



ICP Test Report Certification Packet

Company name: Littelfuse, Inc.

Product Series: 342 Series - Military Spec Drip-Proof Fuseholder for 3AG, F02 and F03 Fuses

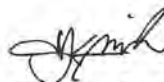
Product #: 03420021Z Series

Issue Date: August 5, 2010

It is hereby certified by Littelfuse, Inc. that there is neither RoHS (EU Directive 2002/95/EC)-restricted substance nor such use, for materials to be used for unit parts, for packing/packaging materials, and for additives and the like in the manufacturing processes.

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

Issued by:


KRISTEEN BACILA

<Global EHS Engineer>

(1) Parts, sub-materials and unit parts

This document covers the 03420021Z Series RoHS-Compliant series products manufactured by Littelfuse, Inc.

< Raw Materials Used

Please see Table 1

(2) The ICP data on all measurable substances

Please see appropriate pages as identified in Table 1

Remarks : under RoHS exemption 6c: Lead as an alloying element in copper not exceeding 4% lead by weight.

Table 1: List of Raw Materials covered by this report

Total Parts	Raw Material Part Number	Raw Material Description	Page(s)
1	889-118	Body Insert	3-6
2	875-5xx (875-546-001)	Back Terminal	7-12
3	342021-1/ 057143	Body	13-19
4	342021-2/ 057143	Knob	13-19
5	886-140	Side Terminal	20-24
6	889-117	Knob Insert	25-28
7	882-xxx (882-119)	Contact	29-33
8	912-xxx (912-312)	Spring	34-39
9	692469	Solder	40-45
10	905-xxx (905-010)	Lock washer	46-50



Test Report

No. : CE/2008/A5029

Date : 2008/10/27

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LITTELFUSE INC.

800 E. NORTHWEST HIGHWAY, DES PLAINES, IL 60016



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

Sample Description : BODY INSERT
Style/Item No. : 889-118
Sample Receiving Date : 2008/10/22
Testing Period : 2008/10/22 TO 2008/10/27

Test Requested : In accordance with the RoHS Directive 2002/95/EC, and its amendment directives.

Test Method : With reference to IEC 62321/2nd CDV (111/95/CDV)
Procedures for the Determination of Levels of Regulated
Substances in Electrotechnical Products.

- (1) Determination of Cadmium by ICP-AES.
- (2) Determination of Lead by ICP-AES.
- (3) Determination of Mercury by ICP-AES.
- (4) Determination of Hexavalent Chromium for metallic samples
by Spot test / boiling water extraction Method.

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

Nicole Chien / Supervisor

Signed for and on behalf of

SGS TAIWAN LTD.

Chemical Laboratory - Taipei

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LITTELFUSE INC.

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

Test Item (s):	Method (Refer to)	Result	MDL
		No.1	
Cadmium (Cd)	(1)	28	2
Lead (Pb)	(2)	26600	2
Mercury (Hg)	(3)	n.d.	2
Hexavalent Chromium Cr(VI) by Spot test / boiling water extraction	(4)	Negative	See Note 4

TEST PART DESCRIPTION:

NO.1 : SILVER COLORED METAL INSERT

Note : 1. mg/kg = ppm

2. n.d. = Not Detected

3. MDL = Method Detection Limit

4. Spot-test:

Negative = Absence of Cr(VI) coating / surface layer,

Positive = Presence of Cr(VI) coating / surface layer;

(The tested sample should be further verified by boiling-water-extraction method if the spot test result cannot be confirmed.)

Boiling-water-extraction:

Negative = Absence of Cr(VI) coating / surface layer.

Positive = Presence of Cr(VI) coating / surface layer;

the detected concentration in boiling-water-extraction solution is equal or greater than 0.02 mg/kg with 50 cm² sample surface area.

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台灣檢驗科技股份有限公司 Chemical-Taipei 33 WuChyuan Road, Wuku Industrial Zone, Taipei County, Taiwan / 台北縣五股工業區五權路33號 t + 886 (02)2299 3279 f + 886 (02)2299 3237 www.sgs.com

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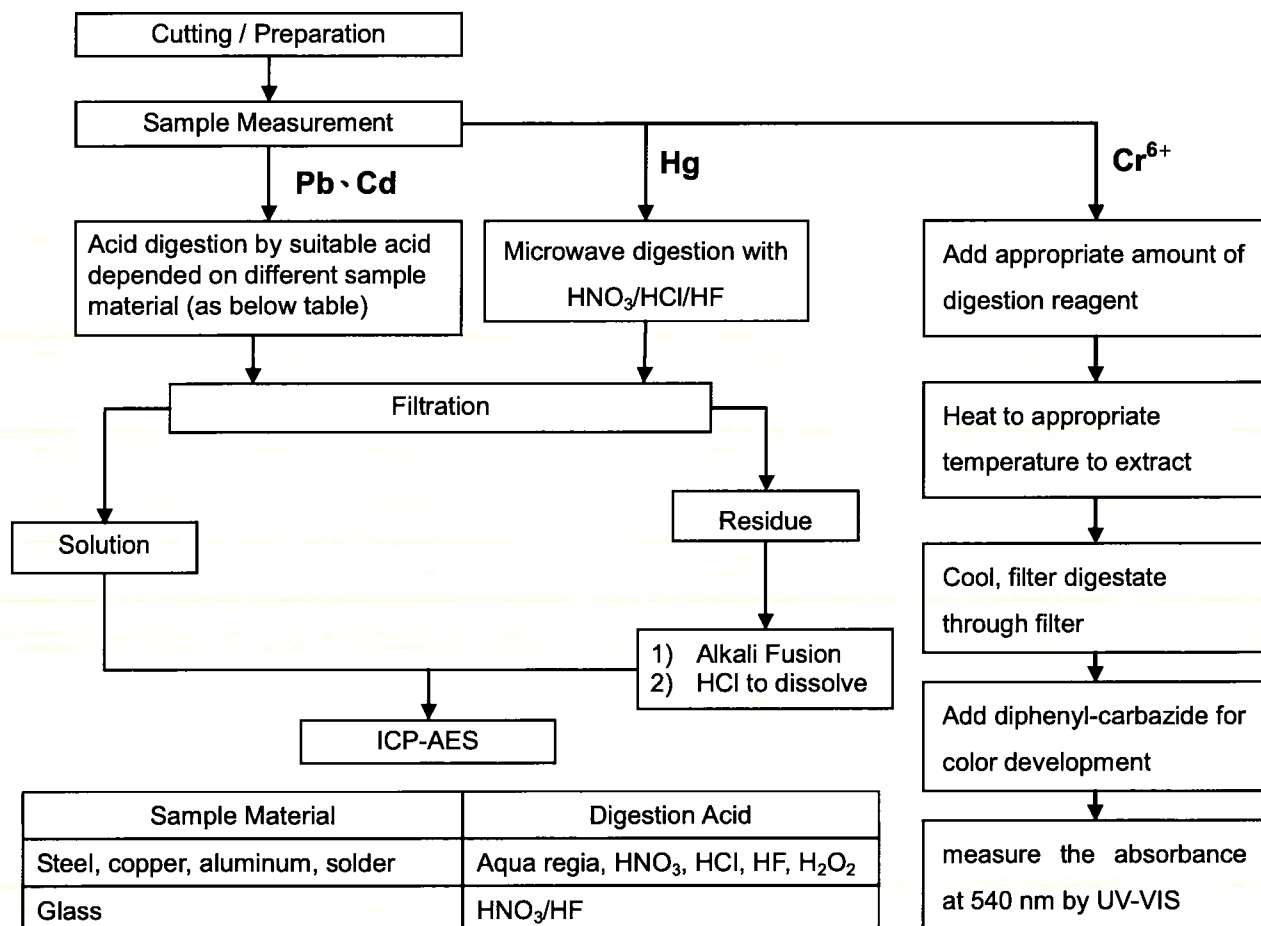
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LITTELFUSE INC.

800 E. NORTHWEST HIGHWAY, DES PLAINES, IL 60016



- 1) These samples were dissolved totally by pre-conditioning method according to below flow chart.
(Cr⁶⁺ test method excluded)
- 2) Name of the person who made measurement: Climbgreat Yang
- 3) Name of the person in charge of measurement: Troy Chang



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800 E. NORTHWEST HIGHWAY, DES PLAINES, IL 60016



**** End of Report ****

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台灣檢驗科技股份有限公司 | Chemical-Taipei 33 WuChyuan Road, Wuku Industrial Zone, Taipei County, Taiwan / 台北縣五股工業區五權路33號 t + 886 (02)2299 3279 f + 886 (02)2299 3237 www.sgs.com

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Test Report

Number : TWNC00108558
Page 1 Of 6

Applicant: Littelfuse, Inc.
800 E. Northwest Hwy
Desplaines Il 60016

Date : FEB 27, 2009

Sample Description:

One (1) group of submitted samples said to be :
Part Description : Back Terminal
Part Number : 875-524
Date Sample Received : FEB 24, 2009
Date Test Started : FEB 25, 2009

Test Conducted :

As requested by the applicant, for details please refer to attached pages.

Authorized By:
On Behalf Of Intertek Testing Services
Taiwan Limited



K. Y. Liang
Director

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approval of the laboratory.

Intertek Testing Services Taiwan Ltd.

8F., No. 423, Ruiguang Rd., Neihu District, Taipei 114, Taiwan, R.O.C.

全國公證檢驗股份有限公司

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Number: TWNC00108558
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Test Conducted

(I) Test Result Summary :

<u>Testing Item</u>	<u>Result (ppm)</u>
	<u>Silvery Metal</u>
Heavy Metal	
Cadmium (Cd) content	ND
Lead (Pb) content	43
Mercury (Hg) content	ND
Chromium VI (Cr ⁶⁺) content	ND

Remarks: ppm = Parts per million based on weight of tested sample = mg/kg
ND = Not detected

Responsibility Of Chemist : Irene Chiou / Kevin Liu

Date Sample Received : FEB 24, 2009

Testing Period : FEB 25, 2009 To FEB 26, 2009

(II) RoHS Requirement:

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

The above limits were quoted from 2002/95/EC and amendment 2005/618/EC for homogeneous material.

Intertek Testing Services Taiwan Ltd.

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Number: TWNC00108558
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Test Conducted

(III) Test Method:

Testing Item	Testing Method	Reporting Limit
Cadmium (Cd) content	With reference to IEC 62321 edition 1.0:2008 in clause 8/9/10, by microwave digestion until the tested samples are totally dissolved and determined by ICP-OES.	2 ppm
Lead (Pb) content	With reference to IEC 62321 edition 1.0:2008 in clause 8/9/10, by microwave digestion until the tested samples are totally dissolved and determined by ICP-OES.	2 ppm
Mercury (Hg) content	With reference to IEC 62321 edition 1.0:2008 in clause 7, by microwave digestion until the tested samples are totally dissolved and determined by ICP-OES.	2 ppm
Chromium VI (Cr ⁶⁺) Content	With reference to USEPA 3060A & 7196A, by alkaline digestion and determined by UV-Vis Spectrophotometer	1 ppm

Remark: Reporting limit = Quantitation limit of analyte in sample

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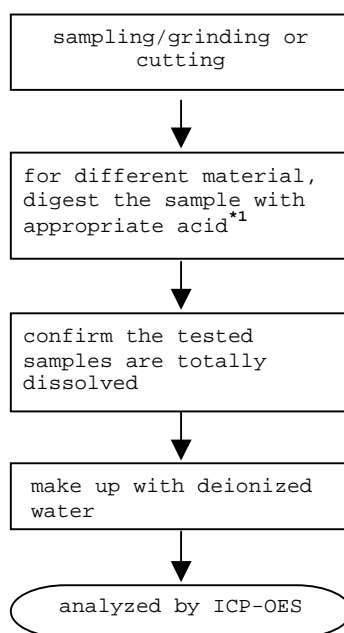
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Test Conducted

(IV) Measurement Flowchart:

Test For Heavy Metal (Cd/Pb/Hg) Contents

Reference Standard: IEC 62321 edition 1.0:2008



Remarks:

*1: List Of Appropriate Acid:

Material	Acid Added For Digestion
Polymers	HNO ₃ , HCl, HF, H ₂ O ₂ , H ₃ BO ₃
Metals	HNO ₃ , HCl, HF
Electronics	HNO ₃ , HCl, H ₂ O ₂ , HBF ₄

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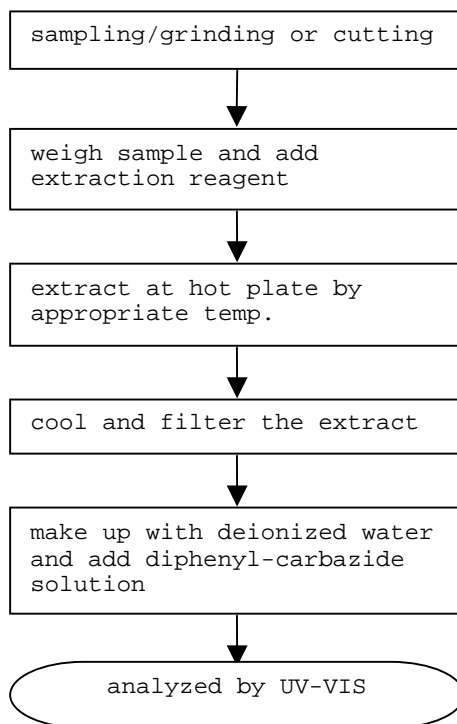
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Test Conducted
(IV) Measurement Flowchart:

Test For Chromium (VI) Content
Reference Standard: USEPA 3060A/7196A



End Of Report

Test Conducted

Photo



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Test Report

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LITTELFUSE INC.
800 E. NORTHWEST HIGHWAY, DES PLAINES, IL 60016-3096, USA



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

Sample Description : BODY (057143)
Style/Item No. : 340267-11
Sample Receiving Date : 2008/10/16
Testing Period : 2008/10/16 TO 2008/10/21

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


Chenyu Kung / Operation Manager
Signed for and on behalf of
SGS TAIWAN LTD.
Chemical Laboratory – Taipei

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Test Report

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LITTELFUSE INC.
800 E. NORTHWEST HIGHWAY, DES PLAINES, IL 60016-3096, USA



Test Result(s)

PART NAME NO.1 : GRAY PLASTIC

Test Item (s):	Unit	Method	MDL	Result
				No.1
Cadmium (Cd)	mg/kg	With reference to IEC 62321/2nd CDV (111/95/CDV). Determination of Cadmium by ICP-AES.	2	n.d.
Lead (Pb)	mg/kg	With reference to IEC 62321/2nd CDV (111/95/CDV). Determination of Lead by ICP-AES.	2	11
Mercury (Hg)	mg/kg	With reference to IEC 62321/2nd CDV (111/95/CDV). Determination of Mercury by ICP-AES.	2	n.d.
Hexavalent Chromium Cr(VI) by alkaline extraction	mg/kg	With reference to IEC 62321/2nd CDV (111/95/CDV). Determination of Hexavalent Chromium for non-metallic samples by UV/Vis Spectrometry.	2	n.d.
Halogen	---	With reference to BS EN 14582:2007. Analysis was performed by IC method for F , Cl , Br, I content.	---	---
Halogen-Fluorine (F) (CAS No.: 014762-94-8)	mg/kg	With reference to BS EN 14582:2007. Analysis was performed by IC method for Fluorine content.	50	n.d.
Halogen-Chlorine (Cl) (CAS No.: 022537-15-1)	mg/kg	With reference to BS EN 14582:2007. Analysis was performed by IC method for Chlorine content.	50	32400
Halogen-Bromine (Br) (CAS No.: 010097-32-2)	mg/kg	With reference to BS EN 14582:2007. Analysis was performed by IC method for Bromine content.	50	n.d.
Halogen-Iodine (I) (CAS No.: 014362-44-8)	mg/kg	With reference to BS EN 14582:2007. Analysis was performed by IC method for Iodine content.	50	n.d.

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LITTELFUSE INC.
800 E. NORTHWEST HIGHWAY, DES PLAINES, IL 60016-3096, USA



Test Item (s):	Unit	Method	MDL	Result
				No.1
Sum of PBBs	mg/kg	With reference to IEC 62321/2nd CDV (111/95/CDV). Determination of PBB and PBDE by GC/MS.	-	n.d.
Monobromobiphenyl			5	n.d.
Dibromobiphenyl			5	n.d.
Tribromobiphenyl			5	n.d.
Tetrabromobiphenyl			5	n.d.
Pentabromobiphenyl			5	n.d.
Hexabromobiphenyl			5	n.d.
Heptabromobiphenyl			5	n.d.
Octabromobiphenyl			5	n.d.
Nonabromobiphenyl			5	n.d.
Decabromobiphenyl			5	n.d.
Sum of PBDEs			-	n.d.
Monobromodiphenyl ether			5	n.d.
Dibromodiphenyl ether			5	n.d.
Tribromodiphenyl ether			5	n.d.
Tetrabromodiphenyl ether			5	n.d.
Pentabromodiphenyl ether			5	n.d.
Hexabromodiphenyl ether			5	n.d.
Heptabromodiphenyl ether			5	n.d.
Octabromodiphenyl ether			5	n.d.
Nonabromodiphenyl ether			5	n.d.
Decabromodiphenyl ether			5	n.d.

- Note : 1. mg/kg = ppm
2. n.d. = Not Detected
3. MDL = Method Detection Limit
4. " - " = Not Regulated
5. "----" = Not Conducted

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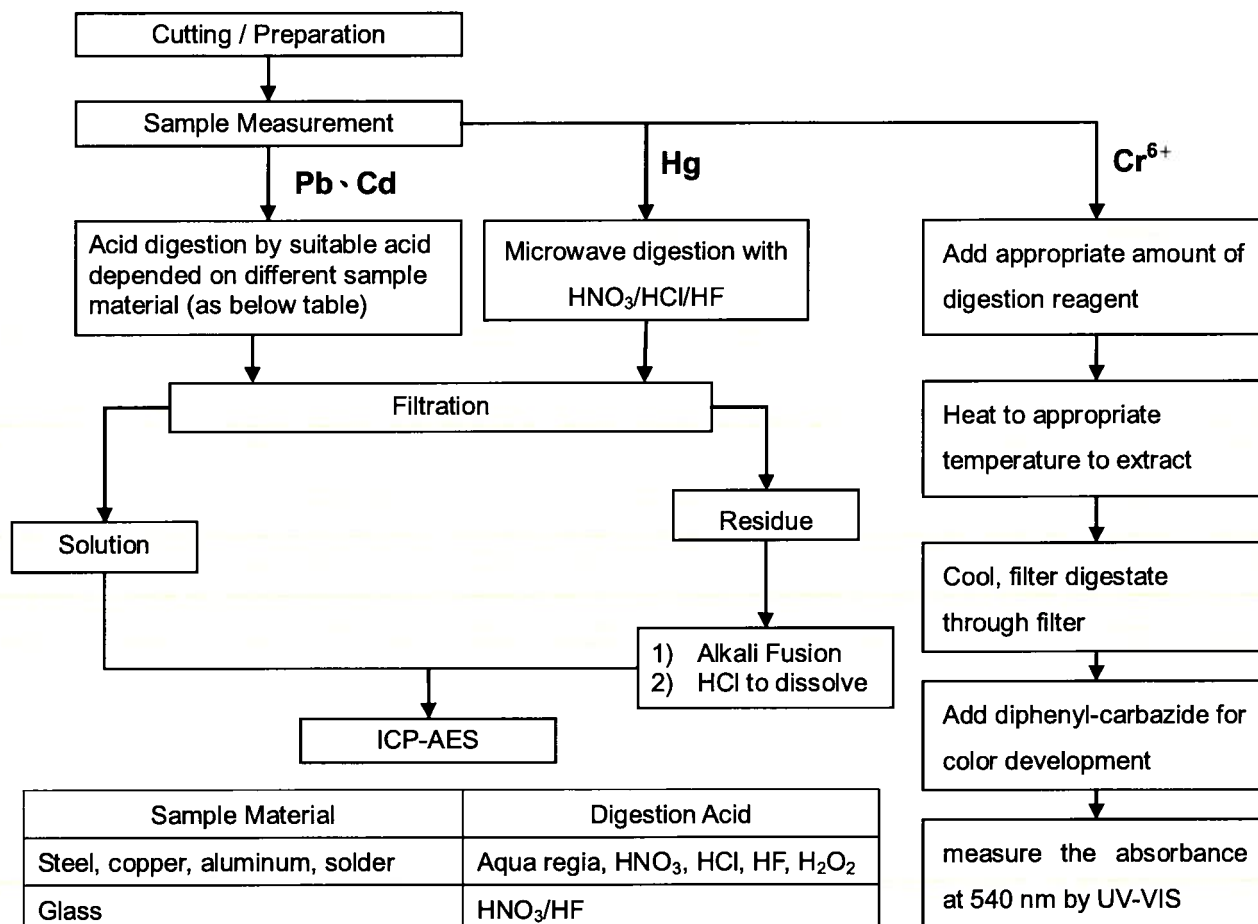
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LITTELFUSE INC.

800 E. NORTHWEST HIGHWAY, DES PLAINES, IL 60016-3096, USA



- 1) These samples were dissolved totally by pre-conditioning method according to below flow chart.
(Cr⁶⁺ test method excluded)
- 2) Name of the person who made measurement: Climbgreat Yang
- 3) Name of the person in charge of measurement: Troy Chang



Sample Material	Digestion Acid
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	Any acid to total digestion

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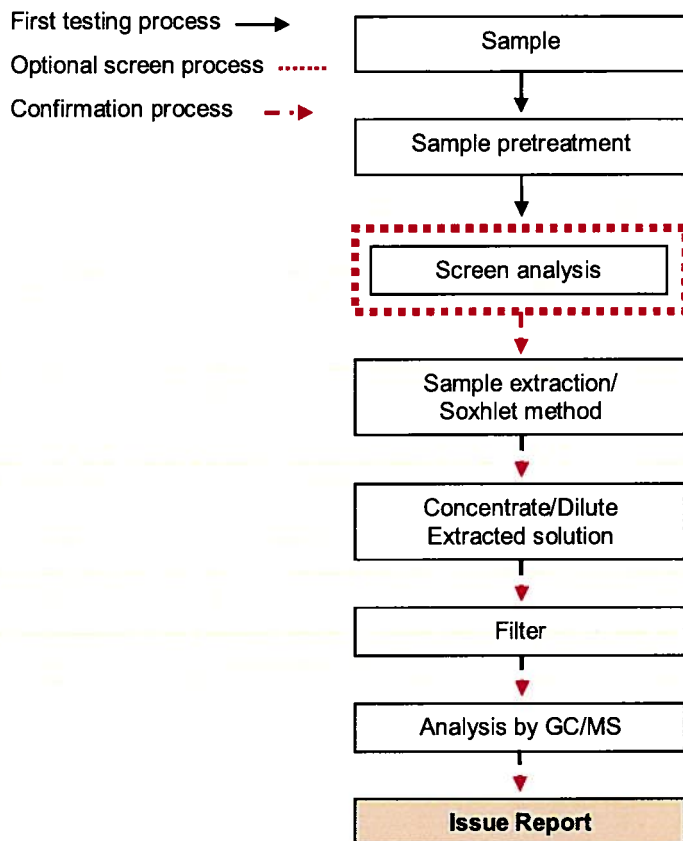
LITTELFUSE INC.

800 E. NORTHWEST HIGHWAY, DES PLAINES, IL 60016-3096, USA



PBB/PBDE analytical FLOW CHART

- 1) Name of the person who made measurement: Roman Wong
- 2) Name of the person in charge of measurement: Shinjyh Chen



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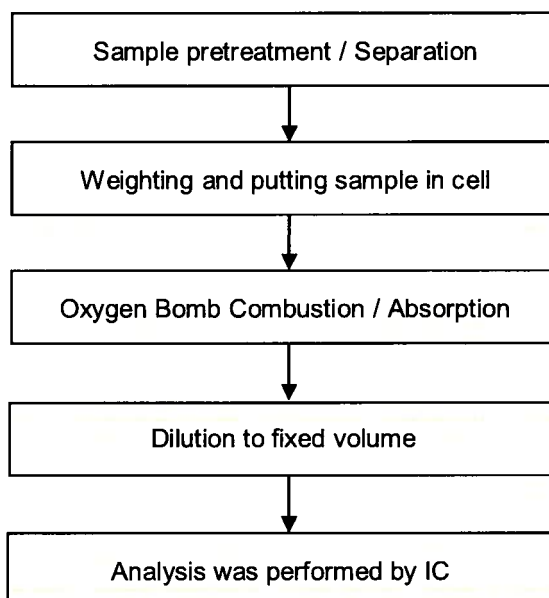
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Analytical flow chart of halogen content

- 1) Name of the person who made measurement: Alan Chen
- 2) Name of the person in charge of measurement: Troy Chang



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Test Report

No. : CE/2008/A3464 Date : 2008/10/21 Page : 7 of 7

LITTELFUSE INC.
800 E. NORTHWEST HIGHWAY, DES PLAINES, IL 60016-3096, USA



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Test Report

No. : CE/2008/A5028

Date : 2008/10/27

Page : 1 of 5

LITTELFUSE INC.

800 E. NORTHWEST HIGHWAY, DES PLAINES, IL 60016



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

Sample Description : SIDE TERMINAL
Style/Item No. : 886-140
Sample Receiving Date : 2008/10/22
Testing Period : 2008/10/22 TO 2008/10/27

Test Requested : In accordance with the RoHS Directive 2002/95/EC, and its amendment directives.

Test Method : With reference to IEC 62321/2nd CDV (111/95/CDV) Procedures for the Determination of Levels of Regulated Substances in Electrotechnical Products.

- (1) Determination of Cadmium by ICP-AES.
- (2) Determination of Lead by ICP-AES.
- (3) Determination of Mercury by ICP-AES.
- (4) Determination of Hexavalent Chromium for metallic samples by Spot test / boiling water extraction Method.

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


Nicole Chien / Supervisor
Signed for and on behalf of
SGS TAIWAN LTD.
Chemical Laboratory - Taipei

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Test Report

No. : CE/2008/A5028

Date : 2008/10/27

Page : 2 of 5

LITTELFUSE INC.

800 E. NORTHWEST HIGHWAY, DES PLAINES, IL 60016



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

Test Item (s):	Method (Refer to)	Result		MDL
		No.1	No.2	
Cadmium (Cd)	(1)	n.d.	n.d.	2
Lead (Pb)	(2)	185	18	2
Mercury (Hg)	(3)	n.d.	n.d.	2
Hexavalent Chromium Cr(VI) by Spot test / boiling water extraction	(4)	Negative	Negative	See Note 4

TEST PART DESCRIPTION:

NO.1 : PLATING LAYER OF SILVER COLORED METAL
NO.2 : BASE MATERIAL OF SILVER COLORED METAL

Note : 1. mg/kg = ppm

2. n.d. = Not Detected

3. MDL = Method Detection Limit

4. Spot-test:

Negative = Absence of Cr(VI) coating / surface layer,

Positive = Presence of Cr(VI) coating / surface layer;

(The tested sample should be further verified by boiling-water-extraction method if the spot test result cannot be confirmed.)

Boiling-water-extraction:

Negative = Absence of Cr(VI) coating / surface layer.

Positive = Presence of Cr(VI) coating / surface layer;

the detected concentration in boiling-water-extraction solution is equal or greater than 0.02 mg/kg with 50 cm² sample surface area.

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SGS Taiwan Ltd.
台灣檢驗科技股份有限公司

Chemical-Taipei 33 WuChyuan Road, Wuku Industrial Zone, Taipei County, Taiwan / 台北縣五股工業區五權路33號 t + 886 (02)2299 3279 f + 886 (02)2299 3237 www.sgs.com

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Test Report

No. : CE/2008/A5028 Date : 2008/10/27

Page : 3 of 5

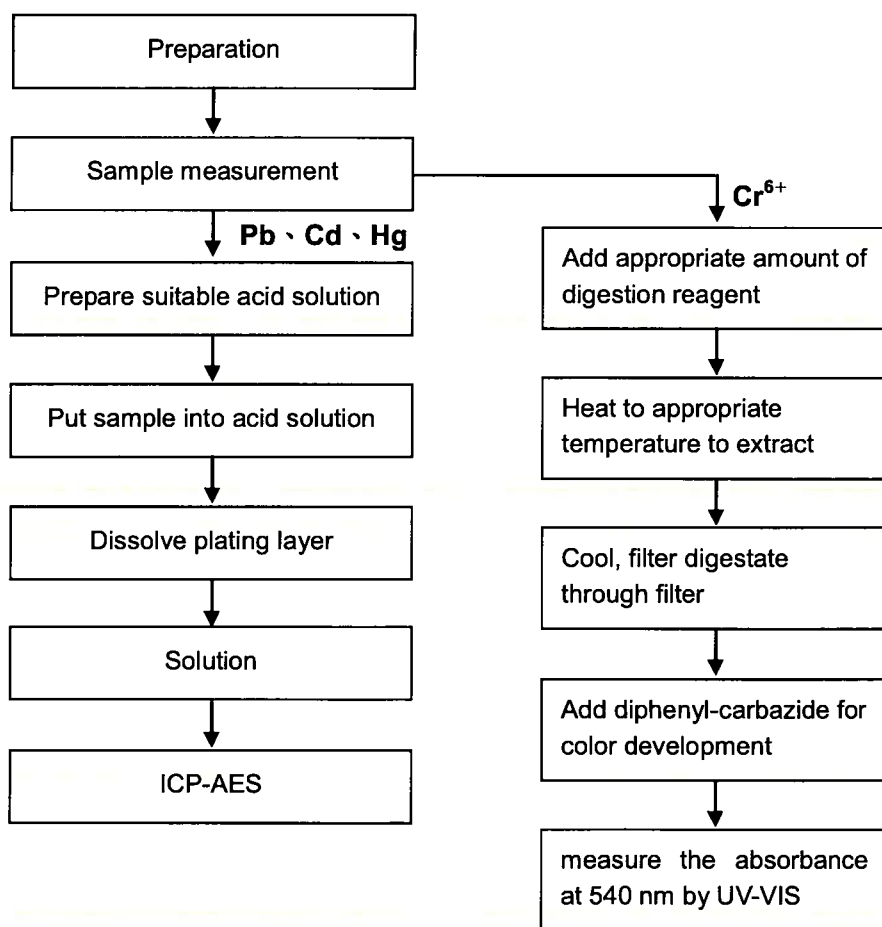
LITTELFUSE INC.

800 E. NORTHWEST HIGHWAY, DES PLAINES, IL 60016



- NO.1
- 1) These samples were dissolved totally by pre-conditioning method according to below flow chart. (Cr⁶⁺ test method excluded)
 - 2) Name of the person who made measurement: Climbgreat Yang
 - 3) Name of the person in charge of measurement: Troy Chang

Flow Chart of Stripping method for metal analysis



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Test Report

No. : CE/2008/A5028 Date : 2008/10/27

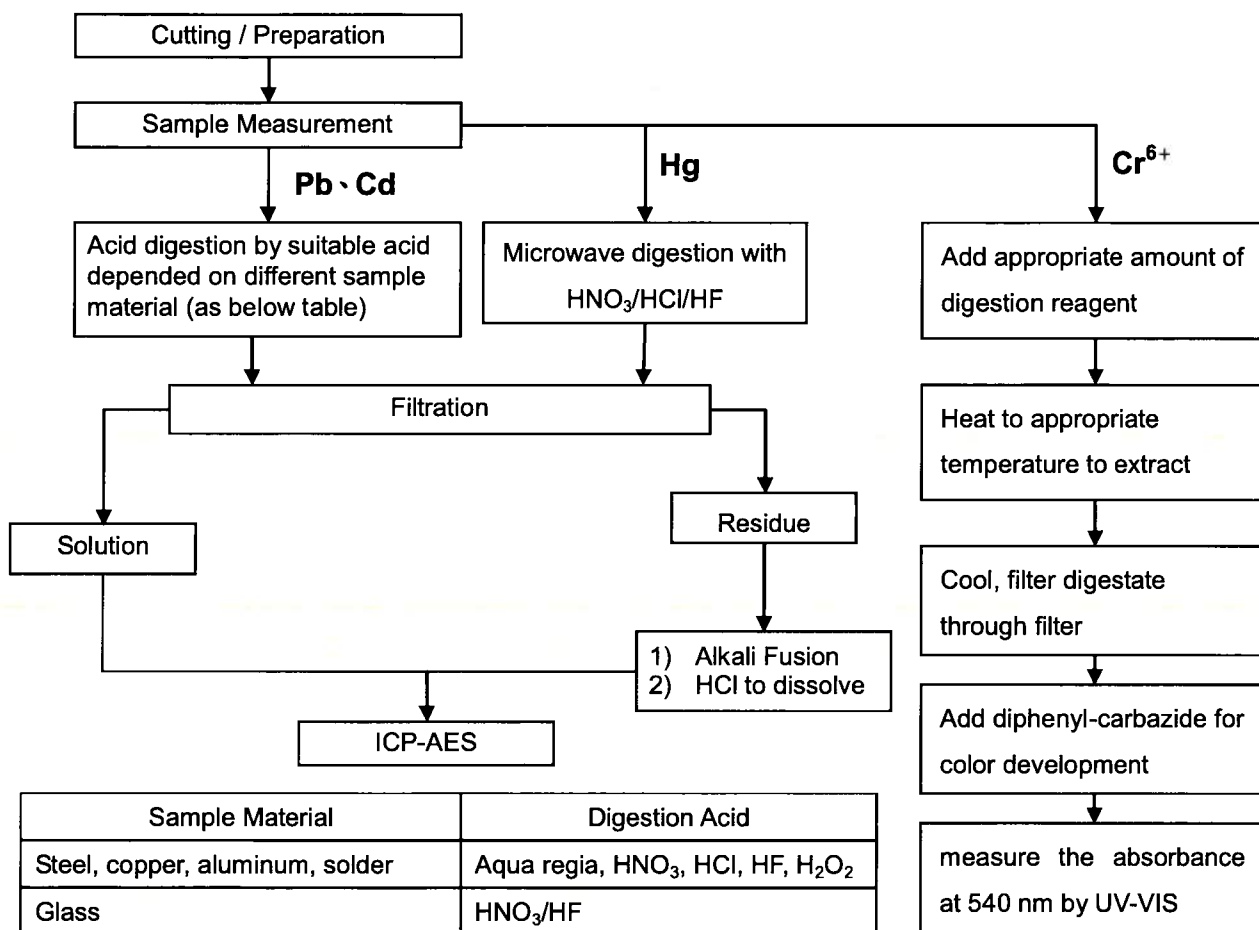
Page : 4 of 5

LITTELFUSE INC.

800 E. NORTHWEST HIGHWAY, DES PLAINES, IL 60016



- NO.2
- 1) These samples were dissolved totally by pre-conditioning method according to below flow chart.
(Cr⁶⁺ test method excluded)
 - 2) Name of the person who made measurement: Climbgreat Yang
 - 3) Name of the person in charge of measurement: Troy Chang



Sample Material	Digestion Acid
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	Any acid to total digestion

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No. : CE/2008/A5028

Date : 2008/10/27

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LITTELFUSE INC.

800 E. NORTHWEST HIGHWAY, DES PLAINES, IL 60016



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Test Report

No. : CE/2008/A5020 Date : 2008/10/27

Page : 1 of 4

LITTELFUSE INC.

800 E. NORTHWEST HIGHWAY, DES PLAINES, IL 60016



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

Sample Description : KNOB INSERT
Style/Item No. : 889-117
Sample Receiving Date : 2008/10/22
Testing Period : 2008/10/22 TO 2008/10/27

Test Requested : In accordance with the RoHS Directive 2002/95/EC, and its amendment directives.

Test Method : With reference to IEC 62321/2nd CDV (111/95/CDV)
Procedures for the Determination of Levels of Regulated
Substances in Electrotechnical Products.
(1) Determination of Cadmium by ICP-AES.
(2) Determination of Lead by ICP-AES.
(3) Determination of Mercury by ICP-AES.
(4) Determination of Hexavalent Chromium for metallic samples
by Spot test / boiling water extraction Method.

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

Nicole Chien / Supervisor
Signed for and on behalf of
SGS TAIWAN LTD.
Chemical Laboratory - Taipei

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Test Report

No. : CE/2008/A5020 Date : 2008/10/27

Page : 2 of 4

LITTELFUSE INC.

800 E. NORTHWEST HIGHWAY, DES PLAINES, IL 60016



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

Test Item (s):	Method (Refer to)	Result	MDL
		No.1	
Cadmium (Cd)	(1)	27	2
Lead (Pb)	(2)	27400	2
Mercury (Hg)	(3)	n.d.	2
Hexavalent Chromium Cr(VI) by Spot test / boiling water extraction	(4)	Negative	See Note 4

TEST PART DESCRIPTION:

NO.1 : SILVER COLORED METAL INSERT

Note : 1. mg/kg = ppm

2. n.d. = Not Detected

3. MDL = Method Detection Limit

4. Spot-test:

Negative = Absence of Cr(VI) coating / surface layer,

Positive = Presence of Cr(VI) coating / surface layer;

(The tested sample should be further verified by boiling-water-extraction method if the spot test result cannot be confirmed.)

Boiling-water-extraction:

Negative = Absence of Cr(VI) coating / surface layer.

Positive = Presence of Cr(VI) coating / surface layer;

the detected concentration in boiling-water-extraction solution is equal or greater than 0.02 mg/kg with 50 cm² sample surface area.

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Test Report

No. : CE/2008/A5020 Date : 2008/10/27

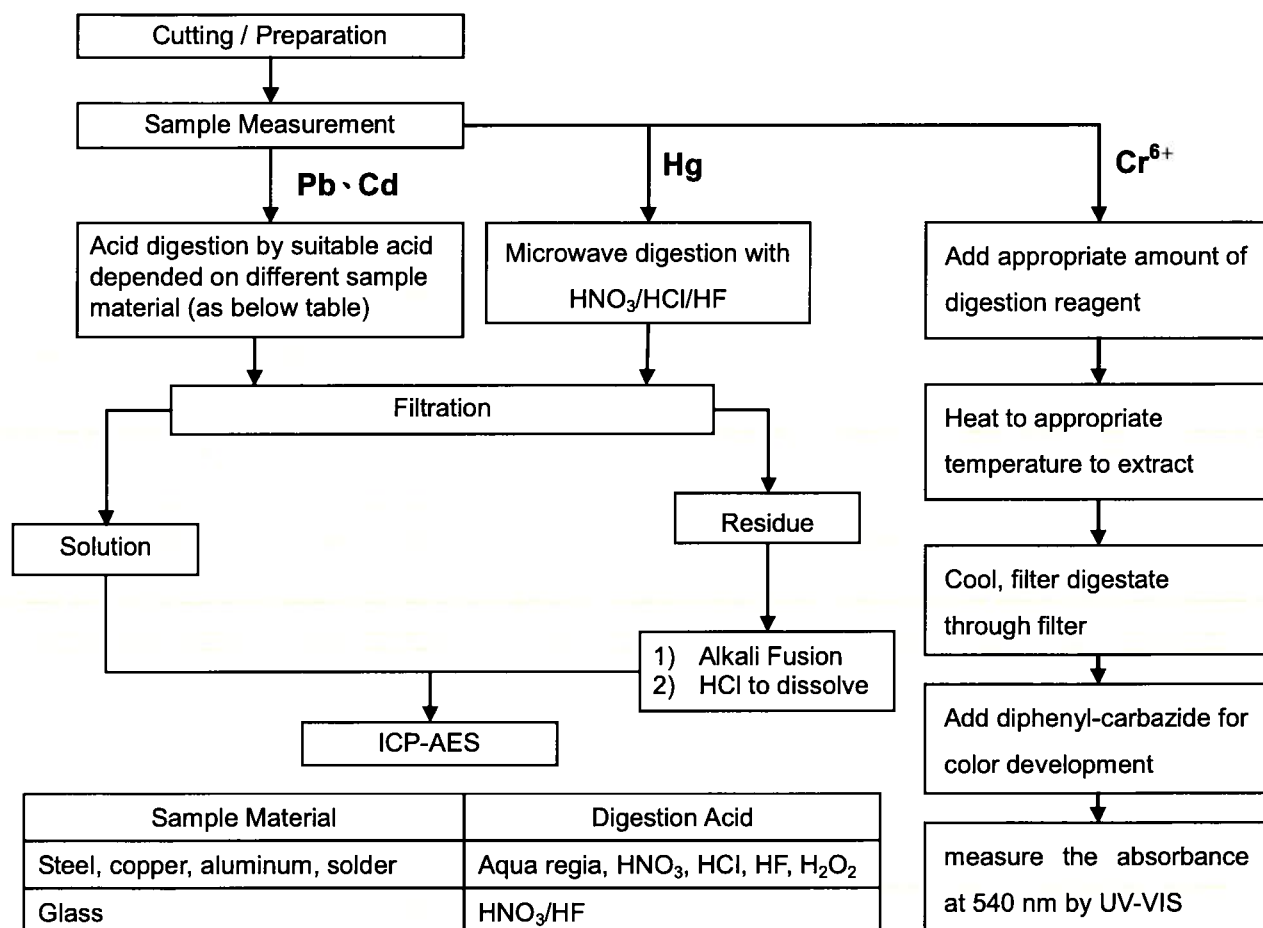
Page : 3 of 4

LITTELFUSE INC.

800 E. NORTHWEST HIGHWAY, DES PLAINES, IL 60016



- 1) These samples were dissolved totally by pre-conditioning method according to below flow chart.
(Cr⁶⁺ test method excluded)
- 2) Name of the person who made measurement: Climbgreat Yang
- 3) Name of the person in charge of measurement: Troy Chang



Sample Material	Digestion Acid
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	Any acid to total digestion

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Test Report

No. : CE/2008/A5020

Date : 2008/10/27

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LITTELFUSE INC.

800 E. NORTHWEST HIGHWAY, DES PLAINES, IL 60016



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Test Report

No. : CE/2008/15965 Date : 2008/01/24 Page : 1 of 5

LITTELFUSE INC.
800 E. NORTHWEST HWY. DES PLAINES, IL 60016

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

Sample Description : CONTACT CLIP
Style/Item No. : 882-756-000
Facility : PIEDRAS
Sample Receiving Date : 2008/01/21
Testing Period : 2008/01/21 TO 2008/01/24


=====

Test Requested : In accordance with the RoHS Directive 2002/95/EC, and its amendment directives.

Test Method : With reference to IEC 62321, Ed.1 111/54/CDV
Procedures for the Determination of Levels of Regulated
Substances in Electrotechnical Products.

- (1) Determination of Cadmium by ICP-AES.
- (2) Determination of Lead by ICP-AES.
- (3) Determination of Mercury by ICP-AES.
- (4) Determination of Hexavalent Chromium for metallic samples by Spot test / Colorimetric Method.

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


Nicole Chien / Supervisor
Signed for and on behalf of
SGS TAIWAN LTD.
Chemical Laboratory - Taipei

Test Report

No. : CE/2008/15965 Date : 2008/01/24 Page : 2 of 5

LITTELFUSE INC.
800 E. NORTHWEST HWY. DES PLAINES, IL 60016



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

Test Item (s):	Method (Refer to)	Result		MDL
		No.1	No.2	
Cadmium (Cd)	(1)	n.d.	n.d.	2
Lead (Pb)	(2)	339	7	2
Mercury (Hg)	(3)	n.d.	n.d.	2
Hexavalent Chromium Cr(VI) by Spot test / boiling water extraction	(4)	Negative	Negative	See Note 4

TEST PART DESCRIPTION:

NO.1 : PLATING LAYER OF SILVER COLORED METAL
NO.2 : BASE MATERIAL OF SILVER COLORED METAL

Note : 1. mg/kg = ppm

2. n.d. = Not Detected

3. MDL = Method Detection Limit

4. Spot-test:

Negative = Absence of Cr(VI) coating / surface layer,

Positive = Presence of Cr(VI) coating / surface layer;

(The tested sample should be further verified by boiling-water-extraction method if the spot test result cannot be confirmed.)

Boiling-water-extraction:

Negative = Absence of Cr(VI) coating / surface layer.

Positive = Presence of Cr(VI) coating / surface layer;

the detected concentration in boiling-water-extraction solution is equal or greater than 0.02 mg/kg with 50 cm² sample surface area.

Test Report

No.: CE/2008/15965 Date : 2008/01/24

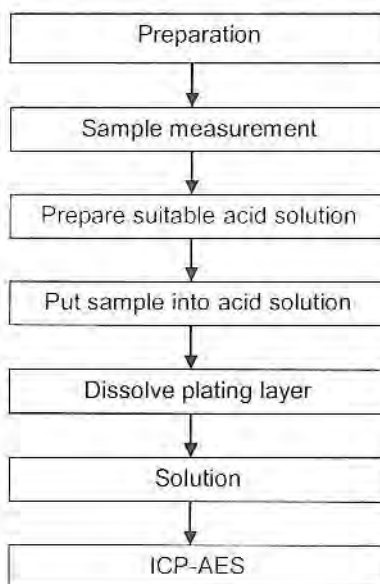
Page : 3 of 5

LITTELFUSE INC.
800 E. NORTHWEST HWY. DES PLAINES, IL 60016



- NO.1
- 1) These samples were dissolved totally by pre-conditioning method according to below flow chart.
 - 2) Name of the person who made measurement: Troy Chang
 - 3) Name of the person in charge of measurement: Chenyu Kung

Flow Chart of Stripping method for metal analysis



Test Report

No. : CE/2008/15965 Date : 2008/01/24

Page : 4 of 5

LITTELFUSE INC.

800 E. NORTHWEST HWY. DES PLAINES, IL 60016

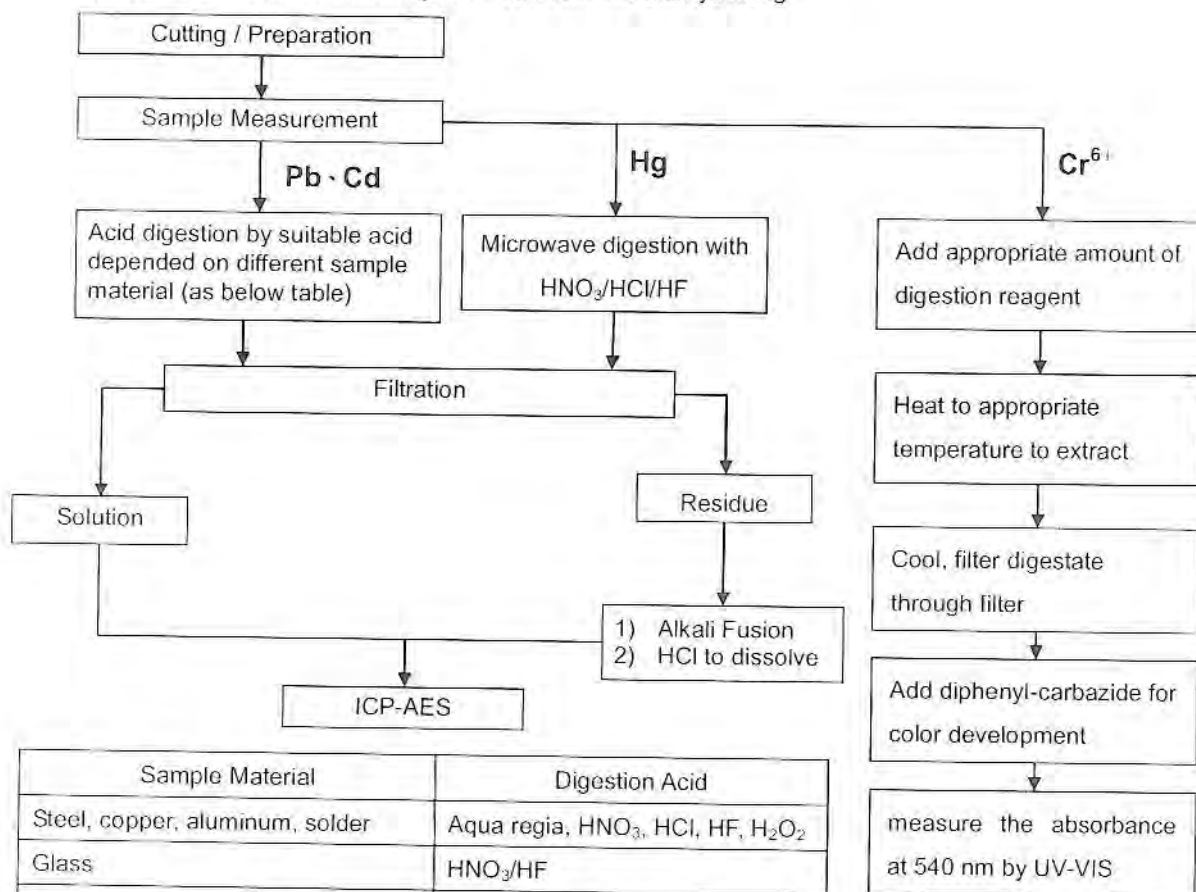


NO.2 1) These samples were dissolved totally by pre-conditioning method according to below flow chart.

(Cr⁶⁺ test method excluded)

2) Name of the person who made measurement: Troy Chang

3) Name of the person in charge of measurement: Chenyu Kung



Sample Material	Digestion Acid
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	Any acid to total digestion

Test Report

No. : CE/2008/15965

Date : 2008/01/24

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LITTELFUSE INC.

800 E. NORTHWEST HWY. DES PLAINES, IL 60016



** End of Report **



Test Report

Number : TWNC00107643
Page 1 Of 6

Applicant: Littelfuse, Inc.
800 E. Northwest Hwy
Desplaines Il 60016

Date : Feb 20, 2009

Sample Description:

One (1) group of submitted samples said to be :

Part Description : Spring
Part Number : 912-321
Date Sample Received : Feb 17, 2009
Date Test Started : Feb 18, 2009

Test Conducted :

As requested by the applicant, for details please refer to attached pages.

Authorized By:
On Behalf Of Intertek Testing Services
Taiwan Limited



K. Y. Liang
Director

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Intertek Testing Services Taiwan Ltd.

8F., No. 423, Ruiguang Rd., Neihu District, Taipei 114, Taiwan, R.O.C.

全國公證檢驗股份有限公司

114 台北市內湖區瑞光路 423 號 8 樓

Tel: (+886-2) 6602-2888 · 2797-8885 Fax: (+886-2) 6602-2400 · 6602-2401



Number: TWNC00107643
Page 2 Of 6

Test Conducted

(I) Test Result Summary :

<u>Testing Item</u>	<u>Result (ppm)</u>
	<u>Silvery Metal</u>
Heavy Metal	
Cadmium (Cd) content	ND
Lead (Pb) content	ND
Mercury (Hg) content	ND
Chromium VI (Cr ⁶⁺) content	ND

Remarks: ppm = Parts per million based on weight of tested sample = mg/kg
ND = Not detected

Responsibility Of Chemist : Irene Chiou / Kevin Liu

Date Sample Received : Feb 17, 2009

Testing Period : Feb 18, 2009 to Feb 20, 2009

(II) RoHS Requirement:

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

The above limits were quoted from 2002/95/EC and amendment 2005/618/EC for homogeneous material.

Intertek Testing Services Taiwan Ltd.

8F., No. 423, Ruiguang Rd., Neihu District, Taipei 114, Taiwan, R.O.C.

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Test Conducted

(III) Test Method:

Testing Item	Testing Method	Reporting Limit
Cadmium (Cd) content	With reference to IEC 62321 edition 1.0:2008 in clause 8/9/10, by microwave digestion until the tested samples are totally dissolved and determined by ICP-OES.	2 ppm
Lead (Pb) content	With reference to IEC 62321 edition 1.0:2008 in clause 8/9/10, by microwave digestion until the tested samples are totally dissolved and determined by ICP-OES.	2 ppm
Mercury (Hg) content	With reference to IEC 62321 edition 1.0:2008 in clause 7, by microwave digestion until the tested samples are totally dissolved and determined by ICP-OES.	2 ppm
Chromium VI (Cr ⁶⁺) Content	With reference to USEPA 3060A & 7196A, by alkaline digestion and determined by UV-Vis Spectrophotometer	1 ppm

Remark: Reporting limit = Quantitation limit of analyte in sample

Intertek Testing Services Taiwan Ltd.

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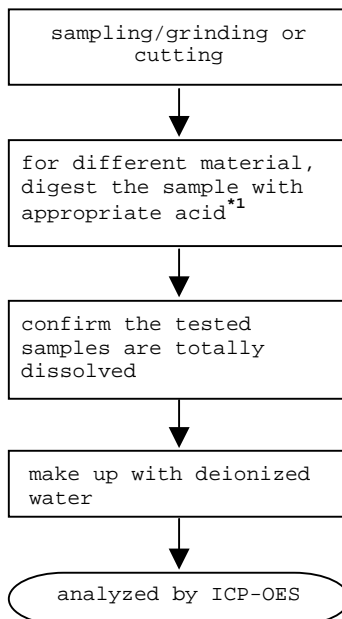
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Tel: (+886-2) 6602-2888 · 2797-8885 Fax: (+886-2) 6602-2400 · 6602-2401

Test Conducted

(IV) Measurement Flowchart:

Test For Heavy Metal (Cd/Pb/Hg) Contents
Reference Standard: IEC 62321 edition 1.0:2008



Remarks:

*1: List Of Appropriate Acid:

<u>Material</u>	<u>Acid Added For Digestion</u>
Polymers	HNO ₃ , HCl, HF, H ₂ O ₂ , H ₃ BO ₃
Metals	HNO ₃ , HCl, HF
Electronics	HNO ₃ , HCl, H ₂ O ₂ , HBF ₄

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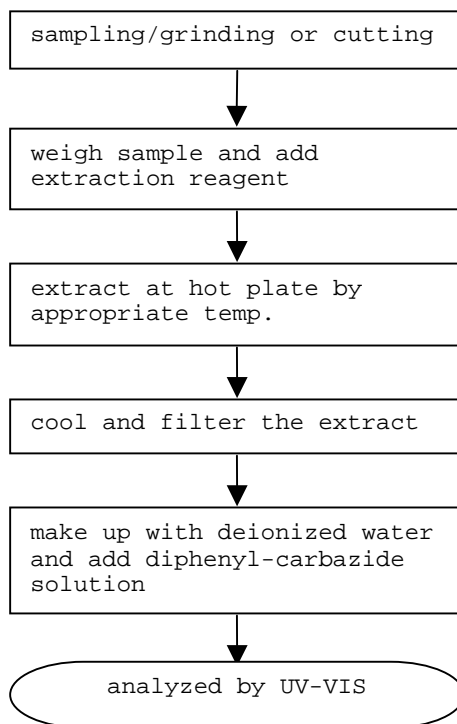
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Test Conducted

(IV) Measurement Flowchart:

Test For Chromium (VI) Content

Reference Standard: USEPA 3060A/7196A



End Of Report

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Test Conducted

Photo



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Test Report

Number : TWNC00107711
Page 1 Of 6

Applicant: Littelfuse, Inc.
800 E. Northwest Hwy
Desplaines Il 60016

Date : FEB 20, 2009

Sample Description:

One (1) group of submitted samples said to be :
Part Description : BAR SOLDER 13.5 X .750
Part Number : 692469
Date Sample Received : FEB 18, 2009
Date Test Started : FEB 18, 2009

Test Conducted :

As requested by the applicant, for details please refer to attached pages.

Authorized By:
On Behalf Of Intertek Testing Services
Taiwan Limited



K. Y. Liang
Director

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Number: TWNC00107711
Page 2 Of 6

Test Conducted

(I) Test Result Summary :

<u>Testing Item</u>	<u>Result (ppm)</u>
	<u>Silvery Metal</u>
Heavy Metal	
Cadmium (Cd) content	ND
Lead (Pb) content	401
Mercury (Hg) content	ND
Chromium VI (Cr ⁶⁺) content	ND

Remarks: ppm = Parts per million based on weight of tested sample = mg/kg
ND = Not detected

Responsibility Of Chemist : Irene Chiou / Kevin Liu

Date Sample Received : FEB 18, 2009

Testing Period : FEB 18, 2009 TO FEB 20, 2009

(II) RoHS Requirement:

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

The above limits were quoted from 2002/95/EC and amendment 2005/618/EC for homogeneous material.

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Test Conducted

(III) Test Method:

Testing Item	Testing Method	Reporting Limit
Cadmium (Cd) content	With reference to IEC 62321 edition 1.0:2008 in clause 8/9/10, by microwave digestion until the tested samples are totally dissolved and determined by ICP-OES.	2 ppm
Lead (Pb) content	With reference to IEC 62321 edition 1.0:2008 in clause 8/9/10, by microwave digestion until the tested samples are totally dissolved and determined by ICP-OES.	2 ppm
Mercury (Hg) content	With reference to IEC 62321 edition 1.0:2008 in clause 7, by microwave digestion until the tested samples are totally dissolved and determined by ICP-OES.	2 ppm
Chromium VI (Cr ⁶⁺) Content	With reference to USEPA 3060A & 7196A, by alkaline digestion and determined by UV-Vis Spectrophotometer	1 ppm

Remark: Reporting limit = Quantitation limit of analyte in sample

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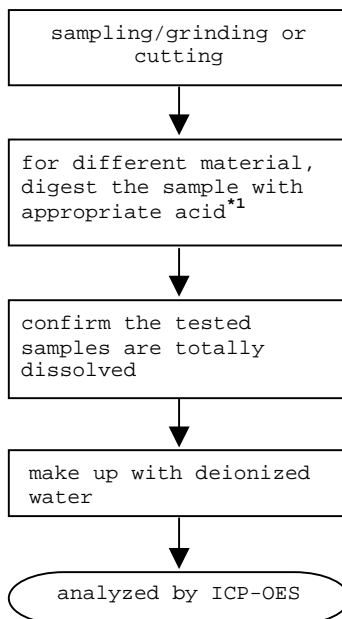
Tel: (+886-2) 6602-2888 · 2797-8885 Fax: (+886-2) 6602-2400 · 6602-2401

Test Conducted

(IV) Measurement Flowchart:

Test For Heavy Metal (Cd/Pb/Hg) Contents

Reference Standard: IEC 62321 edition 1.0:2008



Remarks:

*1: List Of Appropriate Acid:

Material	Acid Added For Digestion
Polymers	HNO ₃ , HCl, HF, H ₂ O ₂ , H ₃ BO ₃
Metals	HNO ₃ , HCl, HF
Electronics	HNO ₃ , HCl, H ₂ O ₂ , HBF ₄

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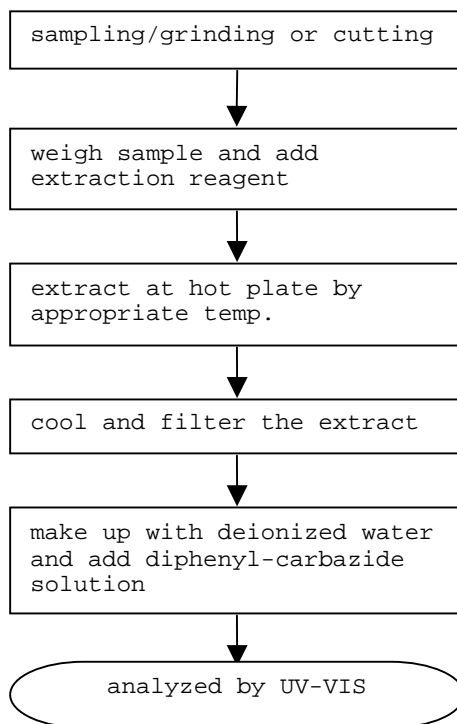
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Test Conducted
(IV) Measurement Flowchart:

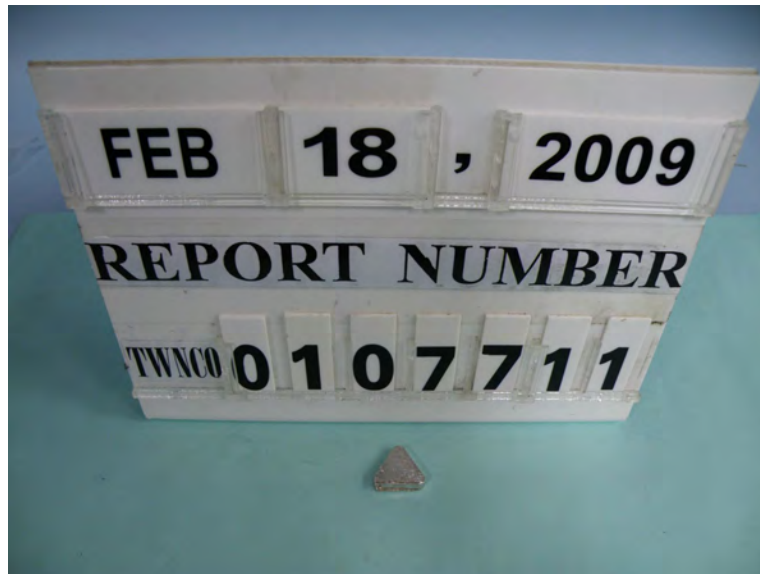
Test For Chromium (VI) Content
Reference Standard: USEPA 3060A/7196A



End Of Report

Test Conducted

Photo



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Test Report

No. : CE/2008/A3638 Date : 2008/10/21

Page : 1 of 5

LITTELFUSE INC.
800 E. NORTHWEST HIGHWAY, DES PLAINES, IL 60016



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


Sample Description : LOCKWASHER
Style/Item No. : 905-016
Sample Receiving Date : 2008/10/16
Testing Period : 2008/10/16 TO 2008/10/21

Test Requested : In accordance with the RoHS Directive 2002/95/EC, and its amendment directives.

Test Method : With reference to IEC 62321/2nd CDV (111/95/CDV) Procedures for the Determination of Levels of Regulated Substances in Electrotechnical Products.

- (1) Determination of Cadmium by ICP-AES.
- (2) Determination of Lead by ICP-AES.
- (3) Determination of Mercury by ICP-AES.
- (4) Determination of Hexavalent Chromium for metallic samples by Spot test / boiling water extraction Method.

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


Nicole Chien / Supervisor
Signed for and on behalf of
SGS TAIWAN LTD.
Chemical Laboratory - Taipei

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Test Report

No. : CE/2008/A3638

Date : 2008/10/21

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LITTELFUSE INC.

800 E. NORTHWEST HIGHWAY, DES PLAINES, IL 60016



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

Test Item (s):	Method (Refer to)	Result		MDL
		No.1	No.2	
Cadmium (Cd)	(1)	19	n.d.	2
Lead (Pb)	(2)	48	n.d.	2
Mercury (Hg)	(3)	n.d.	n.d.	2
Hexavalent Chromium Cr(VI) by Spot test / boiling water extraction	(4)	Negative	Negative	See Note 4

TEST PART DESCRIPTION:

NO.1 : PLATING LAYER OF COPPER COLORED METAL

NO.2 : BASE MATERIAL OF COPPER COLORED METAL

Note : 1. mg/kg = ppm

2. n.d. = Not Detected

3. MDL = Method Detection Limit

4. Spot-test:

Negative = Absence of Cr(VI) coating / surface layer,

Positive = Presence of Cr(VI) coating / surface layer;

(The tested sample should be further verified by boiling-water-extraction method if the spot test result cannot be confirmed.)

Boiling-water-extraction:

Negative = Absence of Cr(VI) coating / surface layer.

Positive = Presence of Cr(VI) coating / surface layer;

the detected concentration in boiling-water-extraction solution is equal or greater than 0.02 mg/kg with 50 cm² sample surface area.

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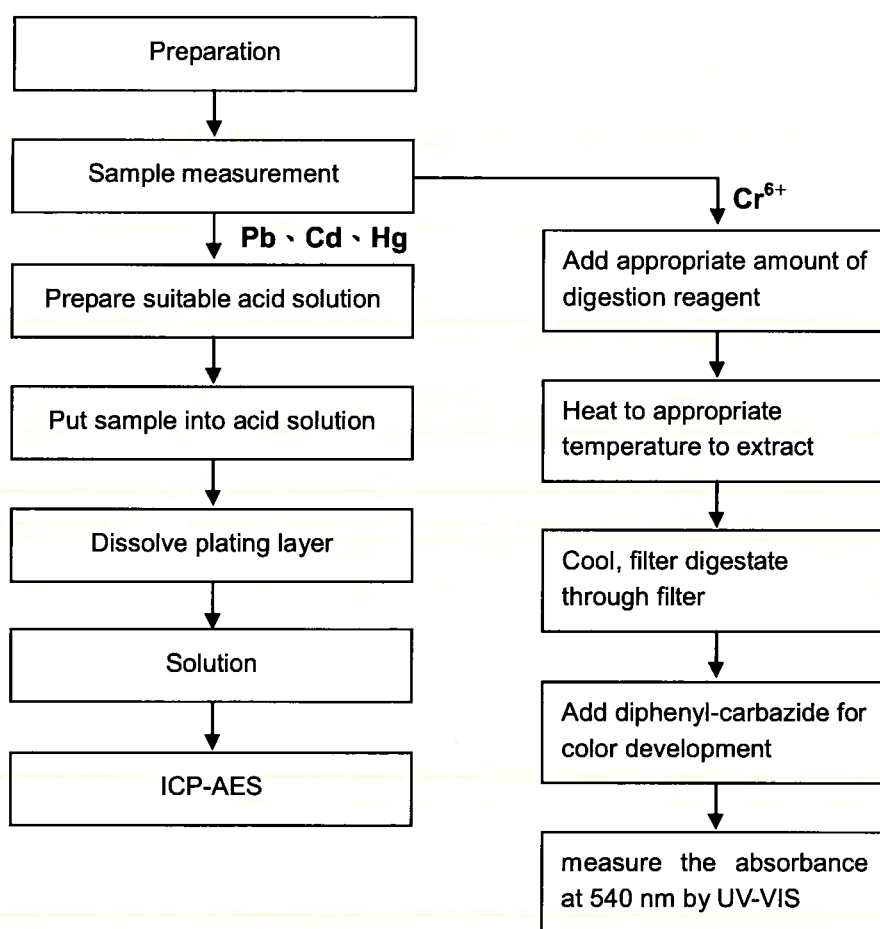
LITTELFUSE INC.

800 E. NORTHWEST HIGHWAY, DES PLAINES, IL 60016



- NO.1
- 1) These samples were dissolved totally by pre-conditioning method according to below flow chart. (Cr⁶⁺ test method excluded)
 - 2) Name of the person who made measurement: Climbgreat Yang
 - 3) Name of the person in charge of measurement: Troy Chang

Flow Chart of Stripping method for metal analysis



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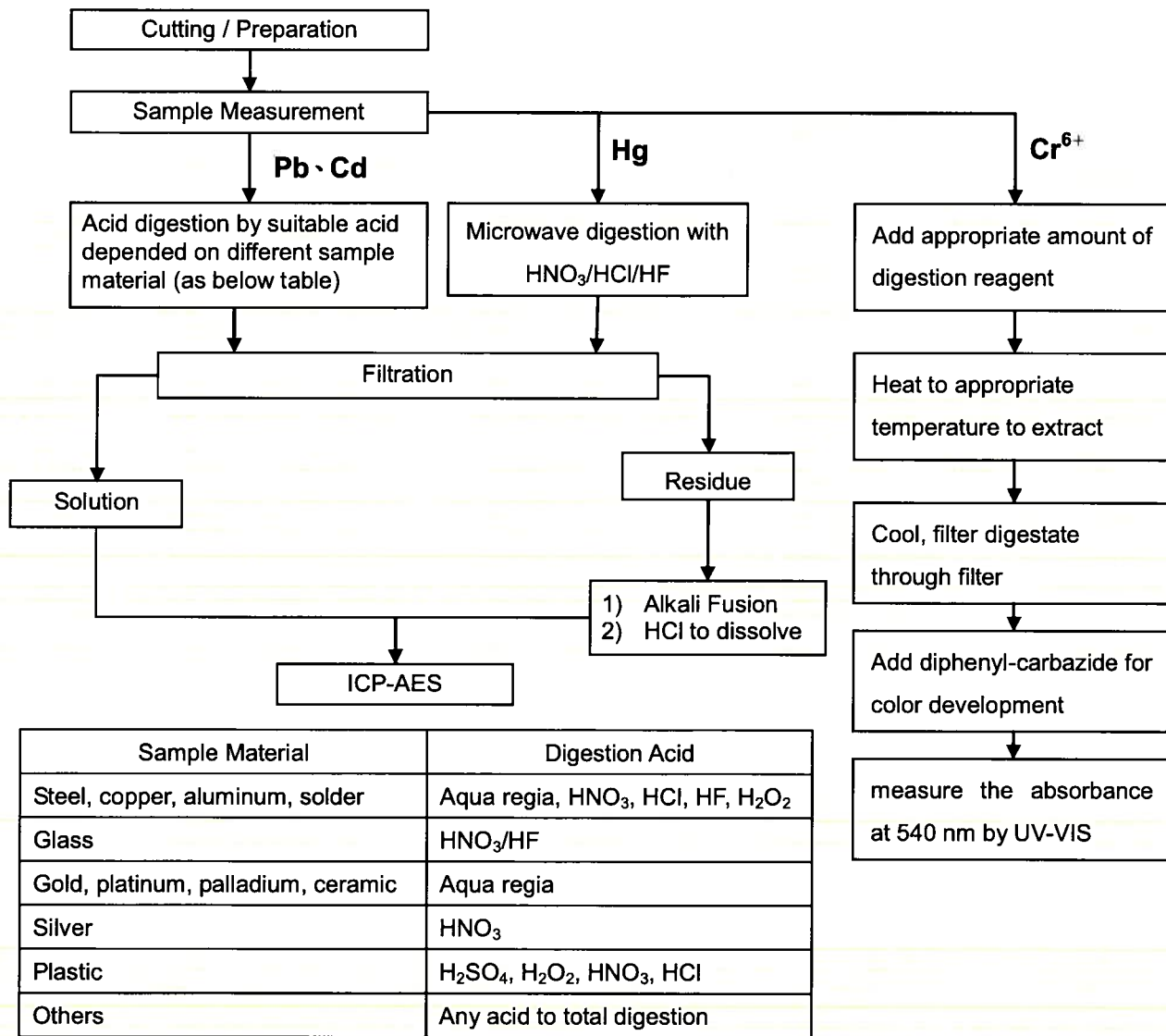
No. : CE/2008/A3638 Date : 2008/10/21

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LITTELFUSE INC.
800 E. NORTHWEST HIGHWAY, DES PLAINES, IL 60016



- NO.2
- 1) These samples were dissolved totally by pre-conditioning method according to below flow chart.
(Cr⁶⁺ test method excluded)
 - 2) Name of the person who made measurement: Climbgreat Yang
 - 3) Name of the person in charge of measurement: Troy Chang



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Test Report

No. : CE/2008/A3638 Date : 2008/10/21

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** End of Report **

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