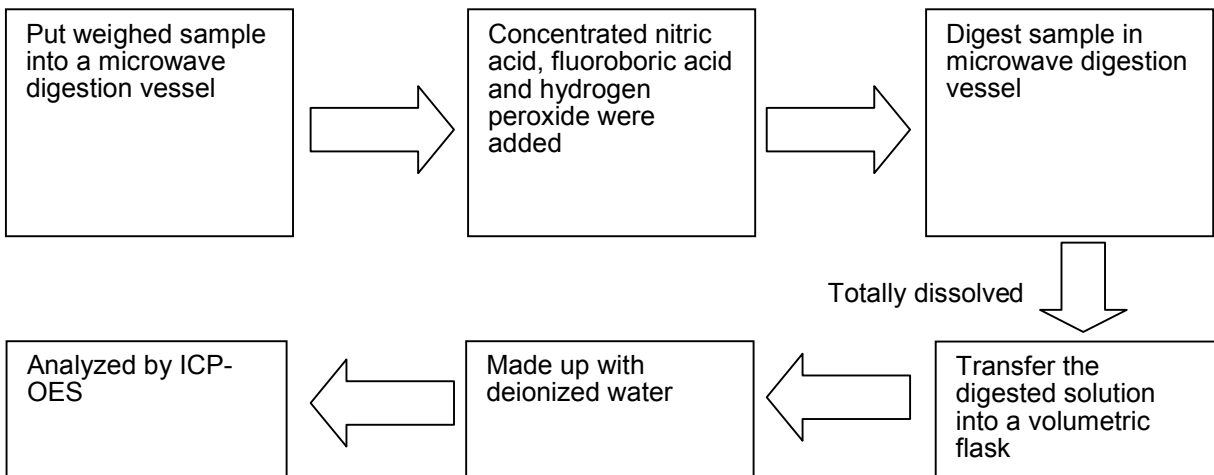
Tests Conducted

(D) Measurement Flowchart:

1. Test for Cd/Pb Contents



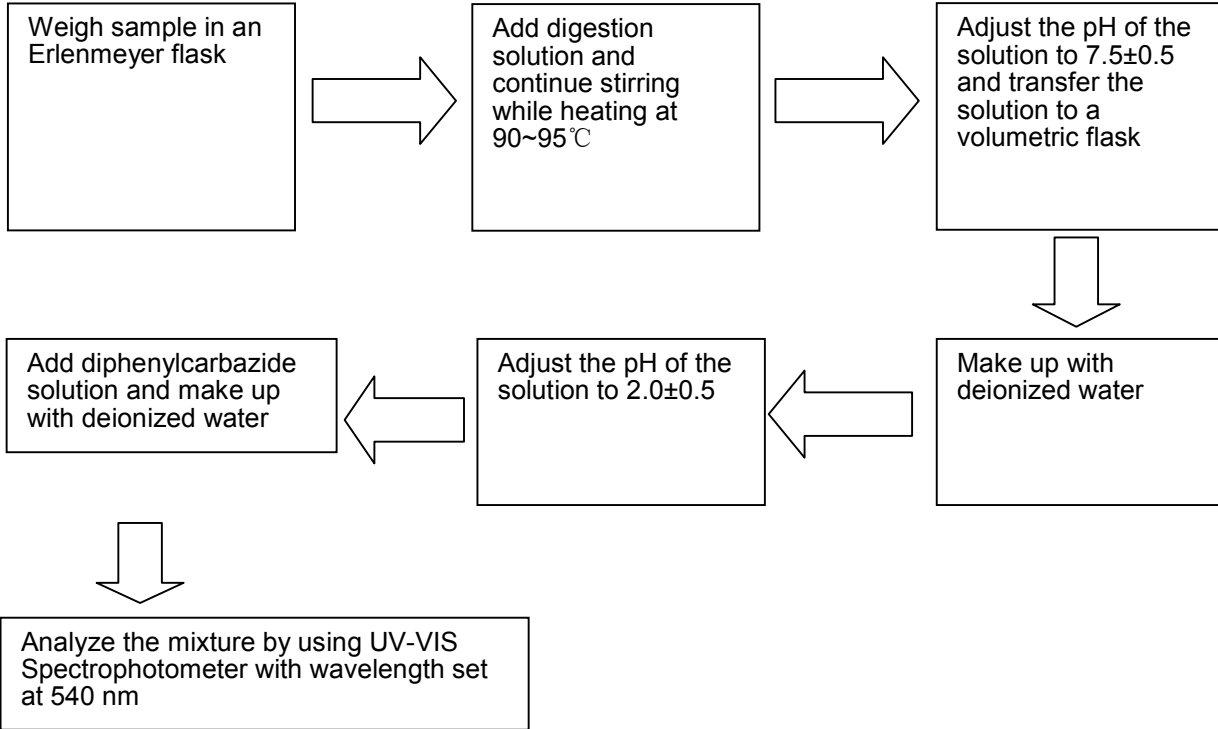
2. Test for Hg Content



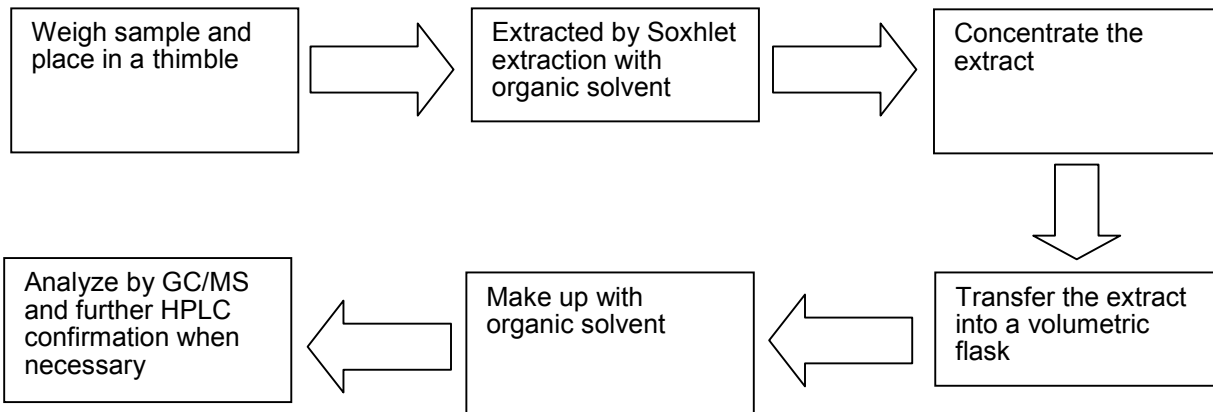
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Tests Conducted

3. Test for Chromium (VI) ( $Cr^{6+}$ ) Content (Alkaline Digestion)



4. Test for PBBs/PBDEs Contents



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**Test Report**

Number: SZ HH00687971S1

Tests Conducted

2 Phthalate Content

With reference to EN14372, by Gas chromatographic-Mass Spectrometric (GC-MS) analysis.

	<u>Result (%)</u>
Dibutyl phthalate (DBP)	<0.01
Di-(2-ethyl hexyl) phthalate (DEHP)	<0.01
Benzyl butyl phthalate (BBP)	<0.01
Sum of three phthalates	<0.01
Limit 0.1	%

The above limit was quoted according to Annex XVII Items 51 & 52 of the REACH Regulation (EC) No. 1907/2006 & Amendment No. 552/2009 (formerly known as Directive 2005/84/EC) for phthalate content in toys and children articles.

< = Less than

As per client's request, only DBP, DEHP and BBP were tested for the submitted sample.

Tested sample : Silver-grey paste (terminations).

Date sample received : May 08, 2012  
Testing period : May 08, 2012 to May 12, 2012

3 Hexabromocyclododecane (HBCDD) Content:

By solvent extraction followed by Gas Chromatographic - Mass Spectrometric (GC-MS) analysis.

Result : Less than 10 mg/kg

mg/kg = milligram per kilogram

Tested Component : Silver-grey paste (terminations).

Date sample received : May 08, 2012  
Testing period : May 08, 2012 to May 10, 2012

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**Test Report**

Number: SZ HH00687971S1

Tests Conducted

4 Halo gen Content

( I ) Test Result Summary:

Testing Item	Result (mg/kg)
Fluorine (F) Content	ND
Chlorine (Cl) Content	89
Bromine (Br) Content	ND
Iodine (I) Content	ND

mg/kg = milligram per kilogram based on dry weight of sample = ppm  
ND = Not detected

( II ) Test Method:

Testing Item T	Testing Method Repor	Testing Limit
Halogen (F, Cl, Br, I) Content	With reference to BS EN 14582:2007, by calorimetric bomb and determined by Ion Chromatography	50 mg/kg

Reporting limit = Quantitation limit of analyte in sample

Date sample received: May 08, 2012  
Testing period: May 08, 2012 to May 11, 2012

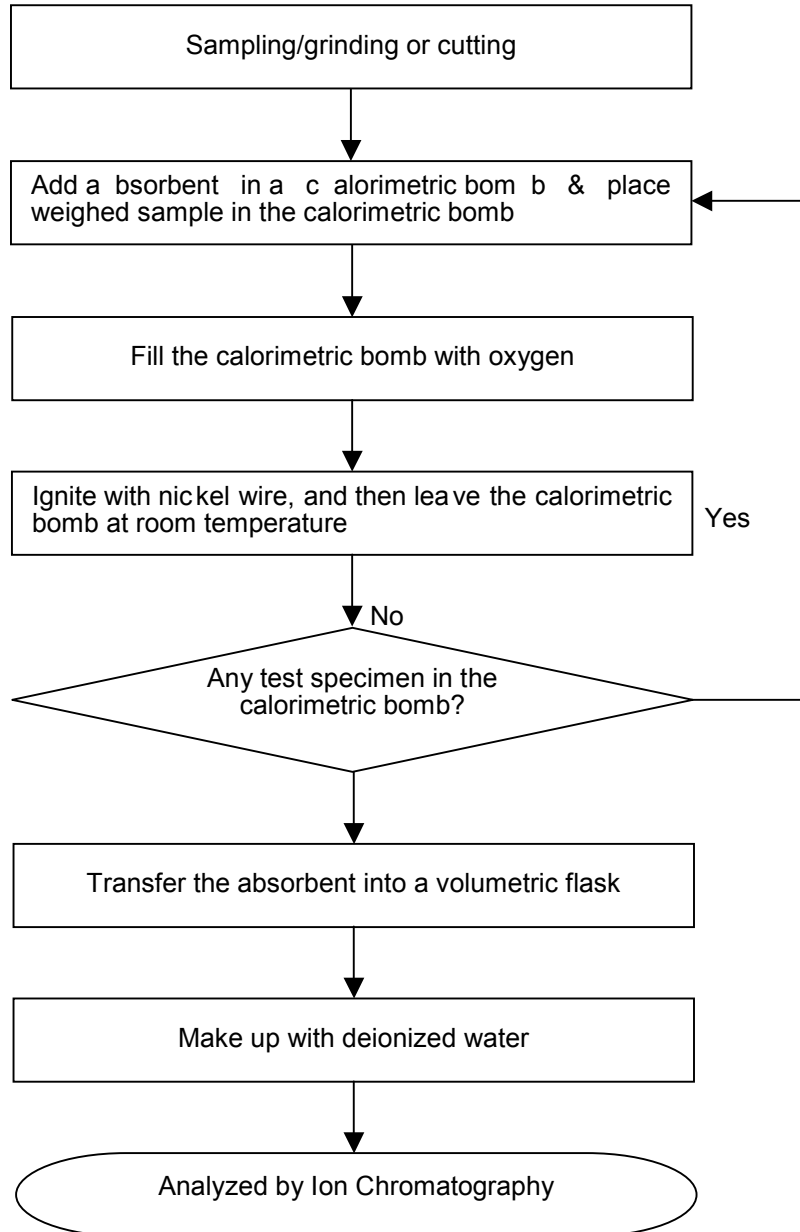
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Tests Conducted

(III) Measurement Flowchart:

Test for Halogen Content (Reference Method: BS EN 14582:2007)



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End of report



**Test Report**

Number: SZ HH00687968

Applicant: LITTELFUSE, INC  
8755 WEST HIGGINS ROAD SUITE  
500CHICAGO IL 60631 USA

Date: May 14, 2012

Attn: KRISTEEN BACILA/ARSENIO CESISTA JR.

Sample Description:

One (1) submitted sample said to be **silver-grey plated metal (nickel plated).**



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Tests conducted:

As requested by the applicant, refer to attached page(s) for details.

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Conclusion:

<u>Tested Samples Stan</u>	<u>ard</u>	<u>Result</u>
Submitted sample	Restriction of the use of certain hazardous substance in electrical electronic and equipment (RoHS Direction 2002/95/EC and supersedure 2011/65/EU)	P ass

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Authorized by:  
For Intertek Testing Services  
Shenzhen Ltd.



Ben N.L. Lin  
General Manager



**Test Report**

Number: SZ HH00687968

Tests Conducted

RoHS Chemical Test

(A) Test Result Summary:

Testing Item	Result
Cadmium (Cd) Content (mg/kg)	ND(<2)
Lead (Pb) Content (mg/kg)	ND(<2)
Mercury (Hg) Content (mg/kg)	ND(<2)
Chromium (VI)(Cr <sup>6+</sup> ) Result (By Boiling Water Extraction on Metal)(mg/kg with 50cm <sup>2</sup> )	Negative(<0.02)

Chemist: Wang Haijun

mg/kg = milligram per kilogram = ppm  
 mg/kg with 50cm<sup>2</sup> = milligram per kilogram with 50 square centimetre  
 < = Less than  
 ND = Not detected

Positive = A positive test result indicated the presence of Cr(VI) at the time of testing, equal to or greater than threshold of 1 mg/kg for spot test procedure or 0.02 mg/kg for boiling-water-extraction procedures with a sample surface area of 50cm<sup>2</sup> used. However, it shall not be interpreted as the Cr(VI) concentration in the coating layer of the sample and should not be used as a method detection limit for this qualitative test.

Negative = A negative test result indicated above positive observation was not found at the time of testing. When the spot-test showed a negative result, the boiling-water-extraction procedure shall be used to verify the result.

(B) RoHS Requirement:

Restricted Substances	Limits
Cadmium (Cd)	0.01% (100 mg/kg)
Lead (Pb)	0.1% (1000 mg/kg)
Mercury (Hg)	0.1% (1000 mg/kg)
Chromium (VI) (Cr <sup>6+</sup> )	0.1% (1000 mg/kg)

The above limits were quoted from 2002/95/EC and superseded 2011/65/EU for homogeneous material.  
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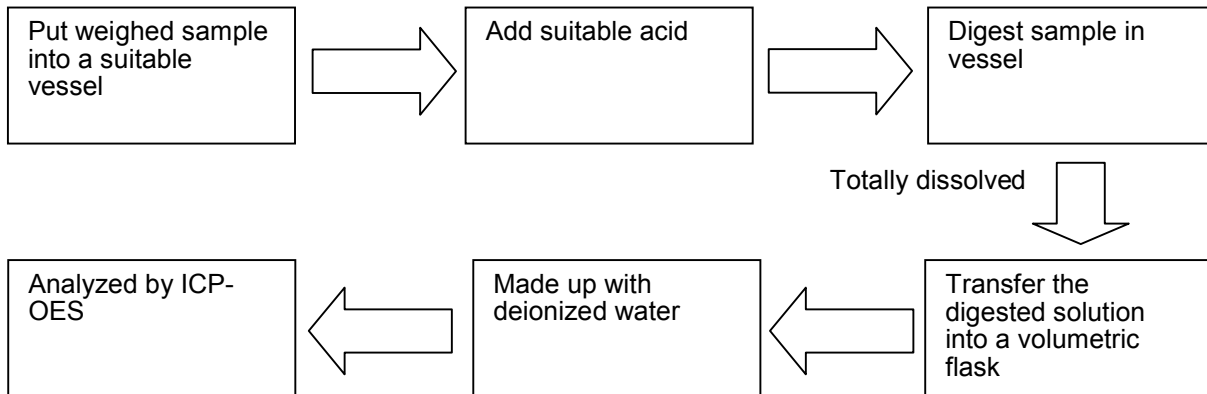
Tests Conducted

(C) Test Method:

Testing Item	Testing Method	Reporting Limit
Cadmium (Cd) Content	With reference to IEC 62321 Edition 1.0:2008, by acid digestion and determined by ICP - OES	2 mg/kg
Lead (Pb) Content	With reference to IEC 62321 Edition 1.0:2008, by acid digestion and determined by ICP - OES	2 mg/kg
Mercury (Hg) Content	With reference to IEC 62321 Edition 1.0:2008, by acid digestion and determined by ICP - OES	2 mg/kg
Chromium (VI) (Cr <sup>6+</sup> ) Content	With reference to IEC 62321 Edition 1.0:2008, by boiling water extraction and determined by UV-VIS Spectrophotometer	Positive/Negative (Threshold of 0.02mg/kg with 50cm <sup>2</sup> )

Date sample received: May 08, 2012  
 Testing period: May 08, 2012 to May 11, 2012

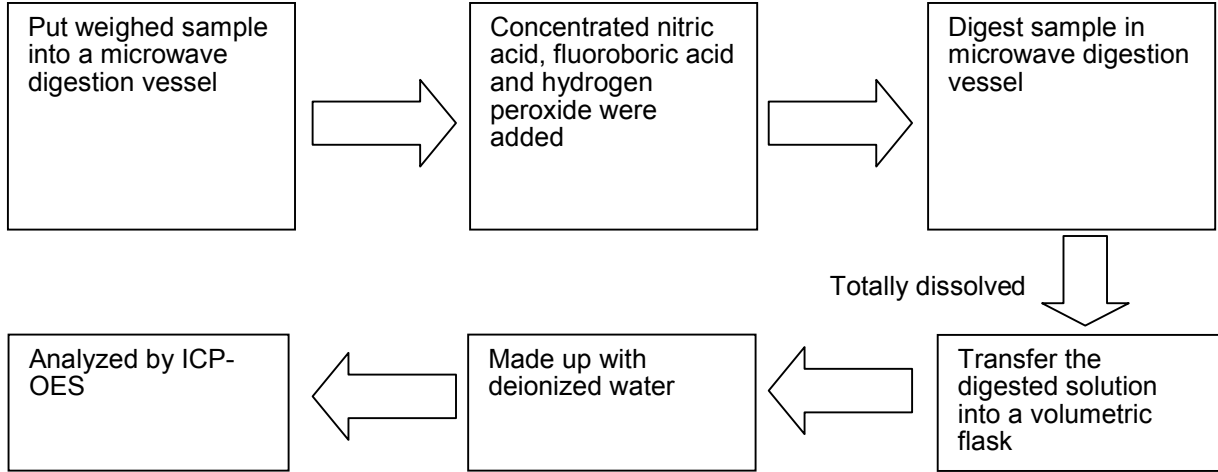
(D) Measurement Flowchart:  
 1. Test for Cd/Pb Contents



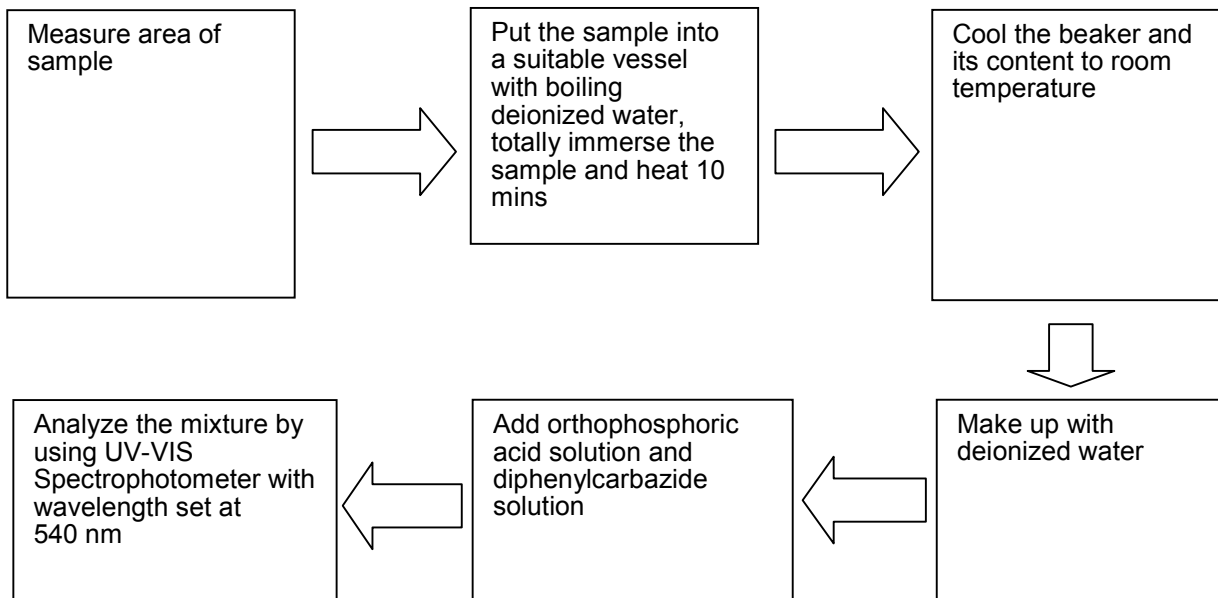
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Tests Conducted

2. Test for Hg Content



3. Test for Chromium (VI) (Cr<sup>6+</sup>) Content (Boiling Water Extraction)



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End of report



**Test Report**

Number: SZ HH00687973

Applicant: LITTELFUSE, INC  
8755 WEST HIGGINS ROAD SUITE  
500CHICAGO IL 60631 USA

Date: May 11, 2012

Attn: KRISTEEN BACILA/ARSENIO CESISTA JR.

Sample Description:  
One (1) submitted sample said to be **solder (tin plated).**



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Tests conducted:  
As requested by the applicant, refer to attached page(s) for details.

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Conclusion:

<u>Tested Samples Stan</u>	<u>dard</u>	<u>Result</u>
Submitted sample	Restriction of the use of certain hazardous substance in electrical electronic and equipment (RoHS Direction 2002/95/EC and supersedure 2011/65/EU)	P ass

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Authorized by:  
For Intertek Testing Services  
Shenzhen Ltd.


Ben N.L. Lin  
General Manager



**Test Report**

Number: SZ HH00687973

Tests Conducted

RoHS Chemical Test

(A) Test Result Summary:

Testing Item	Result
Cadmium (Cd) Content (mg/kg)	ND(<2)
Lead (Pb) Content (mg/kg)	276
Mercury (Hg) Content (mg/kg)	ND(<2)
Chromium (VI)(Cr <sup>6+</sup> ) Result (By Boiling Water Extraction on Metal)(mg/kg with 50cm <sup>2</sup> )	Negative(<0.02)

Chemist: Wang Haijun

mg/kg = milligram per kilogram = ppm  
 mg/kg with 50cm<sup>2</sup> = milligram per kilogram with 50 square centimetre  
 < = Less than  
 ND = Not detected

Positive = A positive test result indicated the presence of Cr(VI) at the time of testing, equal to or greater than threshold of 1 mg/kg for spot test procedure or 0.02 mg/kg for boiling-water-extraction procedures with a sample surface area of 50cm<sup>2</sup> used. However, it shall not be interpreted as the Cr(VI) concentration in the coating layer of the sample and should not be used as a method detection limit for this qualitative test.

Negative = A negative test result indicated above positive observation was not found at the time of testing. When the spot-test showed a negative result, the boiling-water-extraction procedure shall be used to verify the result.

(B) RoHS Requirement:

Restricted Substances	Limits
Cadmium (Cd)	0.01% (100 mg/kg)
Lead (Pb)	0.1% (1000 mg/kg)
Mercury (Hg)	0.1% (1000 mg/kg)
Chromium (VI) (Cr <sup>6+</sup> )	0.1% (1000 mg/kg)

The above limits were quoted from 2002/95/EC and superseded 2011/65/EU for homogeneous material.  
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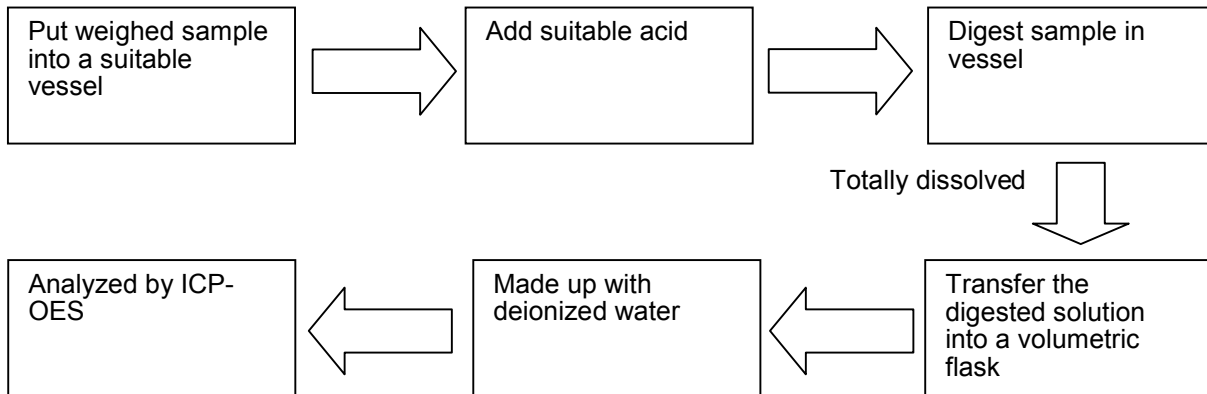
Tests Conducted

(C) Test Method:

Testing Item	Testing Method	Reporting Limit
Cadmium (Cd) Content	With reference to IEC 62321 Edition 1.0:2008, by acid digestion and determined by ICP - OES	2 mg/kg
Lead (Pb) Content	With reference to IEC 62321 Edition 1.0:2008, by acid digestion and determined by ICP - OES	2 mg/kg
Mercury (Hg) Content	With reference to IEC 62321 Edition 1.0:2008, by acid digestion and determined by ICP - OES	2 mg/kg
Chromium (VI) (Cr <sup>6+</sup> ) Content	With reference to IEC 62321 Edition 1.0:2008, by boiling water extraction and determined by UV-VIS Spectrophotometer	Positive/Negative (Threshold of 0.02mg/kg with 50cm <sup>2</sup> )

Date sample received: May 08, 2012  
 Testing period: May 08, 2012 to May 10, 2012

(D) Measurement Flowchart:  
 1. Test for Cd/Pb Contents

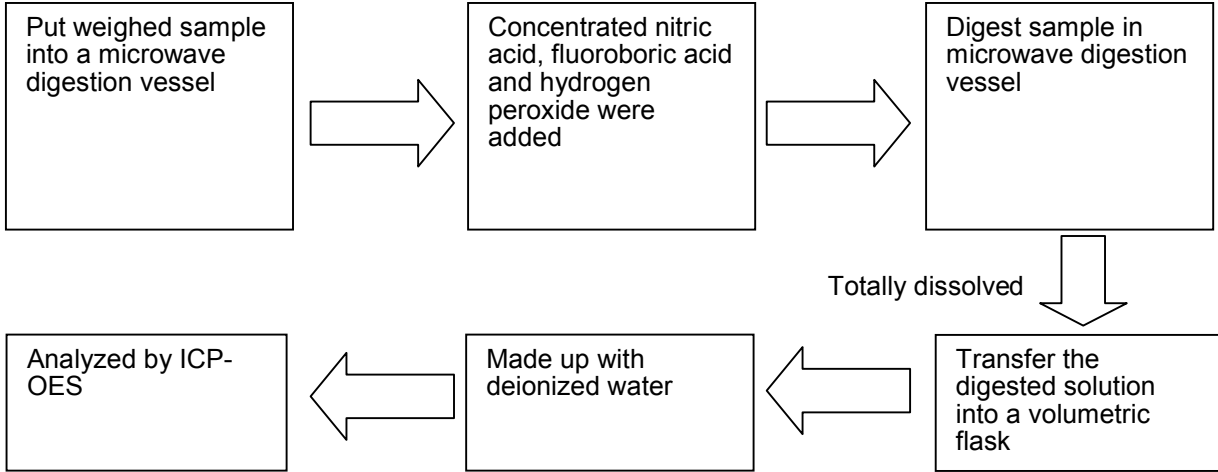


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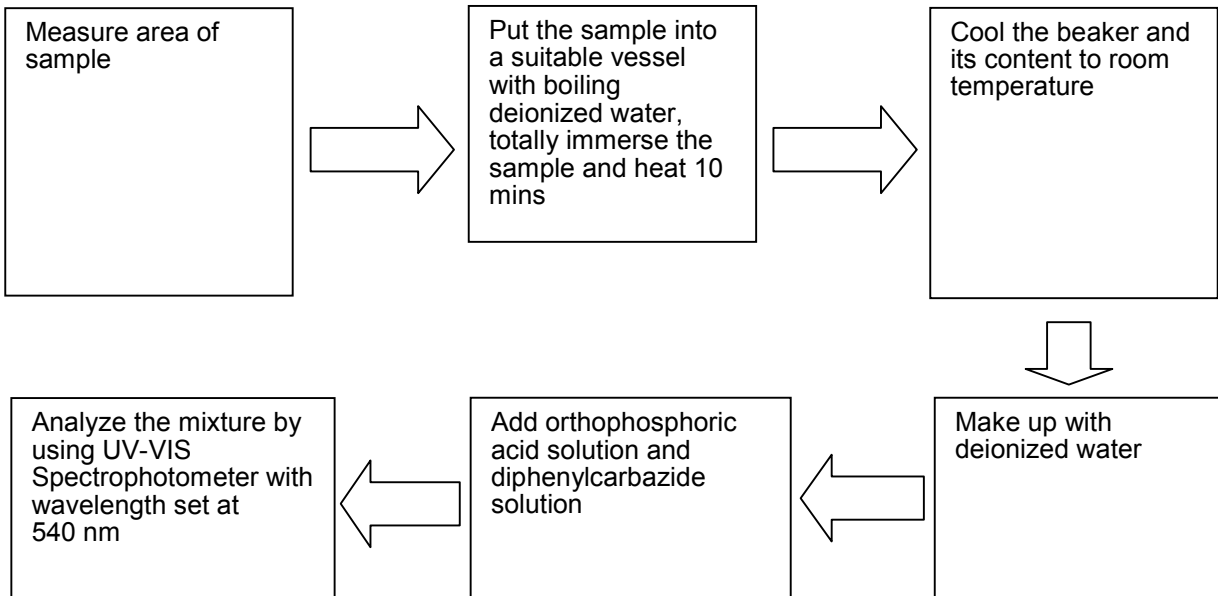


Tests Conducted

2. Test for Hg Content



3. Test for Chromium (VI) (Cr<sup>6+</sup>) Content (Boiling Water Extraction)



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End of report