ICP Test Report Certification Packet

Company name: Littelfuse, Inc.

Product Series: TVS Array for ESD Protection

Product #: SP4001-04UTG

Issue Date: July 31, 2013

It is hereby certified by Littelfuse, Inc. that there is neither RoHS (2011/65/EU – recast of 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.
And it is certified by Littelfuse, Inc. that the series products listed above are compliant with LF Halogen Free Standard (Cl≤900ppm, Br≤900ppm, Cl+Br≤1500ppm) as defined in IEC 61249-2-21.
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: JENNY DINGLASAN

<Global EHS Specialist>

(1) Parts, sub-materials and unit parts

This document covers the TVS Array for ESD Protection 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 identifed in Table 1

Remarks：.

Table 1: List of Raw Materials covered by this report

Total Parts	Raw Material Part Number	Raw Material Description	Page(s)
1	A194	Lead Frame-Cu Alloy	3-15
2	8290	Adhesive	16-45
3	N/A	Au Bonding Wire	46-58
4	CEL-9220	Epoxy Molding Compound	59-67
5	N/A	Ni/Au/Pd Plating	68-103
6	N/A	Wafer	104-110

Signature valid
For Question
Please Contact with SGS
www.tw.sgs.com

測試報告
Test Report

號碼(No.) : KA/2013/11121 日期(Date) : 2013/01/21 頁數(Page) : 1 of 13

ASM TECHNOLOGY SINGAPORE PTE LTD
2 YISHUN AVENUE 7, SINGAPORE 768924

以下測試樣品係由客戶送樣，且由客戶聲稱並經客戶確認如下
(The following samples was/were submitted and identified by/on behalf of the client as):

樣品名稱(Sample Description)	:	A194 ALLOY
收件日期(Sample Receiving Date)	:	2013/01/15
測試期間(Testing Period)	:	2013/01/15 TO 2013/01/21
送樣廠商(Sample Submitted By)	:	ASM TECHNOLOGY SINGAPORE PTE LTD

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測試結果(Test Results) : 請見下一頁 (Please refer to next pages).

Ray Chang

Ray Chang / Asst. Manager
Signed for and on behalf of
SGS Taiwan Limited

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測試報告
Test Report

ASM TECHNOLOGY SINGAPORE PTE LTD
2 YISHUN AVENUE 7, SINGAPORE 768924

測試結果(Test Results)

測試部位(PART NAME) NO.1 : 紅銅色 A194 ALLOY (COPPER RED A194 ALLOY)

測試項目 (Test Items)	單位 (Unit)	測試方法 (Method)	方法偵測極限值 (MDL)	結果 (Result) NO.1
鎘 / Cadmium (Cd)	mg/kg	參考IEC 62321: 2008方法, 用感應藕合電漿原子發射光譜儀檢測. / With reference to IEC 62321: 2008 and performed by ICP-AES.	2	n.d.
鉛 / Lead (Pb)	mg/kg	參考IEC 62321: 2008方法, 用感應藕合電漿原子發射光譜儀檢測. / With reference to IEC 62321: 2008 and performed by ICP-AES.	2	n.d.
汞 / Mercury (Hg)	mg/kg	參考IEC 62321: 2008方法, 用感應藕合電漿原子發射光譜儀檢測. / With reference to IEC 62321: 2008 and performed by ICP-AES.	2	n.d.
六價鉻 / Hexavalent Chromium Cr(VI) by boiling water extraction#	**	參考IEC 62321: 2008方法, 用Boiling water extraction方法檢測. / With reference to IEC 62321: 2008 and performed by boiling water extraction Method.	0.02mg/kg with 50 cm^2 surface area	Negative
多溴聯苯總和 / Sum of PBBs	mg/kg	參考IEC 62321: 2008方法, 以氣相層析儀/質譜儀檢測. / With reference to IEC 62321: 2008 and performed by GC/MS.	-	n.d.
一溴聯苯 / Monobromobiphenyl			5	n.d.
二溴聯苯 / Dibromobiphenyl			5	n.d.
三溴聯苯 / Tribromobiphenyl			5	n.d.
四溴聯苯 / Tetrabromobiphenyl			5	n.d.
五溴聯苯 / Pentabromobiphenyl			5	n.d.
六溴聯苯 / Hexabromobiphenyl			5	n.d.
七溴聯苯 / Heptabromobiphenyl			5	n.d.
八溴聯苯 / Octabromobiphenyl			5	n.d.
九溴聯苯 / Nonabromobiphenyl			5	n.d.
十溴聯苯 / Decabromobiphenyl			5	n.d.

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Test Report

ASM TECHNOLOGY SINGAPORE PTE LTD
2 YISHUN AVENUE 7, SINGAPORE 768924

測試項目 (Test Items)	單位 (Unit)	測試方法 (Method)	方法偵測極限值 (MDL)	結果 (Result) NO.1
多溴聯苯醚總和 / Sum of PBDEs	mg/kg	參考IEC 62321: 2008方法，以氣相層析儀/質譜儀檢測. / With reference to IEC 62321: 2008 and performed by GC/MS.	-	n.d.
一溴聯苯醚 / Monobromodiphenyl ether			5	n.d.
二溴聯苯醚 / Dibromodiphenyl ether			5	n.d.
三溴聯苯醚 / Tribromodiphenyl ether			5	n.d.
四溴聯苯醚 / Tetrabromodiphenyl ether			5	n.d.
五溴聯苯醚 / Pentabromodiphenyl ether			5	n.d.
六溴聯苯醚 / Hexabromodiphenyl ether			5	n.d.
七溴聯苯醚 / Heptabromodiphenyl ether			5	n.d.
八溴聯苯醚 / Octabromodiphenyl ether			5	n.d.
九溴聯苯醚 / Nonabromodiphenyl ether			5	n.d.
十溴聯苯醚 / Decabromodiphenyl ether			5	n.d.
銻 / Antimony (Sb)	mg/kg	參考US EPA 3052方法，用感應藕合電漿原子發射光譜儀檢測銻含量. / With reference to US EPA Method 3052 for Antimony Content. Analysis was performed by ICP-AES.	2	n.d.
六溴環十二烷 / Hexabromocyclododecane (HBCDD) (CAS No.: 25637-99-4)	mg/kg	參考US EPA 3540C: 1996方法，以氣相層析質譜儀檢測. / With reference to US EPA 3540C: 1996 method. Analysis was performed by GC/MS.	5	n.d.
全氟辛烷磺酸 / Perfluorooctane sulfonates (PFOS) PFOS – Acid PFOS – Metal Salt PFOS – Amide	$\mu g/m^2$	參考US EPA 3550C: 2007方法，以液相層析質譜儀檢測全氟辛烷磺酸含量. / With reference to US EPA 3550C: 2007 method for PFOS Content. Analysis was performed by LC/MS.	1	n.d.
全氟辛酸(銨) / PFOA (CAS No.: 000335-67-1)	$\mu g/m^2$	參考US EPA 3550C: 2007方法，以液相層析質譜儀檢測全氟辛烷磺酸含量. / With reference to US EPA 3550C: 2007 method for PFOS Content. Analysis was performed by LC/MS.	1	n.d.

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測試項目 (Test Items)	單位 (Unit)	測試方法 (Method)	方法偵測極限值 (MDL)	結果 (Result) NO.1
鹵素 / Halogen				
鹵素 (氟) / Halogen-Fluorine (F) (CAS No.: 14762-94-8)	mg/kg	參考BS EN 14582:2007, 以離子層析儀分析. / With reference to BS EN 14582:2007. Analysis was performed by IC.	50	n.d.
鹵素 (氯) / Halogen-Chlorine (Cl) (CAS No.: 22537-15-1)			50	n.d.
鹵素 (溴) / Halogen-Bromine (Br) (CAS No.: 10097-32-2)			50	n.d.
鹵素 (碘) / Halogen-Iodine (I) (CAS No.: 14362-44-8)			50	n.d.
可塑劑定量分析 / Phthalates				
鄰苯二甲酸甲苯基丁酯 / BBP (Benzyl butyl phthalate) (CAS No.: 85-68-7)	%	本測試參考EN 14372, 以氣相層析儀/質譜儀檢測之. / With reference to EN 14372. Analysis was performed by GC/MS.	0.003	n.d.
鄰苯二甲酸二丁酯 / DBP (Dibutyl phthalate) (CAS No.: 84-74-2)			0.003	n.d.
鄰苯二甲酸二 (2-乙基己基)酯 / DEHP (Di- (2-ethylhexyl) phthalate) (CAS No.: 117-81-7)			0.003	n.d.
鄰苯二甲酸二異癸酯 / DIDP (Di-isodecyl phthalate) (CAS No.: 26761-40-0)			0.01	n.d.
鄰苯二甲酸二異壬酯 / DINP (Di-isononyl phthalate) (CAS No.: 28553-12-0)			0.01	n.d.
鄰苯二甲酸二正辛酯 / DNOP (Di-n-octyl phthalate) (CAS No.: 117-84-0)			0.003	n.d.

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備註(Note)：

1. mg/kg = ppm；0.1wt% = 1000ppm
2. n.d. = Not Detected (未檢出)
3. MDL = Method Detection Limit (方法偵測極限值)
4. "-" = Not Regulated (無規格值)
5. **= Qualitative analysis (No Unit) 定性分析(無單位)
6. # = a. Positive means the presence of CrVI on the tested areas
   (Positive表示測試區域偵測到六價鉻)
   b. Negative means the absence of CrVI on the tested areas
   (Negative表示測試區域未偵測到六價鉻)
   The detected concentration in boiling-water-extraction solution is equal or greater than 0.02 mg/kg with 50 cm^2 tested areas . / 該溶液濃度≧0.02 mg/kg with 50 cm^2 (tested areas)

PFOS參考資訊(Reference Information) : 持久性有機污染物 POPs - (EU) 757/2010

PFOS濃度在物質或製備中不得超過0.001%(10ppm)，在半成品、成品或零部件中不得超過0.1%(1000ppm)，在紡織品或塗層材料中不得超過1μg/m^2。(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/m^2.)

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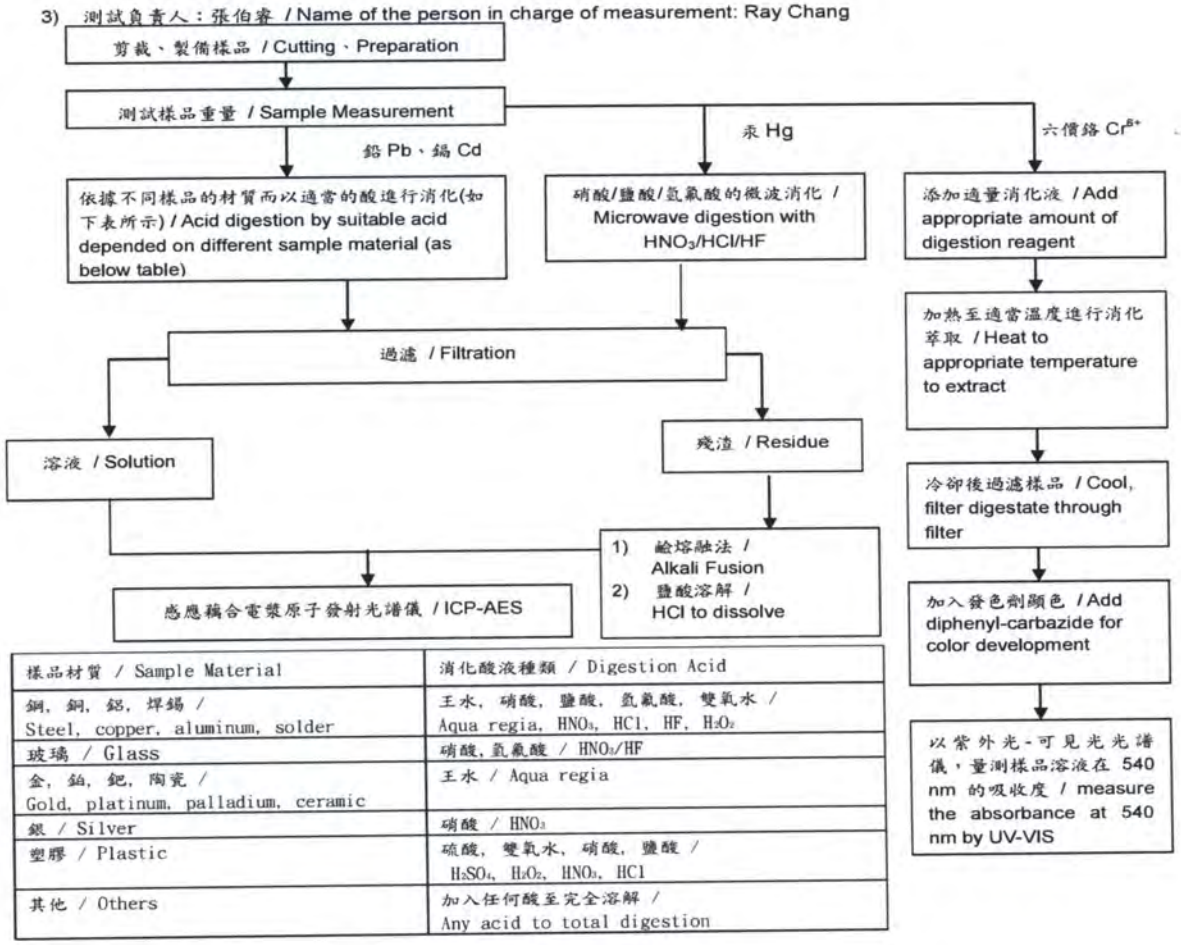
1) 根據以下的流程圖之條件，樣品已完全溶解。(六價鉻測試方法除外) / These samples were dissolved totally by pre-conditioning method according to below flow chart. (Cr^{6+} test method excluded)

2) 測試人員：張俊雄 / Name of the person who made measurement: Alex Chang

3) 測試負責人：張伯睿 / Name of the person in charge of measurement: Ray Chang



樣品材質 / Sample Material	消化酸液種類 / Digestion Acid
鋼，銅，鋁，焊錫 / Steel, copper, aluminum, solder	王水，硝酸，鹽酸，氫氟酸，雙氧水 / Aqua regia, HNO_3, HCl, HF, H_2O_2
玻璃 / Glass	硝酸，氫氟酸 / HNO_3/HF
金，鉑，鈀，陶瓷 / Gold, platinum, palladium, ceramic	王水 / Aqua regia
銀 / Silver	硝酸 / HNO_3
塑膠 / Plastic	硫酸，雙氧水，硝酸，鹽酸 / H_2SO_4, H_2O_2, HNO_3, HCl
其他 / Others	加入任何酸至完全溶解 / Any acid to total digestion

Note** : (1) 針對非金屬材料加入鹼性消化液，加熱至 90~95℃ 萃取. / For non-metallic material, add alkaline digestion reagent and heat to 90~95℃.
(2) 針對金屬材料加入純水，加熱至沸騰萃取. / For metallic material, add pure water and heat to boiling.

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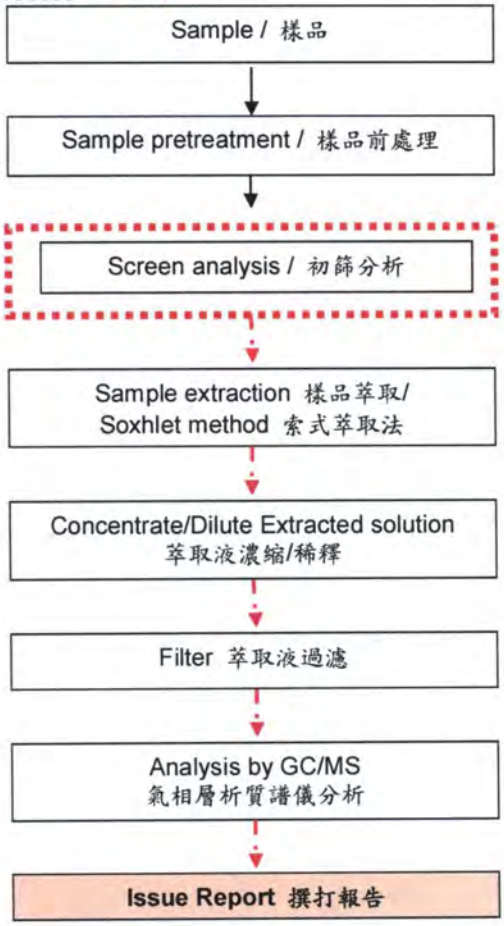
多溴聯苯/多溴聯苯醚 分析流程圖 / PBB/PBDE analytical FLOW CHART

1)測試人員：曹嘉琪 / Name of the person who made measurement: Anson Tsao
2)測試負責人：張伯睿 / Name of the person in charge of measurement: Ray Chang

初次測試程序 / First testing process ——→
選擇性篩檢程序 / Optional screen process ·····
確認程序 / Confirmation process - · - ▶



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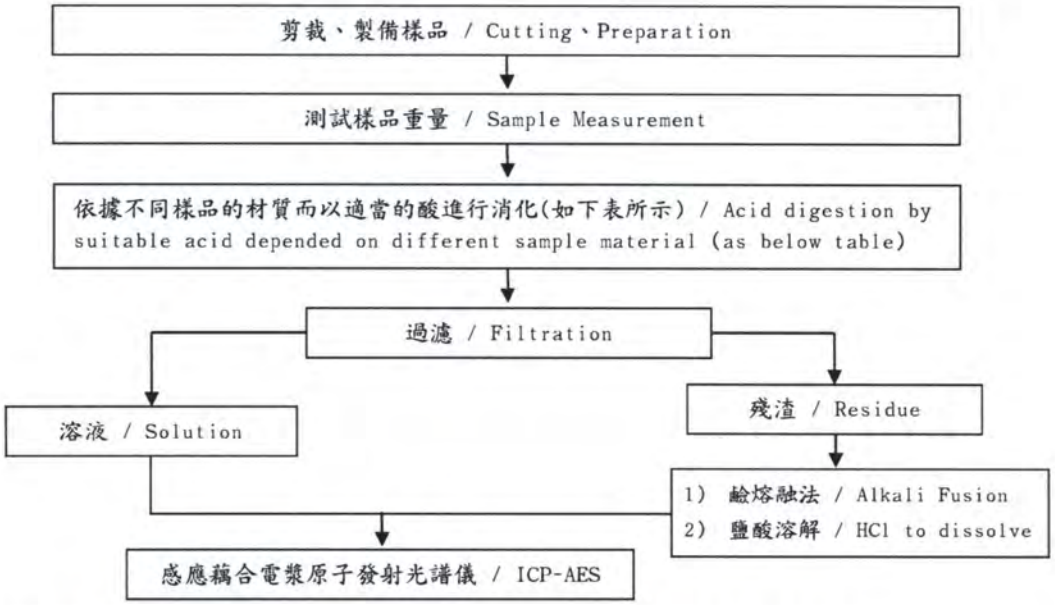
1) 根據以下的流程圖之條件，樣品已完全溶解。 / These samples were dissolved totally by pre-conditioning method according to below flow chart.
2) 測試人員：張俊雄 / Name of the person who made measurement: Alex Chang
3) 測試負責人：張伯睿 / Name of the person in charge of measurement: Ray Chang

元素以 ICP-AES 分析的消化流程圖

(Flow Chart of digestion for the elements analysis performed by ICP-AES)



鋼,銅,鋁,焊錫 / Steel, copper, aluminum, solder	王水,硝酸,鹽酸,氫氟酸,雙氧水 / Aqua regia, HNO_3, HCl, HF, H_2O_2
玻璃 / Glass	硝酸,氫氟酸 / HNO_3/HF
金,鉑,鈀,陶瓷 / Gold, platinum, palladium, ceramic	王水 / Aqua regia
銀 / Silver	硝酸 / HNO_3
塑膠 / Plastic	硫酸,雙氧水,硝酸,鹽酸 / H_2SO_4, H_2O_2, HNO_3, HCl
其他 / Others	加入任何酸至完全溶解 / Any acid to total digestion

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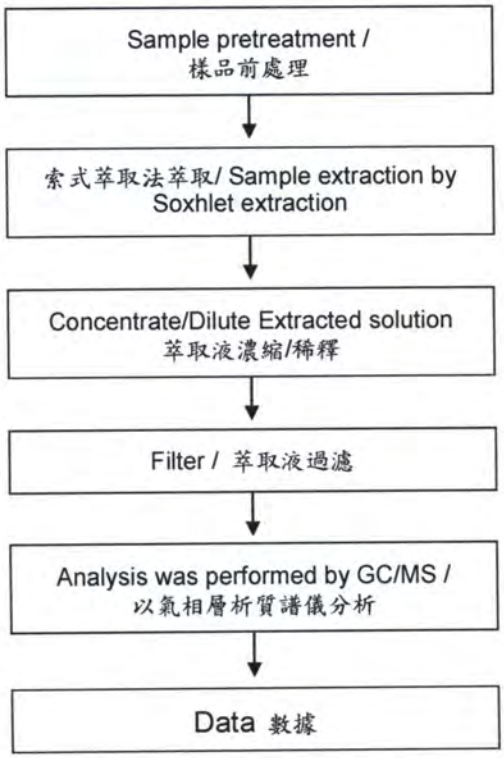
六溴環十二烷分析流程圖 / HBCDD Analytical FLOW CHART

1) 測試人員：曹嘉琪/ Name of the person who made measurement: Anson Tsao
2) 測試負責人：張伯睿/ Name of the person in charge of measurement: Ray Chang



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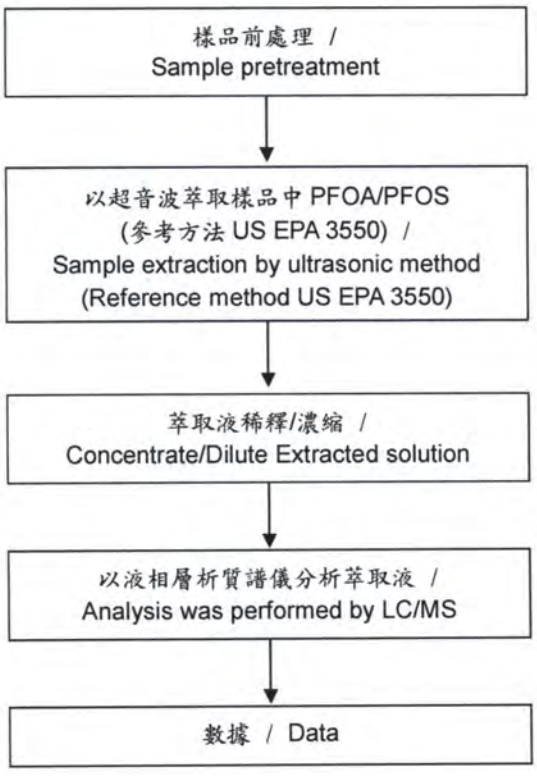
ASM TECHNOLOGY SINGAPORE PTE LTD
2 YISHUN AVENUE 7, SINGAPORE 768924

全氟辛酸(鉀)/ 全氟辛烷磺酸分析流程圖 /
Analytical flow chart of PFOA/PFOS content

1)測試人員：曹嘉琪 / Name of the person who made measurement: Anson Tsao

2)測試負責人：張伯睿 / Name of the person in charge of measurement: Ray Chang



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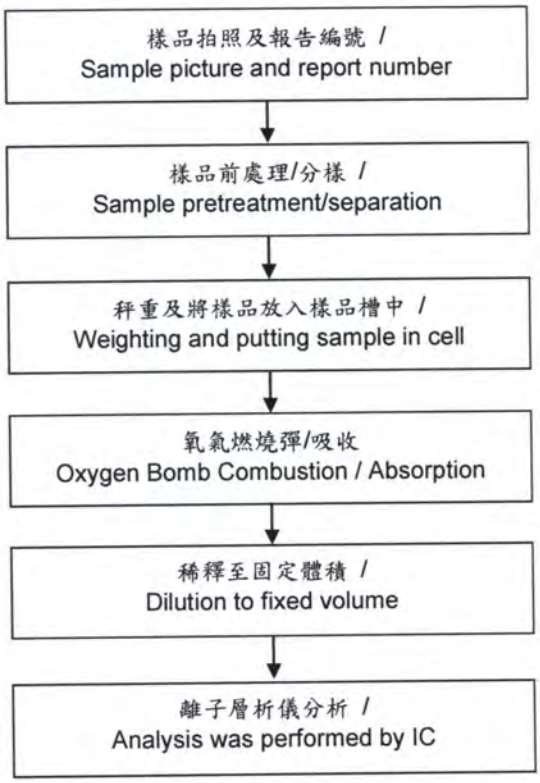
2 YISHUN AVENUE 7, SINGAPORE 768924

鹵素分析流程圖 / Analytical flow chart of halogen content

1) 測試人員：洪秀眞/ Name of the person who made measurement: Jean Hung
2) 測試負責人：張伯睿/ Name of the person in charge of measurement: Ray Chang



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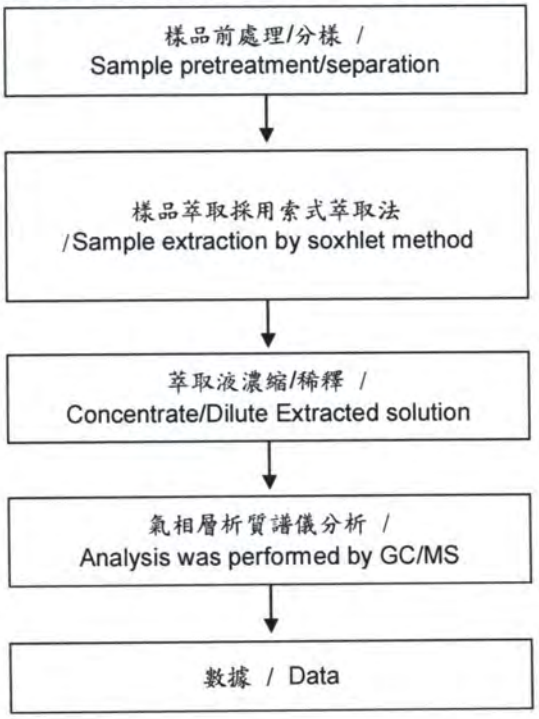
測試報告
Test Report

ASM TECHNOLOGY SINGAPORE PTE LTD
2 YISHUN AVENUE 7, SINGAPORE 768924

可塑劑分析流程圖 / Analytical flow chart of phthalate content

1)測試人員：曹嘉琪 / Name of the person who made measurement: Anson Tsao

2)測試負責人：張伯睿 / Name of the person in charge of measurement: Ray Chang



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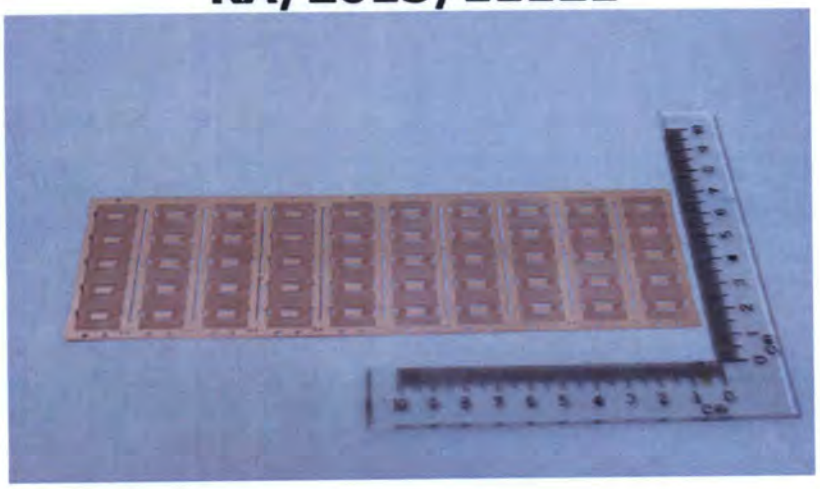
測試報告
Test Report

ASM TECHNOLOGY SINGAPORE PTE LTD
2 YISHUN AVENUE 7, SINGAPORE 768924

* 照片中如有箭頭標示，則表示爲實際檢測之樣品/部位. *
(The tested sample / part is marked by an arrow if it's shown on the photo.)

KA/2013/11121



** 報告結尾(End of Report) **

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t + 886 (07)301 2121 f + 886 (07)3010867 www.tw.sgs.com
Member of the SGS Group

Test Report

No. : CE/2012/82214 Date : 2012/08/20 Page : 1 of 30

HENKEL CORPORATION
HENKEL ADHESIVES-ELECTRONICS MAIN OFFICE: 14000 JAMBOREE ROAD, IRVINE, CALIFORNIA, 92606 U.S.A.

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

Sample Description	:	ADHESIVE
Style/Item No.	:	8290
Sample Receiving Date	:	2012/08/14
Testing Period	:	2012/08/14 TO 2012/08/20

==========

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

SGS TAIWAN LTD

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

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HENKEL CORPORATION
HENKEL ADHESIVES-ELECTRONICS MAIN OFFICE: 14000 JAMBOREE ROAD, IRVINE, CALIFORNIA, 92606 U.S.A.

Test Result(s)

PART NAME No.1 : SILVER COLORED PASTE

Test Item(s)	Unit	Method	MDL	Result
				No.1
Cadmium (Cd)	mg/kg	With reference to IEC 62321: 2008 and performed by ICP-AES.	2	n.d.
Lead (Pb)	mg/kg	With reference to IEC 62321: 2008 and performed by ICP-AES.	2	n.d.
Mercury (Hg)	mg/kg	With reference to IEC 62321: 2008 and performed by ICP-AES.	2	n.d.
Hexavalent Chromium Cr(VI)	mg/kg	With reference to IEC 62321: 2008 and performed by UV-VIS.	2	n.d.
Beryllium (Be)	mg/kg	With reference to US EPA Method 3050B for Beryllium Content. Analysis was performed by ICP-AES.	2	n.d.
Antimony (Sb)	mg/kg	With reference to US EPA Method 3052 for Antimony Content. Analysis was performed by ICP-AES.	2	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.
2- (3,5-di-tert-butyl-2-hydroxyphenyl)-2H-benzotriazole (CAS No.: 3846-71-7)	mg/kg	With reference to US EPA 3540C method. Analysis was performed by GC/MS.	5	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.
Polychlorinated Biphenyls (PCBs) (CAS No.: 1336-36-3)	mg/kg	With reference to US EPA 3540C method. Analysis was performed by GC/MS.	0.5	n.d.
Polychlorinated Naphthalene (PCNs)	mg/kg	With reference to US EPA 3540C method. Analysis was performed by GC/MS.	5	n.d.
Polychlorinated Terphenyls (PCTs)	mg/kg	With reference to US EPA 3540C method. Analysis was performed by GC/MS.	0.5	n.d.

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HENKEL CORPORATION
HENKEL ADHESIVES-ELECTRONICS MAIN OFFICE: 14000 JAMBOREE ROAD, IRVINE, CALIFORNIA, 92606 U.S.A.

Test Item(s)	Unit	Method	MDL	Result
				No.1
Alkanes, C10-13, chloro (Short Chain Chlorinated Paraffins) (CAS No.: 85535-84-8)	mg/kg	With reference to US EPA 3540C method. Analysis was performed by GC/MS.	100	n.d.
PVC	**	Analysis was performed by FTIR and FLAME Test.	-	Negative
Bromochloromethane (CAS No.: 74-97-5)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
Sulfur Hexafluoride (SF6) (CAS No.: 2551-62-4)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
Halogen-Chlorine (Cl) (CAS No.: 22537-15-1)	mg/kg	With reference to BS EN 14582:2007. Analysis was performed by IC.	50	n.d.
Halogen-Bromine (Br) (CAS No.: 10097-32-2)	mg/kg	With reference to BS EN 14582:2007. Analysis was performed by IC.	50	n.d.
Bromomethane (CAS No.: 74-83-9)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
Halons				
Halon-1211 (CAS No.: 353-59-3)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
Halon-1301 (CAS No.: 75-63-8)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
Halon-2402 (CAS No.: 124-73-2)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
Organic-tin compounds				
Tributyl Tin (TBT)	mg/kg	With reference to DIN 38407-13. Analysis was performed by GC/FPD.	0.03	n.d.
Triphenyl Tin (TphT)	mg/kg	With reference to DIN 38407-13. Analysis was performed by GC/FPD.	0.03	n.d.
Tributyl Tin Oxide (TBTO)*** (CAS No.: 56-35-9)	mg/kg	With reference to DIN 38407-13. Analysis was performed by GC/FPD.	-	n.d.

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HENKEL CORPORATION
HENKEL ADHESIVES-ELECTRONICS MAIN OFFICE: 14000 JAMBOREE ROAD, IRVINE, CALIFORNIA, 92606 U.S.A.

Test Item(s)	Unit	Method	MDL	Result No.1
Asbestos				
Actinolite (CAS No.: 77536-66-4)	%	With reference to NIOSH 9000 method. Analysis was performed by XRD.	1	Negative
Amosite (CAS No.: 12172-73-5)			1	Negative
Anthophyllite (CAS No.: 77536-67-5)			1	Negative
Chrysotile (CAS No.: 12001-29-5)			1	Negative
Crocidolite (CAS No.: 12001-28-4)			1	Negative
Tremolite (CAS No.: 77536-68-6)			1	Negative
Sum of PBBs	mg/kg	With reference to IEC 62321: 2008 and performed 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.

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Test Item(s)	Unit	Method	MDL	Result
				No.1
AZO				
1): 4-AMINODIPHENYL (CAS No.: 92-67-1)	mg/kg	With reference to LFGB 82.02-2. Analysis was performed by GC/MS.	3	n.d.
2): BENZIDINE (CAS No.: 92-87-5)	mg/kg	With reference to LFGB 82.02-2. Analysis was performed by GC/MS.	3	n.d.
3): 4-CHLORO-O-TOLUIDINE (CAS No.: 95-69-2)	mg/kg	With reference to LFGB 82.02-2. Analysis was performed by GC/MS.	3	n.d.
4): 2-NAPHTHYLAMINE (CAS No.: 91-59-8)	mg/kg	With reference to LFGB 82.02-2. Analysis was performed by GC/MS.	3	n.d.
5): O-AMINOAZOTOLUENE (CAS No.: 97-56-3)	mg/kg	With reference to LFGB 82.02-2. Analysis was performed by GC/MS.	3	n.d.
6): 2-AMINO-4-NITROTOLUENE (CAS No.: 99-55-8)	mg/kg	With reference to LFGB 82.02-2. Analysis was performed by GC/MS.	3	n.d.
7): P-CHLOROANILINE (CAS No.: 106-47-8)	mg/kg	With reference to LFGB 82.02-2. Analysis was performed by GC/MS.	3	n.d.
8): 2,4-DIAMINOANISOLE (CAS No.: 615-05-4)	mg/kg	With reference to LFGB 82.02-2. Analysis was performed by GC/MS.	3	n.d.
9): 4,4'-DIAMINODIPHENYLMETHANE (CAS No.: 101-77-9)	mg/kg	With reference to LFGB 82.02-2. Analysis was performed by GC/MS.	3	n.d.
10): 3,3'-DICHLOROBENZIDINE (CAS No.: 91-94-1)	mg/kg	With reference to LFGB 82.02-2. Analysis was performed by GC/MS.	3	n.d.
11): 3,3'-DIMETHOXYBENZIDINE (CAS No.: 119-90-4)	mg/kg	With reference to LFGB 82.02-2. Analysis was performed by GC/MS.	3	n.d.
12): 3,3'-DIMETHYLBENZIDINE (CAS No.: 119-93-7)	mg/kg	With reference to LFGB 82.02-2. Analysis was performed by GC/MS.	3	n.d.
13): 3,3'-DIMETHYL-4,4'-DIAMINODIPHENYLMETHANE (CAS No.: 838-88-0)	mg/kg	With reference to LFGB 82.02-2. Analysis was performed by GC/MS.	3	n.d.
14): P-CRESIDINE (2-METHOXY-5-METHYLANILINE) (CAS No.: 120-71-8)	mg/kg	With reference to LFGB 82.02-2. Analysis was performed by GC/MS.	3	n.d.
15): 4,4'-METHYLENE-BIS- (2-CHLOROANILINE) (CAS No.: 101-14-4)	mg/kg	With reference to LFGB 82.02-2. Analysis was performed by GC/MS.	3	n.d.

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HENKEL ADHESIVES-ELECTRONICS MAIN OFFICE: 14000 JAMBOREE ROAD, IRVINE, CALIFORNIA, 92606 U.S.A.

Test Item(s)	Unit	Method	MDL	Result
				No.1
16): 4,4'-OXYDIANILINE (CAS No.: 101-80-4)	mg/kg	With reference to LFGB 82.02-2. Analysis was performed by GC/MS.	3	n.d.
17): 4,4'-THIODIANILINE (CAS No.: 139-65-1)	mg/kg	With reference to LFGB 82.02-2. Analysis was performed by GC/MS.	3	n.d.
18): O-TOLUIDINE (CAS No.: 95-53-4)	mg/kg	With reference to LFGB 82.02-2. Analysis was performed by GC/MS.	3	n.d.
19): 2,4-TOLUYLENEDIAMINE (CAS No.: 95-80-7)	mg/kg	With reference to LFGB 82.02-2. Analysis was performed by GC/MS.	3	n.d.
20): 2,4,5-TRIMETHYLANILINE (CAS No.: 137-17-7)	mg/kg	With reference to LFGB 82.02-2. Analysis was performed by GC/MS.	3	n.d.
21): O-ANISIDINE (CAS No.: 90-04-0)	mg/kg	With reference to LFGB 82.02-2. Analysis was performed by GC/MS.	3	n.d.
22): P-AMINOAZOBENZENE (CAS No.: 60-09-3)	mg/kg	With reference to LFGB 82.02-2. Analysis was performed by GC/MS.	3	n.d.
23): 2,4-XYLIDINE (CAS No.: 95-68-1)	mg/kg	With reference to LFGB 82.02-2. Analysis was performed by GC/MS.	3	n.d.
24): 2,6-XYLIDINE (CAS No.: 87-62-7)	mg/kg	With reference to LFGB 82.02-2. Analysis was performed by GC/MS.	3	n.d.
CFC's (Chlorofluorocarbons)				
Group I				
Chlorofluorocarbon-11 (CAS No.: 75-69-4)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
Chlorofluorocarbon-12 (CAS No.: 75-71-8)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
Chlorofluorocarbon-113 (CAS No.: 76-13-1)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
Chlorofluorocarbon-114 (CAS No.: 76-14-2)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
Chlorofluorocarbon-115 (CAS No.: 76-15-3)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.

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Test Item(s)	Unit	Method	MDL	Result
				No.1
Group III				
Chlorofluorocarbon-13 (CAS No.: 75-72-9)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
Chlorofluorocarbon-111 (CAS No.: 354-56-3)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
Chlorofluorocarbon-112 (CAS No.: 76-12-0)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
Chlorofluorocarbon-211 (CAS No.: 422-78-6)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
Chlorofluorocarbon-212 (CAS No.: 3182-26-1)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
Chlorofluorocarbon-213 (CAS No.: 2354-06-5)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
Chlorofluorocarbon-214 (CAS No.: 29255-31-0)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
Chlorofluorocarbon-215 (CAS No.: 4259-43-2)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
Chlorofluorocarbon-216 (CAS No.: 661-97-2)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
Chlorofluorocarbon-217 (CAS No.: 422-86-6)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
HCFCs (Hydrochlorofluorocarbons)				
HCFC-21 (CAS No.: 75-43-4)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.

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Test Item(s)	Unit	Method	MDL	Result
				No.1
HCFC-22 (CAS No.: 75-45-6)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
HCFC-31 (CAS No.: 593-70-4)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
HCFC-121 (CAS No.: 354-14-3)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
HCFC-122 (CAS No.: 354-21-2)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
HCFC-123 (CAS No.: 306-83-2)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
HCFC-124 (CAS No.: 2837-89-0)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
HCFC-131 (CAS No.: 359-28-4)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
HCFC-132b (CAS No.: 1649-08-7)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
HCFC-133a (CAS No.: 75-88-7)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
HCFC-141b (CAS No.: 1717-00-6)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
HCFC-142b (CAS No.: 75-68-3)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
HCFC-221 (CAS No.: 422-26-4)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.

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Test Item(s)	Unit	Method	MDL	Result
				No.1
HCFC-222 (CAS No.: 422-49-1)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
HCFC-223 (CAS No.: 422-52-6)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
HCFC-224 (CAS No.: 422-54-8)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
HCFC-225ca (CAS No.: 422-56-0)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
HCFC-225cb (CAS No.: 507-55-1)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
HCFC-226 (CAS No.: 431-87-8)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
HCFC-231 (CAS No.: 421-94-3)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
HCFC-232 (CAS No.: 460-89-9)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
HCFC-233 (CAS No.: 7125-84-0)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
HCFC-234 (CAS No.: 425-94-5)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
HCFC-235 (CAS No.: 460-92-4)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
HCFC-241 (CAS No.: 666-27-3)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.

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Test Item(s)	Unit	Method	MDL	Result
				No.1
HCFC-242 (CAS No.: 460-63-9)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
HCFC-243 (CAS No.: 460-69-5)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
HCFC-244	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
HCFC-251 (CAS No.: 421-41-0)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
HCFC-252 (CAS No.: 819-00-1)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
HCFC-253 (CAS No.: 460-35-5)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
HCFC-261 (CAS No.: 420-97-3)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
HCFC-262 (CAS No.: 421-02-03)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
HCFC-271 (CAS No.: 430-55-7)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
HBFCs (Hydrobromofluorocarbons)				
HBFC-21B2 (CHFBr2) (CAS No.: 1868-53-7)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
HBFC-22B1 (CHF2Br) (CAS No.: 1511-62-2)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
HBFC-31B1 (CH2FBr) (CAS No.: 373-52-4)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.

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Test Item(s)	Unit	Method	MDL	Result
				No.1
HBFC-121B4 (C2HFBr4)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
HBFC-122B3 (C2HF2Br3)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
HBFC-123B2 (C2HF3Br2)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
HBFC-124B1 (C2HF4Br)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
HBFC-131B3 (C2H2FBr3)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
HBFC-132B2 (C2H2F2Br2)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
HBFC-133B1 (C2H2F3Br)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
HBFC-141B2 (C2H3FBr2)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
HBFC-142B1 (C2H3F2Br)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
HBFC-151B1 (C2H4FBr)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
HBFC-221B6 (C3HFBr6)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
HBFC-222B5 (C3HF2Br5)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.

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Test Item(s)	Unit	Method	MDL	Result
				No.1
HBFC-223B4 (C3HF3Br4)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
HBFC-224B3 (C3HF4Br3)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
HBFC-225B2 (C3HF5Br2)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
HBFC-226B1 (C3HF6Br)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
HBFC-231B5 (C3H2FBr5)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
HBFC-232B4 (C3H2F2Br4)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
HBFC-233B3 (C3H2F3Br3)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
HBFC-234B2 (C3H2F4Br2)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
HBFC-235B1 (C3H2F5Br)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
HBFC-241B4 (C3H3FBr4)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
HBFC-242B3 (C3H3F2Br3)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
HBFC-243B2 (C3H3F3Br2)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.

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Test Item(s)	Unit	Method	MDL	Result
				No.1
HBFC-244B1 (C3H3F4Br)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
HBFC-251B3 (C3H4FBr3)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
HBFC-252B2 (C3H4F2Br2)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
HBFC-253B1 (C3H4F3Br)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
HBFC-261B2 (C3H5FBr2)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
HBFC-262B1 (C3H5F2Br)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
HBFC-271B1 (C3H6FBr)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
HFCs (Hydrofluorocarbon)				
HFC-23 (CHF3) (CAS No.: 75-46-7)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
HFC-32 (CH2F2) (CAS No.: 75-10-5)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
HFC-41 (CH3F) (CAS No.: 593-53-3)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
HFC-43-10mee (C5H2F10)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
HFC-125 (C2HF5)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.

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Test Item(s)	Unit	Method	MDL	Result
				No.1
HFC-134 (C2H2F4)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
HFC-134a (CH2FCF3) (CAS No.: 811-97-2)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
HFC-143 (CH3F3)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
HFC-143a (CH3F3)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
HFC-152a (C2H4F2) (CAS No.: 75-37-6)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
HFC-227ea (C3HF7) (CAS No.: 431-89-0)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
HFC-236fa (C3H2F6)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
HFC-236ea (C3H2F6) (CAS No.: 431-63-0)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
HFC-245ca (C3H3F5)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
HFC-245fa (C3H3F5)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
HFC-365mfc (C4H5F5)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
PFCs (Perfluorocarbon)				
F14 (CAS No.: 75-73-0)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.

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Test Item(s)	Unit	Method	MDL	Result
				No.1
Fluorocarbon 116 (CAS No.: 76-16-4)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
Freon 218 (CAS No.: 76-19-7)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
Decafluorobutane (CAS No.: 355-25-9)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
Freon C318 (CAS No.: 115-25-3)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
Perfluor-1-butene (CAS No.: 357-26-6)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
perfluorisobutene (CAS No.: 382-21-8)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
1,4-dihydrooctafluorobutane (CAS No.: 377-36-6)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
Nonafluor-2- (trifluoromethyl) butane (CAS No.: 594-91-2)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
Perfluoro-n-pentane (CAS No.: 678-26-2)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
2-perfluoromethylpentane (CAS No.: 355-04-4)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
Perfluorohexane (CAS No.: 355-42-0)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
CHCs (Chlorinate hydrocarbon)				
1,1,1,2-Tetrachloroethane (CAS No.: 630-20-6)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.

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Test Item(s)	Unit	Method	MDL	Result
				No.1
1,1,1-Trichloroethane (CAS No.: 71-55-6)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
1,1,2,2-Tetrachloroethane (CAS No.: 79-34-5)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
1,1,2-Trichloroethane (CAS No.: 79-00-5)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
1,1-Dichloroethane (CAS No.: 75-34-3)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
1,1-Dichloroethene (CAS No.: 75-35-4)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
1,1-Dichloropropene (CAS No.: 563-58-6)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
1,2,3-Trichloropropane (CAS No.: 96-18-4)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
1,2-Dichloroethane (CAS No.: 107-06-2)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
1,2-Dichloropropane (CAS No.: 78-87-5)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
1,3-Dichloropropane (CAS No.: 142-28-9)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
2,2-Dichloropropane (CAS No.: 594-20-7)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
Carbon tetrachloride (CAS No.: 56-23-5)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.

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Test Item(s)	Unit	Method	MDL	Result
				No.1
Chloroethane (CAS No.: 75-00-3)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
Chloroform (CAS No.: 67-66-3)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
Chloromethane (CAS No.: 74-87-3)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
cis-1,2-Dichloroethene (CAS No.: 156-59-2)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
cis-1,3-Dichloropropene (CAS No.: 10061-01-5)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
Hexachlorobutadiene (CAS No.: 87-68-3)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
Methylene Chloride (CAS No.: 75-09-2)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
Tetrachloroethene (CAS No.: 127-18-4)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
trans-1,2-Dichloroethene (CAS No.: 156-60-5)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
trans-1,3-Dichloropropene (CAS No.: 10061-02-6)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.
Trichloroethylene (CAS No.: 79-01-6)	mg/kg	With reference to US EPA 5021 method. Analysis was performed by GC/MS.	1	n.d.

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Note :

1. mg/kg = ppm : 0.1wt% = 1000ppm
2. n.d. = Not Detected
3. MDL = Method Detection Limit
4. " - " = Not Regulated
5. ** = Qualitative analysis (No Unit)
6. Negative = Undetectable / Positive = Detectable
7. Asbestos : Negative = "< 1.0 %", Positive = "> 1.0 %"
8. ***: The substance was calculated by the test result of Tributyl Tin. The MDL was evaluated for Tributyl Tin.

PFOS Reference Information : POPs - (EU) 757/2010

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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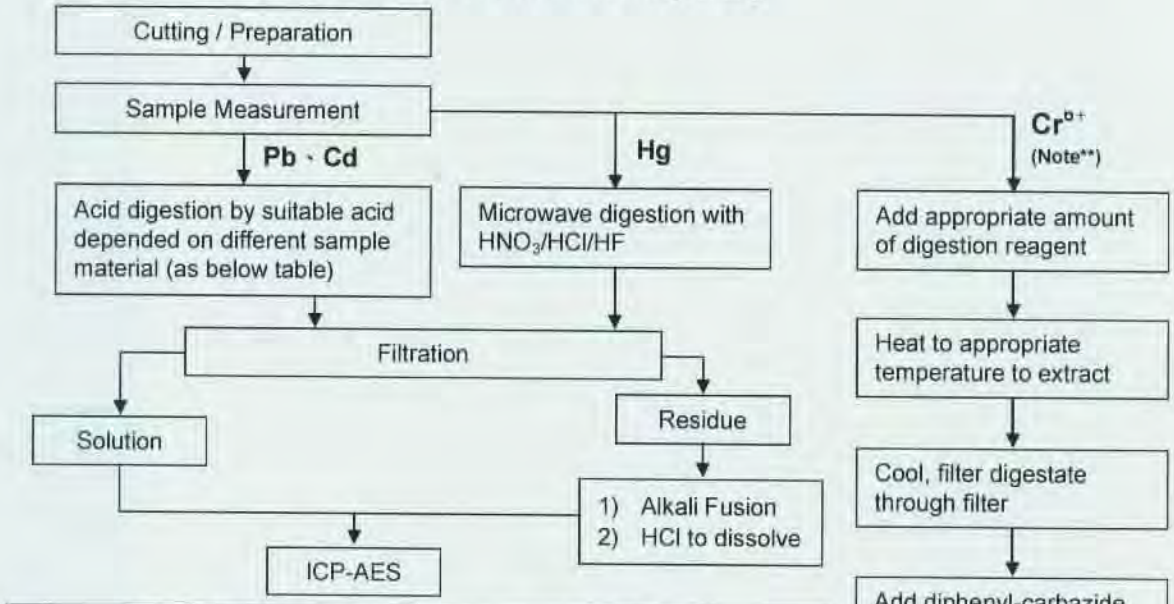
1) These samples were dissolved totally by pre-conditioning method according to below flow chart. (Cr^{6+} test method excluded)
2) Name of the person who made measurement: Climbgreat Yang
3) Name of the person in charge of measurement: Troy Chang



Sample Material	Digestion Acid
Steel, copper, aluminum, solder	Aqua regia, HNO_3, HCl, HF, H_2O_2
Glass	HNO_3/HF
Gold, platinum, palladium, ceramic	Aqua regia
Silver	HNO_3
Plastic	H_2SO_4, H_2O_2, HNO_3, HCl
Others	Added appropriate reagent to total digestion

Note :** (1) For non-metallic material, add alkaline digestion reagent and heat to 90~95℃.
(2) For metallic material, add pure water and heat to boiling.

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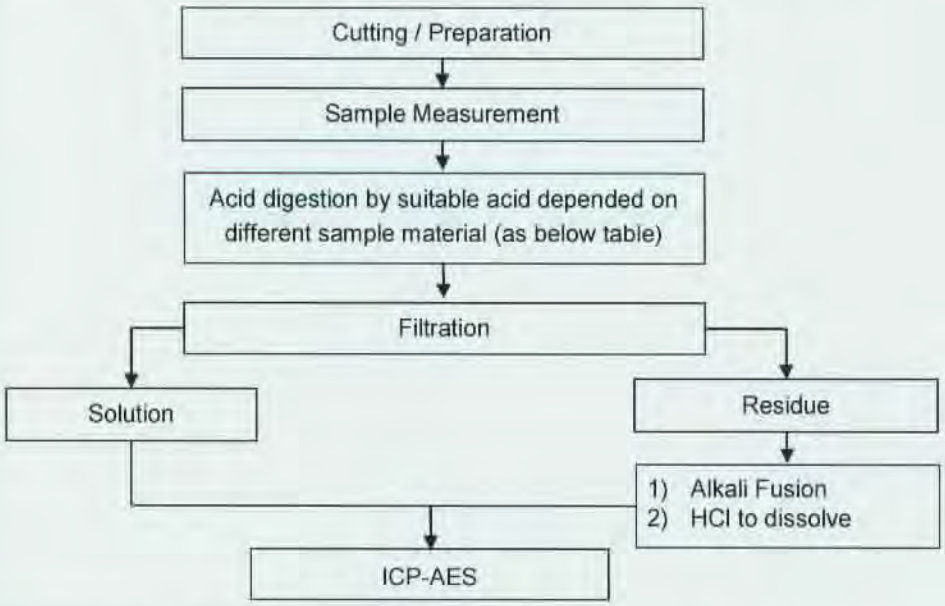
1) These samples were dissolved totally by pre-conditioning method according to below flow chart.
2) Name of the person who made measurement: Climbgreat Yang
3) Name of the person in charge of measurement: Troy Chang

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



Steel, copper, aluminum, solder	Aqua regia, HNO_3, HCl, HF, H_2O_2
Glass	HNO_3/HF
Gold, platinum, palladium, ceramic	Aqua regia
Silver	HNO_3
Plastic	H_2SO_4, H_2O_2, HNO_3, HCl
Others	Added appropriate reagent to total digestion

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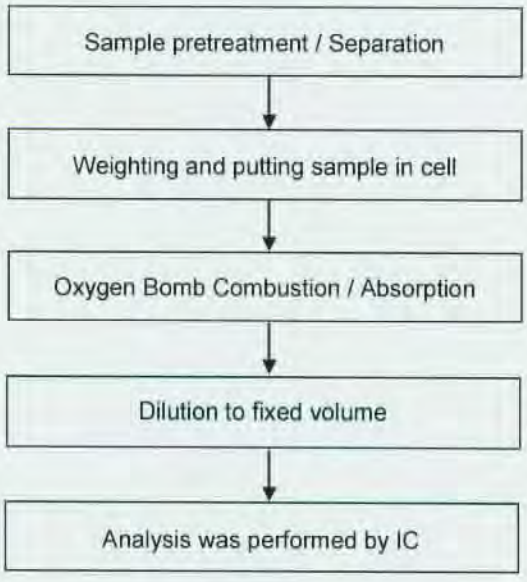
Analytical flow chart of halogen content

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



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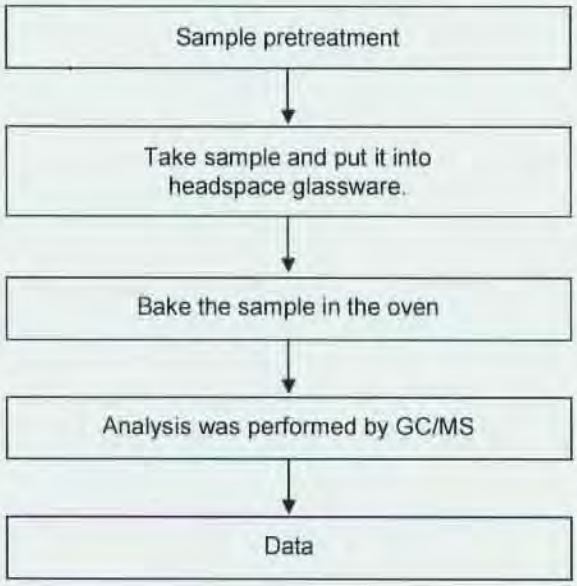
Analytical flow chart of volatile organic compounds (VOCs)

- Name of the person who made measurement : Chun Wu
- Name of the person in charge of measurement : Shinjyh Chen

【Reference method : US EPA 5021】



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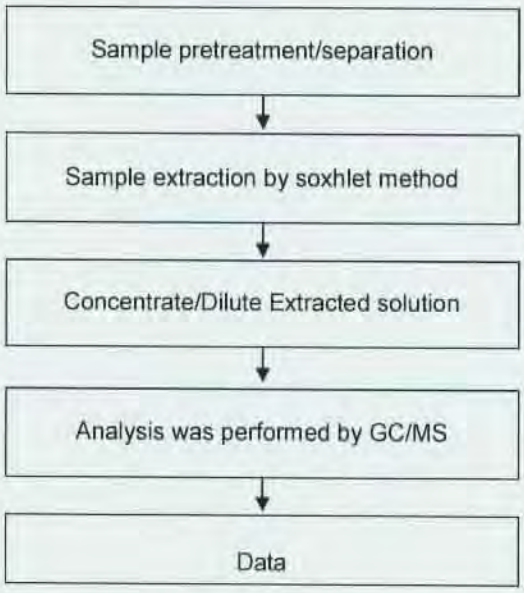
Benzotriazole analytical flow chart

- Name of the person who made measurement: Roman Wong
- Name of the person in charge of measurement: Troy Chang



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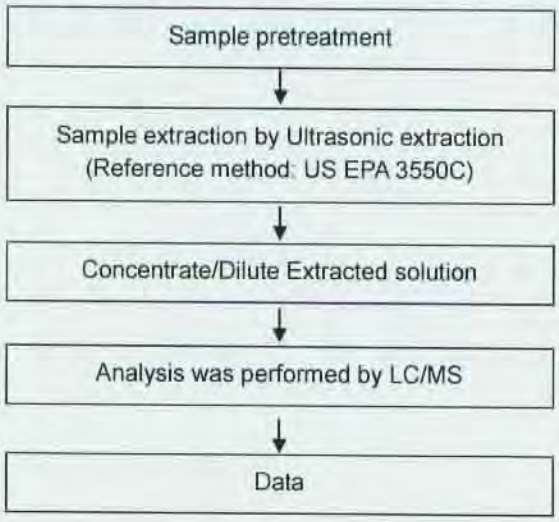
PFOA/PFOS analytical flow chart of Ultrasonic extraction (LC/MS) procedure

- Name of the person who made measurement: Roman Wong
- Name of the person in charge of measurement: Troy Chang



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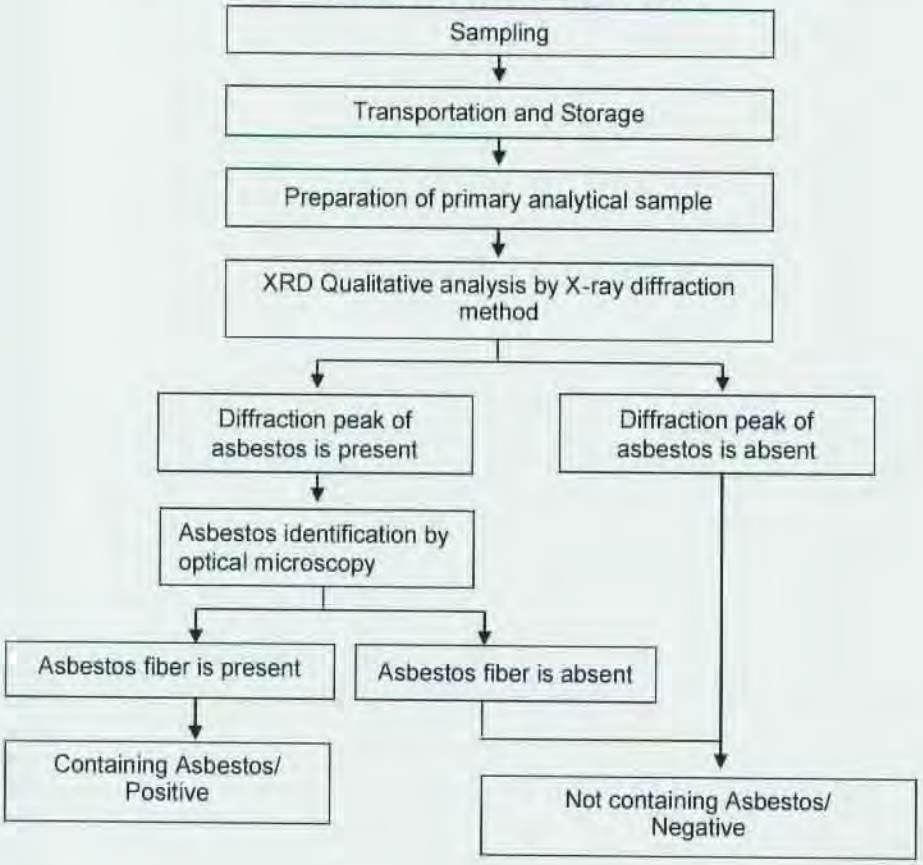
Analysis flow chart for determination of Asbestos

1) Name of the person who made measurement: Victor Kao
2) Name of the person in charge of measurement: Wendy Wei

[Reference method: NIOSH 9000]



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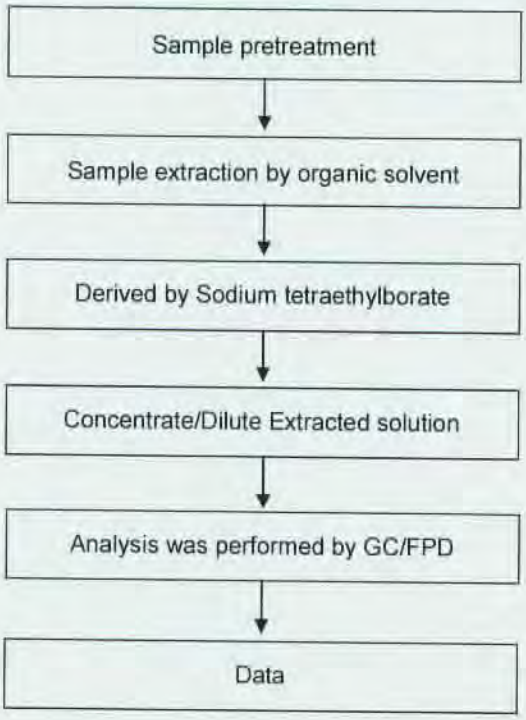
Analytical flow chart of Organic-Tin content

- Name of the person who made measurement: Ginny Chen
- Name of the person in charge of measurement: Troy Chang



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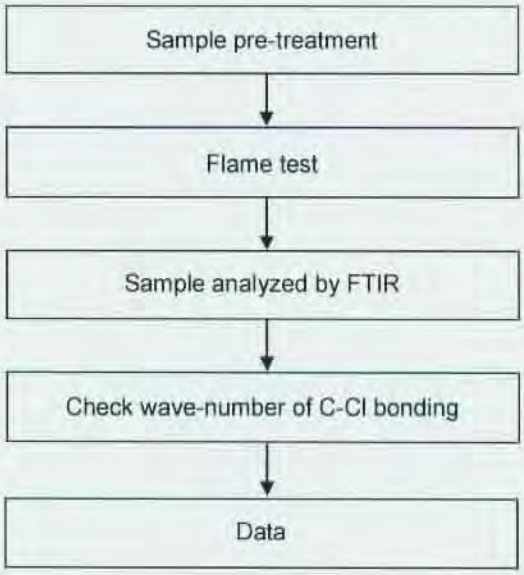
HENKEL CORPORATION
HENKEL ADHESIVES-ELECTRONICS MAIN OFFICE: 14000 JAMBOREE ROAD, IRVINE, CALIFORNIA, 92606 U.S.A.

Analysis flow chart for determination of PVC in material

- Name of the person who made measurement: Ginny Chen
- Name of the person in charge of measurement: Troy Chang



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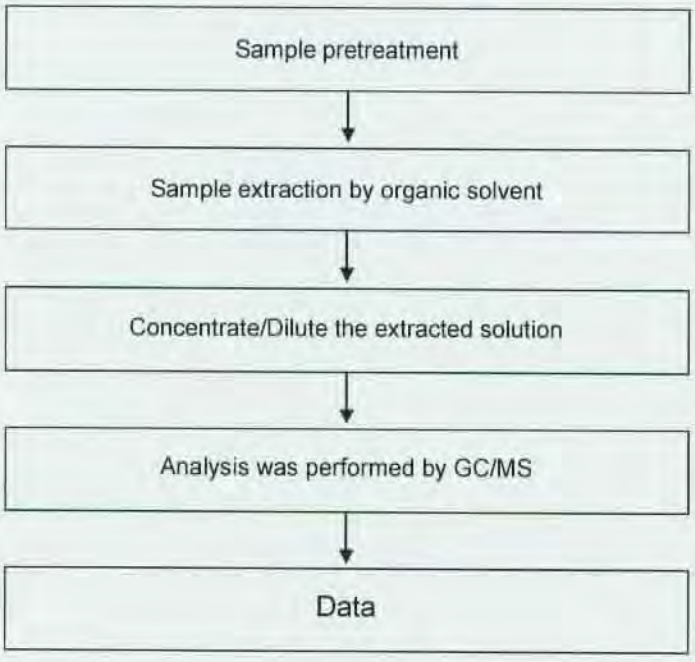
Chlorinated Flame retardant analytical flow chart

1) Name of the person who made measurement: Barry Tseng
2) Name of the person in charge of measurement: Troy Chang

- Reference method: US EPA 8270D, US EPA 3540
- Test Items: PCBs, PCNs, PCTs, Mirex, CP, MCCP



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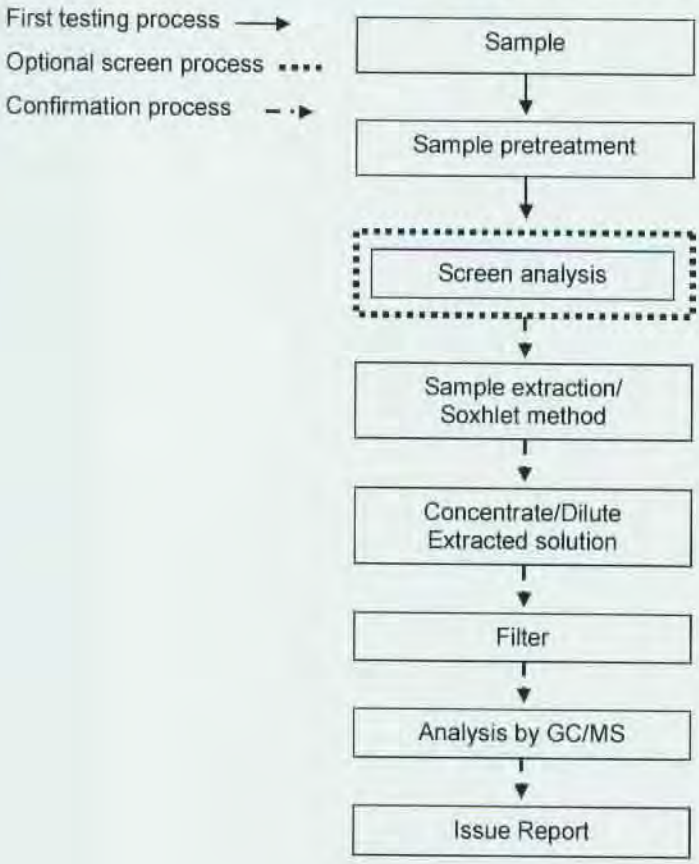
HENKEL ADHESIVES-ELECTRONICS MAIN OFFICE: 14000 JAMBOREE ROAD, IRVINE, CALIFORNIA, 92606 U.S.A.

PBB/PBDE analytical FLOW CHART

- Name of the person who made measurement: Roman Wong
- Name of the person in charge of measurement: Troy Chang



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

CE/2012/82214

** End of Report **

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Test Report

No. CTSSA/22961(B)/12+KA/2012/A1244 Date : 19/11/2012 Page: 1 of 13
CTS Ref. CTSSA/12/3702/Tanaka

TANAKA ELECTRONICS (M) SDN BHD
PLOT 11, PHASE IV, BAYAN LEPAS FREE INDUSTRIAL ZONE
11900 PENANG, MALAYSIA

The following merchandise was (were) submitted and identified by the client as:

Sample Description	:	Au BONDING WIRE
Sample Receiving Date	:	16/10/2012
Testing Period	:	16/10/2012 to 19/11/2012

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).
Analysts	:	Teh Pui Sean, Tay Siam Pine, Lim Meng Hoe, Eileen Tan Yi Pin & Yee Sook Wai

SGS LABORATORY SERVICES (M) SDN. BHD.

CHONG KIEN LEN
B.Sc.(HONS) AMIC
SENIOR LAB MANAGER

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Test Report

Test results:

Test Part Description :

Sample Description : Au BONDING WIRE

RoHS Directive 2011/65/EU Annex II

Test Item(s):	Unit	Test Method	Results	MDL
Cadmium (Cd)	mg/kg	With reference to IEC 62321:2008, and performed by ICP-OES	N.D.	2
Lead (Pb)	mg/kg	With reference to IEC 62321:2008, and performed by ICP-OES	N.D.	2
Mercury (Hg)	mg/kg	With reference to IEC 62321:2008, and performed by ICP-OES	N.D.	2
Hexavalent Chromium (CrVI)	mg/kg	With reference to JIS H 8625, and performed by UV-VIS Spectrophotometry	N.D.	2
Hexavalent Chromium (CrVI) by Spot test / boiling water extraction (optional) #	---	With reference to IEC 62321:2008	Negative	-
Sum of PBBs	mg/kg	With reference to IEC 62321:2008, and performed by GC-MS	N.D.	-
Monobromobiphenyl	mg/kg	With reference to IEC 62321:2008, and performed by GC-MS	N.D.	5
Dibromobiphenyl	mg/kg	With reference to IEC 62321:2008, and performed by GC-MS	N.D.	5
Tribromobiphenyl	mg/kg	With reference to IEC 62321:2008, and performed by GC-MS	N.D.	5
Tetrabromobiphenyl	mg/kg	With reference to IEC 62321:2008, and performed by GC-MS	N.D.	5
Pentabromobiphenyl	mg/kg	With reference to IEC 62321:2008, and performed by GC-MS	N.D.	5
Hexabromobiphenyl	mg/kg	With reference to IEC 62321:2008, and performed by GC-MS	N.D.	5
Heptabromobiphenyl	mg/kg	With reference to IEC 62321:2008, and performed by GC-MS	N.D.	5
Octabromobiphenyl	mg/kg	With reference to IEC 62321:2008, and performed by GC-MS	N.D.	5
Nonabromobiphenyl	mg/kg	With reference to IEC 62321:2008, and performed by GC-MS	N.D.	5
Decabromobiphenyl	mg/kg	With reference to IEC 62321:2008, and performed by GC-MS	N.D.	5

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Sum of PBDEs	mg/kg	With reference to IEC 62321:2008, and performed by GC-MS	N.D.	-
Monobromodiphenyl ether	mg/kg	With reference to IEC 62321:2008, and performed by GC-MS	N.D.	5
Dibromodiphenyl ether	mg/kg	With reference to IEC 62321:2008, and performed by GC-MS	N.D.	5
Tribromodiphenyl ether	mg/kg	With reference to IEC 62321:2008, and performed by GC-MS	N.D.	5
Tetrabromodiphenyl ether	mg/kg	With reference to IEC 62321:2008, and performed by GC-MS	N.D.	5
Pentabromodiphenyl ether	mg/kg	With reference to IEC 62321:2008, and performed by GC-MS	N.D.	5
Hexabromodiphenyl ether	mg/kg	With reference to IEC 62321:2008, and performed by GC-MS	N.D.	5
Heptabromodiphenyl ether	mg/kg	With reference to IEC 62321:2008, and performed by GC-MS	N.D.	5
Octabromodiphenyl ether	mg/kg	With reference to IEC 62321:2008, and performed by GC-MS	N.D.	5
Nonabromodiphenyl ether	mg/kg	With reference to IEC 62321:2008, and performed by GC-MS	N.D.	5
Decabromodiphenyl ether	mg/kg	With reference to IEC 62321:2008, and performed by GC-MS	N.D.	5

Note : (a) mg/kg = ppm ; (0.1wt% = 1000ppm)
(b) N.D. = Not Detected
(c) MDL = Method Detection Limit
(d) # = **Spot-Test:**
a. Negative means the absence of Cr(VI) on the tested areas
b. Positive means the presence of Cr(VI) on the tested areas
(The tested sample should be further verified by boiling-water-extraction method if the spot test result is negative or cannot be confirmed)
Boiling water extraction:
a. Negative means the absence of Cr(VI) on the tested areas
b. Positive means the presence of Cr(VI) on the tested areas;
The detected concentration in 50 mL boiling water extraction solution is equal or greater than 0.02 mg/kg with 50 cm^2 sample surface area.
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.
(e) - = Not regulated

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Test results by chemical method:

Test Item (s):	Unit	Method	Result	MDL
Antimony (Sb)	mg/kg	With reference to EPA Method 3051A, and performed by ICP-OES	N.D.	2
Magnesium (Mg)	mg/kg	With reference to EPA Method 3051A, and performed by ICP-OES	N.D.	2
Beryllium (Be)	mg/kg	With reference to EPA Method 3051A, and performed by ICP-OES	N.D.	2
Polyvinylchloride (PVC)	**	Analysis was performed by FT-IR/ATR	Negative	-
Halogen	---	---	---	
Halogen-Fluorine (F)	mg/kg	With reference to BS EN 14582. Analysis was performed by IC method for Fluorine content.	N.D.	50
Halogen-Chlorine (Cl)	mg/kg	With reference to BS EN 14582. Analysis was performed by IC method for Chlorine content.	N.D.	50
Halogen-Bromine (Br)	mg/kg	With reference to BS EN 14582. Analysis was performed by IC method for Bromine content.	N.D.	50
Halogen-Iodine (I)	mg/kg	With reference to BS EN 14582. Analysis was performed by IC method for Iodine content.	N.D.	50

Test Part Description :

Sample Description : Au BONDING WIRE

Note : (a) mg/kg = ppm
(b) N.D. = Not Detected
(c) MDL = Method Detection Limit
(d) --- = Not Conducted
(e) ** = Qualitative analysis (no unit)
(f) Negative = Undetectable / Positive = Detectable

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Test results by chemical method:

Test Item (s):	Unit	Method	Result	MDL
Hexabromocyclododecane (HBCDD)	mg/kg	Based on EPA 3540C, and performed by GC-MS	N.D.	10
Phthalates	---	---	---	---
DBP (Di-butyl phthalate)	%	With reference to Chromatographia Vol.47, No.784, 1998. Analysis was performed by GC/MS.	N.D.	0.003
DEHP (Di-(2-ethylhexyl phthalate)	%	With reference to Chromatographia Vol.47, No.784, 1998. Analysis was performed by GC/MS.	N.D.	0.003
BBP (Benzyl Butyl phthalate)	%	With reference to Chromatographia Vol.47, No.784, 1998. Analysis was performed by GC/MS.	N.D.	0.003
DINP (Di-isononyl phthalate)	%	With reference to Chromatographia Vol.47, No.784, 1998. Analysis was performed by GC/MS.	N.D.	0.01
DIDP (Di-isodecyl phthalate	%	With reference to Chromatographia Vol.47, No.784, 1998. Analysis was performed by GC/MS.	N.D.	0.01
DNOP (Di-n-octyl phthalate)	%	With reference to Chromatographia Vol.47, No.784, 1998. Analysis was performed by GC/MS.	N.D.	0.003
DNHP (Di-n-hexyl phthalate)	%	With reference to Chromatographia Vol.47, No.784, 1998. Analysis was performed by GC/MS.	N.D.	0.003
DMEP (Bis(2-methoxyethyl)phthalate)	%	With reference to Chromatographia Vol.47, No.784, 1998. Analysis was performed by GC/MS.	N.D.	0.003

Test Part Description:

Sample Description : Au BONDING WIRE

Note : (a) mg/kg = ppm
(b) N.D. = Not Detected
(c) MDL = Method Detection Limit
(d) --- = Not Conducted

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Test Part Description :

Sample Description : Au BONDING WIRE

Test results:

Test Item (s):	Unit	Method	Result	MDL
Dimethyl Fumarate (CAS No. 624-49-7)	mg/kg	With reference to US EPA 3550C method. Analysis was performed by GC/MS.	N.D.	0.1
Perfluorooctane sulfonates (PFOS) PFOS – Acid, Metal Salt, Amide	mg/kg	With reference to US EPA 3540C: 1996 method for PFOS content. Analysis was performed by LC/MS.	N.D.	10
PFOA (CAS No.: 000335-67-1)	mg/kg	With reference to US EPA 3540C: 1996 method for PFOA content. Analysis was performed by LC/MS.	N.D.	10
*Phosphorus (P)	mg/kg	With reference to US EPA Method 3052 for Phosphorus Content. Analysis was performed by ICP-AES.	N.D.	2

Note : (a) mg/kg = ppm
(b) N.D. = Not Detected
(c) MDL = Method Detection Limit
(d) --- = Not Conducted
(e) The sample(s) was/were analysed on behalf of the applicant as mixing sample in one testing.
(f) *The above tests were subcontracted to SGS Taiwan based on report no. KA/2012/A1244

PFOS Reference Information : POPs – (EU) 757/2010
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/m^2.

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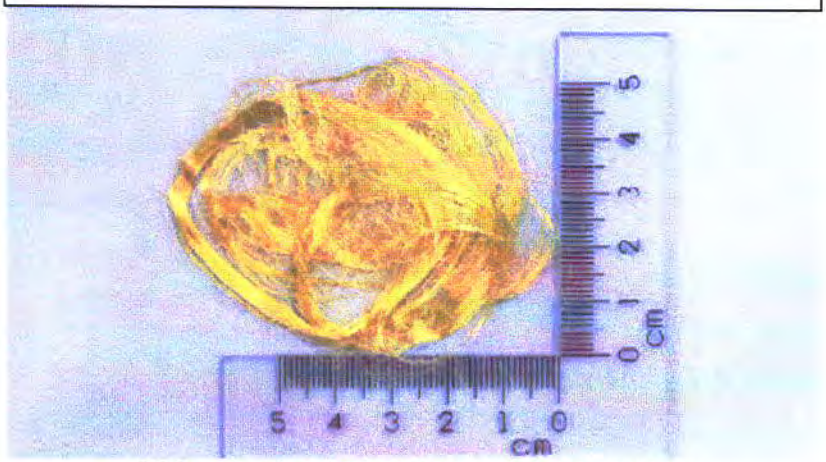
Test Part Description :

Sample Description : Au BONDING WIRE

TANAKA ELECTRONICS (M) SDN BHD
CTSSA/22961(B)/12+KA/2012/A1244



SGS authenticate the photo on original report only

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1. DETERMINATION OF CADMIUM CONTENT BY IEC 62321 2008

Sample Receiving and Registration
↓
Cut sample in small pieces
↓
Weight sample (0.2-0.5g) into digestion vessel
↓
Acid digestion (Microwave)
↓
"Totally Dissolved"
↓
Filtration
↓
Analyses by ICP

2. DETERMINATION OF LEAD CONTENT BY IEC 62321 2008

Sample Receiving and Registration
↓
Cut sample in small pieces
↓
Weight sample (0.2-0.5g) into digestion vessel
↓
Acid digestion (Microwave)
↓
"Totally Dissolved"
↓
Filtration
↓
Analyses by ICP

3. DETERMINATION OF MERCURY CONTENT BY IEC 62321 2008

Sample Receiving and Registration
↓
Cut sample in small pieces
↓
Weight sample (0.2-0.5g) into digestion vessel
↓
Acid digestion (Microwave)
↓
"Totally Dissolved"
↓
Filtration
↓
Analyses by ICP

4. MICROWAVE ASSISTED ACID DIGESTION OF ORGANICALLY BASED METRICES (US EPA 3051A)

Cut sample in small pieces
↓
Weight sample (0.2-0.5g) into digestion vessel
↓
Acid digestion (HNO_3) – Microwave
↓
"Totally Dissolved"
↓
Filtration
↓
Analyses by ICP

5. DETERMINATION OF PBB/PBDE WITH GC-MS BY IEC 62321 2008

Cut sample in small pieces
↓
Weight sample (0.5-4.0g) into extraction thimble
↓
Soxhlet Extraction with Toluene
↓
Filter through 0.45 um membrane filter
↓
Analyses by GC-MS (with appropriate dilution)

6. DETERMINATION OF HEXAVALENT CHROMIUM BY IEC 62321 2008

Sample Receiving and Registration
↓
Sample Preparation
↓
Spot-test (Qualitative)
↓
Boiling-water-extraction
↓
Analyses by UV- Spectrophotometer
↓
Test Report

SGS LABORATORY SERVICES (M) SDN. BHD.

CHONG KIEN LEN
B.Sc.(HONS) AMIC
SENIOR LAB MANAGER

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7. DETERMINATION OF HALOGEN CONTENT

Sample pretreatment
↓
Weighting and putting sample in cell
↓
Combustion / Absorption
↓
Dilution to fixed volume
↓
Analyses by IC

8. DETERMINATION OF HEXAVALENT CHROMIUM BY JIS H 8625

Sample Preparation
↓
Hot water extraction
↓
Add colour-developing reagent
↓
Let stand for 5-10 min
↓
Analyses by UV- Spectrophotometer (540 nm)

9. ANALYTICAL FLOW CHART FOR PVC DETECTION WITH FTIR

Sample preparation
(apply ATR for analysis)
↓
FT-IR Scanning
↓
Report

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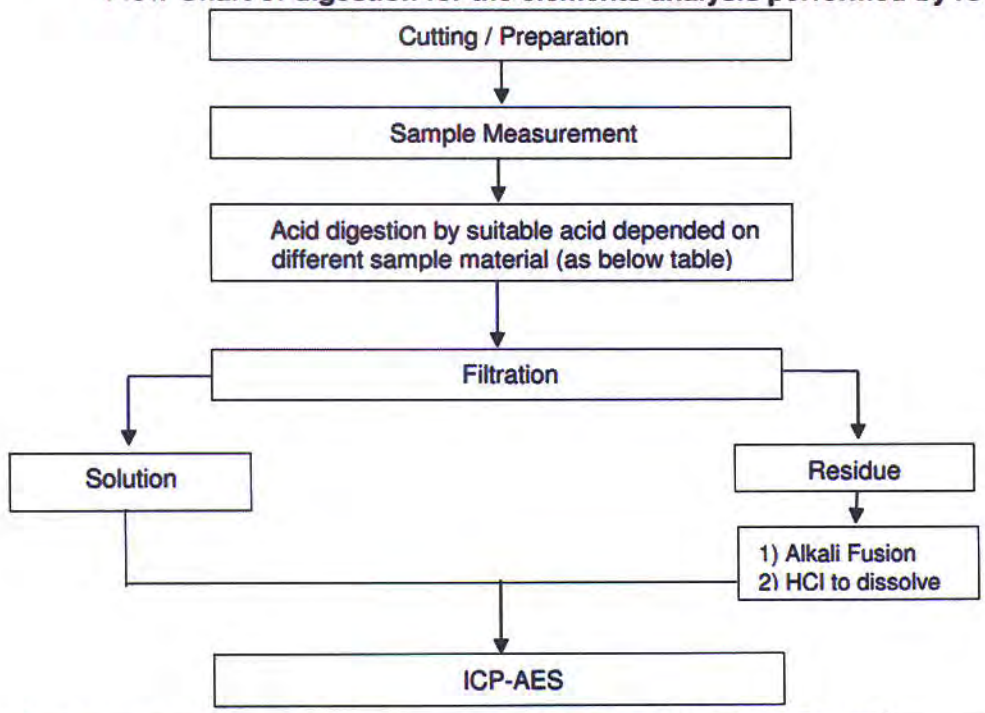
1) These samples were dissolved totally by pre-conditioning method according to below flow chart.
2) Name of the person who made measurement: Alex Chang
3) Name of the person in charge of measurement: Ray Chang

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



Steel, copper, aluminium, solder	Aqua regia, HNO_3, HCl, HF, H_2O_2
Glass	HNO_3/HF
Gold, platinum, palladium, ceramic	Aqua regia
Silver	HNO_3
Plastic	H_2SO_4, H_2O_2, HNO_3, HCl
Others	Any acid to total digestion

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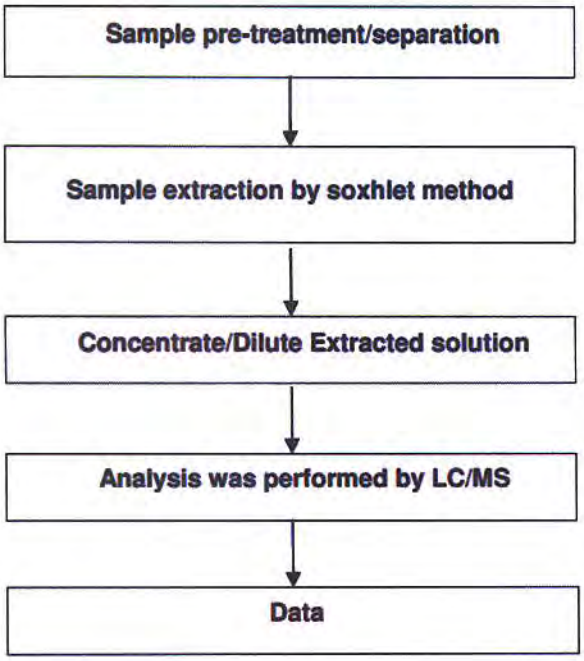
Analytical Flow Chart of PFOS & PFOA Content



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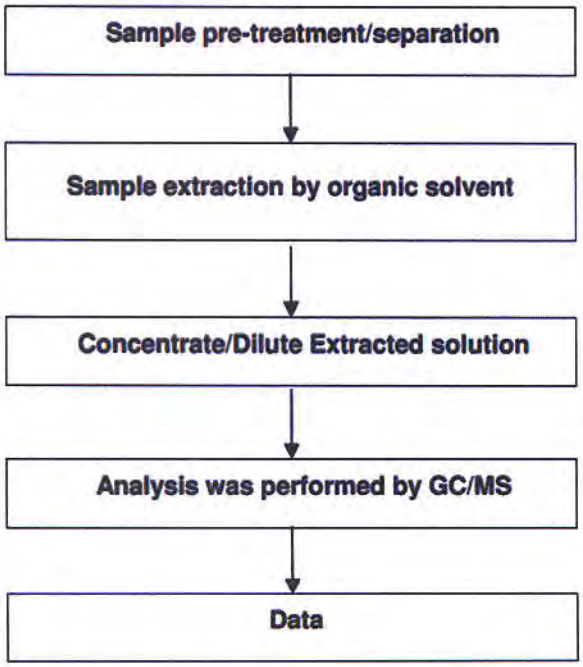
Analytical Flow Chart for Dimethyl Fumarate



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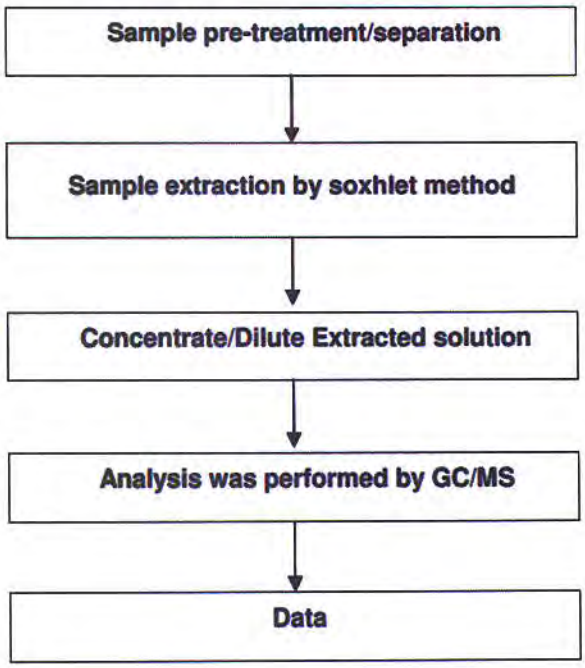
Analytical flow chart of Phthalates Content



**** End of Report ****

SGS LABORATORY SERVICES (M) SDN. BHD.

CHONG KIEN LEN
B.Sc.(HONS) AMIC
SENIOR LAB MANAGER

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Signature valid
For Question
Please Contact with SGS
www.tw.sgs.com

Test Report

No. : CE/2013/41593 Date : 2013/04/22 Page : 1 of 9

HITACHI CHEMICAL CO., LTD.
1772-1 KANAKUBO YUUKI-SHI IBARAKI, 307-0015, JAPAN

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

Sample Description	:	EPOXY MOLDING COMPOUND
Style/Item No.	:	CEL-9220HF
Sample Receiving Date	:	2013/04/09
Testing Period	:	2013/04/09 TO 2013/04/22

==========

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

SGS TAIWAN LTD

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

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HITACHI CHEMICAL CO., LTD.
1772-1 KANAKUBO YUUKI-SHI IBARAKI, 307-0015, JAPAN

Test Result(s)

PART NAME No.1 : DARK GRAY LUMP

Test Item(s)	Unit	Method	MDL	Result
				No.1
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.
PVC	**	Analysis was performed by FTIR and FLAME Test.	-	Negative
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 US EPA 3540C method. Analysis was performed by GC/MS.	5	n.d.
BBP (Benzyl butyl phthalate) (CAS No.: 85-68-7)	%	With reference to EN 14372. Analysis was performed by GC/MS.	0.003	n.d.
DBP (Dibutyl phthalate) (CAS No.: 84-74-2)	%	With reference to EN 14372. Analysis was performed by GC/MS.	0.003	n.d.
DEHP (Di- (2-ethylhexyl) phthalate) (CAS No.: 117-81-7)	%	With reference to EN 14372. Analysis was performed by GC/MS.	0.003	n.d.
DIDP (Di-isodecyl phthalate) (CAS No.: 26761-40-0)	%	With reference to EN 14372. Analysis was performed by GC/MS.	0.01	n.d.
DINP (Di-isononyl phthalate) (CAS No.: 28553-12-0)	%	With reference to EN 14372. Analysis was performed by GC/MS.	0.01	n.d.
DNOP (Di-n-octyl phthalate) (CAS No.: 117-84-0)	%	With reference to EN 14372. Analysis was performed by GC/MS.	0.003	n.d.
DNHP (Di-n-hexyl phthalate) (CAS No.: 84-75-3)	%	With reference to EN 14372. Analysis was performed by GC/MS.	0.003	n.d.
DMEP (Bis (2-methoxyethyl) phthalate) (CAS No.: 117-82-8)	%	With reference to EN 14372. Analysis was performed by GC/MS.	0.003	n.d.

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HITACHI CHEMICAL CO., LTD.
1772-1 KANAKUBO YUUKI-SHI IBARAKI, 307-0015, JAPAN

Test Item(s)	Unit	Method	MDL	Result No.1
Tetrabromobisphenol A (TBBP-A) (CAS No.: 79-94-7)	mg/kg	With reference to Global SOP RSTS-E&E-121. Analysis was performed by LC/MS.	10	n.d.

Note :

1. mg/kg = ppm ; 0.1wt% = 1000ppm
2. n.d. = Not Detected
3. MDL = Method Detection Limit
4. " - " = Not Regulated
5. ** = Qualitative analysis (No Unit)
6. Negative = Undetectable / Positive = Detectable

PFOS Reference Information : POPs - (EU) 757/2010

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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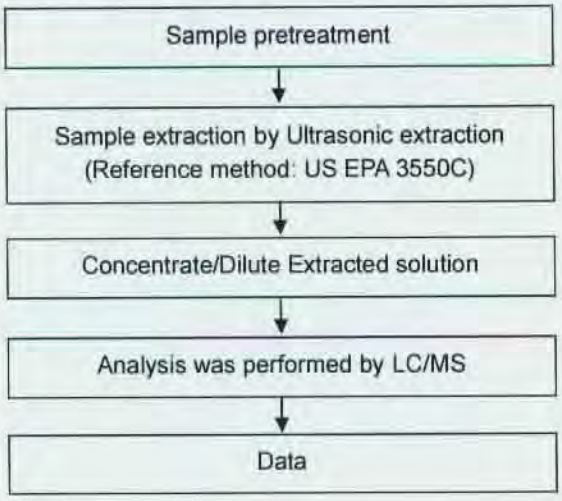
HITACHI CHEMICAL CO., LTD.
1772-1 KANAKUBO YUUKI-SHI IBARAKI, 307-0015, JAPAN

PFOA/PFOS analytical flow chart of Ultrasonic extraction (LC/MS) procedure

- Name of the person who made measurement: Roman Wong
- Name of the person in charge of measurement: Troy Chang



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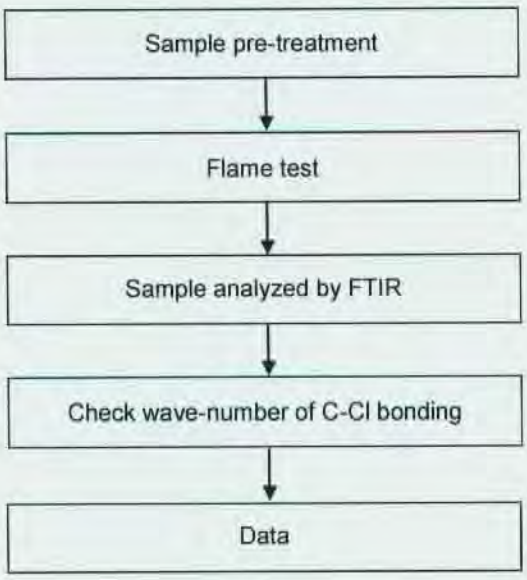
HITACHI CHEMICAL CO., LTD.
1772-1 KANAKUBO YUUKI-SHI IBARAKI, 307-0015, JAPAN

Analysis flow chart for determination of PVC in material

- Name of the person who made measurement: Ginny Chen
- Name of the person in charge of measurement: Troy Chang



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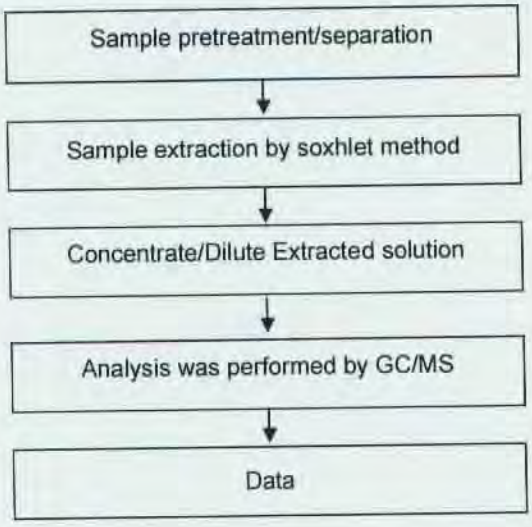
HITACHI CHEMICAL CO., LTD.
1772-1 KANAKUBO YUUKI-SHI IBARAKI, 307-0015, JAPAN

HBCDD analytical flow chart

- Name of the person who made measurement: Roman Wong
- Name of the person in charge of measurement: Troy Chang



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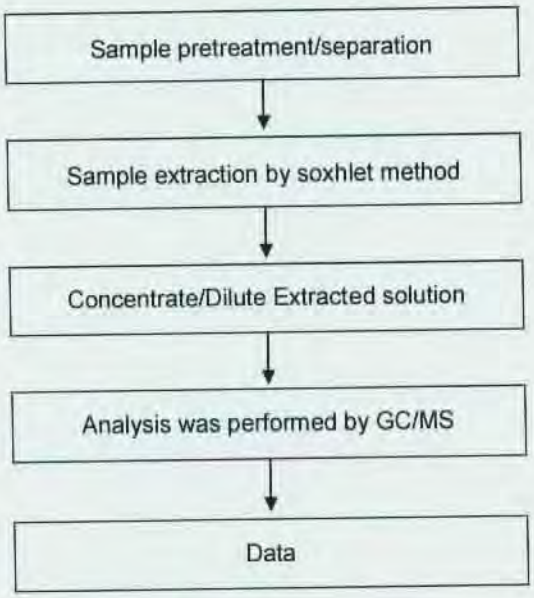
HITACHI CHEMICAL CO., LTD.
1772-1 KANAKUBO YUUKI-SHI IBARAKI, 307-0015, JAPAN

Analytical flow chart of phthalate content

- Name of the person who made measurement: Roman Wong
- Name of the person in charge of measurement: Troy Chang



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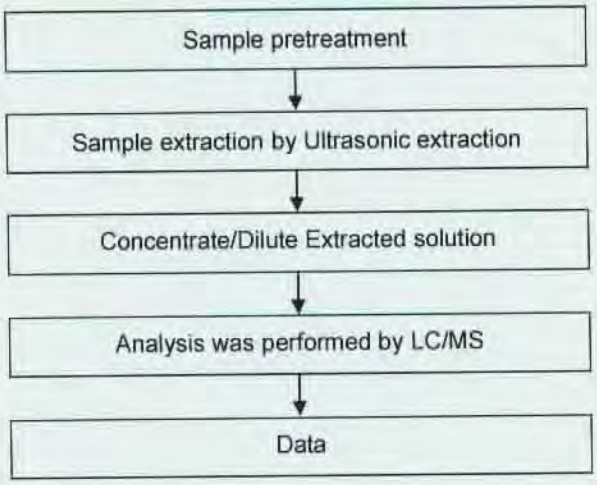
1772-1 KANAKUBO YUUKI-SHI IBARAKI, 307-0015, JAPAN

TBBP-A analytical flow chart

- Name of the person who made measurement: Ginny Chen
- Name of the person in charge of measurement: Troy Chang



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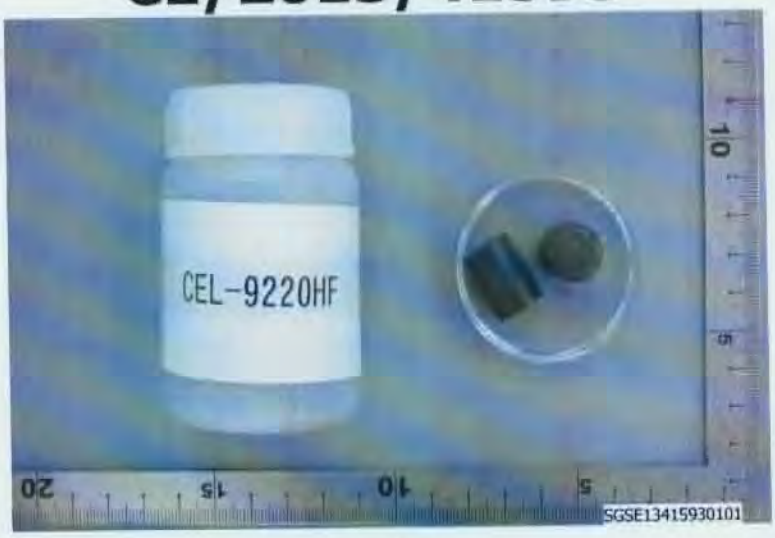
*** The tested sample / part is marked by an arrow if it's shown on the photo. ***

CE/2013/41593



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Signature valid
For Question
Please Contact with SGS
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測試報告
Test Report

號碼(No.) : KA/2012/C2130 日期(Date) : 2013/01/04 頁數(Page) : 1 of 12

ASM HK

4/F, WATSON CENTRE, 16 KUNG YIP ST., KWAI CHUNG. HONG KONG(ASM HK)

以下測試樣品係由客戶送樣，且由客戶聲稱並經客戶確認如下 (The following samples was/were submitted and identified by/on behalf of the client as)：

樣品名稱(Sample Description)	:	Ni PLATING MATERIAL
收件日期(Sample Receiving Date)	:	2012/12/25
測試期間(Testing Period)	:	2012/12/25 TO 2013/01/04
送樣廠商(Sample Submitted By)	:	ASM HK

==========

測試結果(Test Results) : 請見下一頁 (Please refer to next pages).

Ray Chang

Ray Chang / Asst. Manager
Signed for and on behalf of
SGS Taiwan Limited

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高雄市楠梓加工出口區開發路61號
www.tw.sgs.com
Member of the SGS Group

測試報告
Test Report

ASM HK

4/F, WATSON CENTRE, 16 KUNG YIP ST., KWAI CHUNG. HONG KONG(ASM HK)

測試結果(Test Results)

測試部位(PART NAME) NO.1 : 銀色 Ni PLATING MATERIAL (SILVER Ni PLATING MATERIAL)

測試項目 (Test Items)	單位 (Unit)	測試方法 (Method)	方法偵測極限值 (MDL)	結果 (Result) NO.1
鎘 / Cadmium (Cd)	mg/kg	酸洗脫鍍層，參考IEC 62321: 2008方法，以感應耦合電漿原子發射光譜儀檢測. / IEC 62321: 2008 application of modified digestion by surface etching and performed by ICP-AES.	2	n.d.
鉛 / Lead (Pb)	mg/kg	酸洗脫鍍層，參考IEC 62321: 2008方法，以感應耦合電漿原子發射光譜儀檢測. / IEC 62321: 2008 application of modified digestion by surface etching and performed by ICP-AES.	2	n.d.
汞 / Mercury (Hg)	mg/kg	酸洗脫鍍層，參考IEC 62321: 2008方法，以感應耦合電漿原子發射光譜儀檢測. / IEC 62321: 2008 application of modified digestion by surface etching and performed by ICP-AES.	2	n.d.
六價鉻 / Hexavalent Chromium Cr(VI) by boiling water extraction#	**	參考IEC 62321: 2008方法，用Boiling water extraction方法檢測. / With reference to IEC 62321: 2008 and performed by boiling water extraction Method.	0.02mg/kg with 50 cm ^{2} surface area	Negative
多溴聯苯總和 / Sum of PBBs	mg/kg	參考IEC 62321: 2008方法，以氣相層析儀/質譜儀檢測. / With reference to IEC 62321: 2008 and performed by GC/MS.	-	n.d.
一溴聯苯 / Monobromobiphenyl			5	n.d.
二溴聯苯 / Dibromobiphenyl			5	n.d.
三溴聯苯 / Tribromobiphenyl			5	n.d.
四溴聯苯 / Tetrabromobiphenyl			5	n.d.
五溴聯苯 / Pentabromobiphenyl			5	n.d.
六溴聯苯 / Hexabromobiphenyl			5	n.d.
七溴聯苯 / Heptabromobiphenyl			5	n.d.
八溴聯苯 / Octabromobiphenyl			5	n.d.
九溴聯苯 / Nonabromobiphenyl			5	n.d.
十溴聯苯 / Decabromobiphenyl			5	n.d.

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測試報告
Test Report

ASM HK

4/F, WATSON CENTRE, 16 KUNG YIP ST., KWAI CHUNG. HONG KONG(ASM HK)

測試項目 (Test Items)	單位 (Unit)	測試方法 (Method)	方法偵測極限值 (MDL)	結果 (Result) NO.1
多溴聯苯醚總和 / Sum of PBDEs	mg/kg	參考IEC 62321: 2008方法，以氣相層析儀/質譜儀檢測. / With reference to IEC 62321: 2008 and performed by GC/MS.	-	n.d.
一溴聯苯醚 / Monobromodiphenyl ether			5	n.d.
二溴聯苯醚 / Dibromodiphenyl ether			5	n.d.
三溴聯苯醚 / Tribromodiphenyl ether			5	n.d.
四溴聯苯醚 / Tetrabromodiphenyl ether			5	n.d.
五溴聯苯醚 / Pentabromodiphenyl ether			5	n.d.
六溴聯苯醚 / Hexabromodiphenyl ether			5	n.d.
七溴聯苯醚 / Heptabromodiphenyl ether			5	n.d.
八溴聯苯醚 / Octabromodiphenyl ether			5	n.d.
九溴聯苯醚 / Nonabromodiphenyl ether			5	n.d.
十溴聯苯醚 / Decabromodiphenyl ether			5	n.d.
銻 / Antimony (Sb)	mg/kg	參考US EPA 3052方法，用感應藕合電漿原子發射光譜儀檢測銻含量. / With reference to US EPA Method 3052 for Antimony Content. Analysis was performed by ICP-AES.	2	n.d.
六溴環十二烷 / Hexabromocyclododecane (HBCDD) (CAS No.: 25637-99-4)	mg/kg	參考US EPA 3540C: 1996方法，以氣相層析質譜儀檢測. / With reference to US EPA 3540C: 1996 method. Analysis was performed by GC/MS.	5	n.d.
全氟辛烷磺酸 / Perfluorooctane sulfonates (PFOS - Acid, Metal Salt, Amide)	mg/kg	參考US EPA 3550C: 2007方法，以液相層析/質譜儀檢測. / With reference to US EPA 3550C: 2007. Analysis was performed by LC/MS.	10	n.d.
全氟辛酸(鉸) / PFOA (CAS No.: 335-67-1)	mg/kg	參考US EPA 3550C: 2007方法，以液相層析/質譜儀檢測. / With reference to US EPA 3550C: 2007. Analysis was performed by LC/MS.	10	n.d.

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測試報告
Test Report

ASM HK

4/F, WATSON CENTRE, 16 KUNG YIP ST., KWAI CHUNG. HONG KONG(ASM HK)

測試項目 (Test Items)	單位 (Unit)	測試方法 (Method)	方法偵測極限值 (MDL)	結果 (Result) NO.1
可塑劑定量分析 / Phthalates				
鄰苯二甲酸甲苯基丁酯 / BBP (Benzyl butyl phthalate) (CAS No.: 85-68-7)	%	本測試參考EN 14372, 以氣相層析儀/質譜儀檢測之. / With reference to EN 14372. Analysis was performed by GC/MS.	0.003	n.d.
鄰苯二甲酸二丁酯 / DBP (Dibutyl phthalate) (CAS No.: 84-74-2)	%	本測試參考EN 14372, 以氣相層析儀/質譜儀檢測之. / With reference to EN 14372. Analysis was performed by GC/MS.	0.003	n.d.
鄰苯二甲酸二 (2-乙基己基)酯 / DEHP (Di- (2-ethylhexyl) phthalate) (CAS No.: 117-81-7)	%	本測試參考EN 14372, 以氣相層析儀/質譜儀檢測之. / With reference to EN 14372. Analysis was performed by GC/MS.	0.003	n.d.
鄰苯二甲酸二異癸酯 / DIDP (Di-isodecyl phthalate) (CAS No.: 26761-40-0)	%	本測試參考EN 14372, 以氣相層析儀/質譜儀檢測之. / With reference to EN 14372. Analysis was performed by GC/MS.	0.01	n.d.
鄰苯二甲酸二異壬酯 / DINP (Di-isononyl phthalate) (CAS No.: 28553-12-0)	%	本測試參考EN 14372, 以氣相層析儀/質譜儀檢測之. / With reference to EN 14372. Analysis was performed by GC/MS.	0.01	n.d.
鄰苯二甲酸二正辛酯 / DNOP (Di-n-octyl phthalate) (CAS No.: 117-84-0)	%	本測試參考EN 14372, 以氣相層析儀/質譜儀檢測之. / With reference to EN 14372. Analysis was performed by GC/MS.	0.003	n.d.

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Member of the SGS Group

測試報告
Test Report

ASM HK

4/F, WATSON CENTRE, 16 KUNG YIP ST., KWAI CHUNG. HONG KONG(ASM HK)

測試項目 (Test Items)	單位 (Unit)	測試方法 (Method)	方法偵測極限值 (MDL)	結果 (Result) NO.1
鹵素 / Halogen				
鹵素 (氟) / Halogen-Fluorine (F) (CAS No.: 14762-94-8)	mg/kg	參考BS EN 14582:2007, 以離子層析儀分析. / With reference to BS EN 14582:2007. Analysis was performed by IC.	50	n.d.
鹵素 (氯) / Halogen-Chlorine (Cl) (CAS No.: 22537-15-1)	mg/kg	參考BS EN 14582:2007, 以離子層析儀分析. / With reference to BS EN 14582:2007. Analysis was performed by IC.	50	n.d.
鹵素 (溴) / Halogen-Bromine (Br) (CAS No.: 10097-32-2)	mg/kg	參考BS EN 14582:2007, 以離子層析儀分析. / With reference to BS EN 14582:2007. Analysis was performed by IC.	50	n.d.
鹵素 (碘) / Halogen-Iodine (I) (CAS No.: 14362-44-8)	mg/kg	參考BS EN 14582:2007, 以離子層析儀分析. / With reference to BS EN 14582:2007. Analysis was performed by IC.	50	n.d.

備註(Note):

1. mg/kg = ppm ; 0.1wt% = 1000ppm
2. n.d. = Not Detected (未檢出)
3. MDL = Method Detection Limit (方法偵測極限值)
4. "-" = Not Regulated (無規格值)
5. # = a. Positive means the presence of CrVI on the tested areas
   (Positive表示測試區域偵測到六價鉻)
   b. Negative means the absence of CrVI on the tested areas
   (Negative表示測試區域未偵測到六價鉻)

   The detected concentration in boiling-water-extraction solution is equal or greater than 0.02 mg/kg with 50 cm^2 tested areas . / 該溶液濃度≧0.02 mg/kg with 50 cm^2 (tested areas)

PFOS參考資訊(Reference Information) : 持久性有機污染物 POPs - (EU) 757/2010

PFOS濃度在物質或製備中不得超過0.001%(10ppm), 在半成品、成品或零部件中不得超過0.1%(1000ppm), 在紡織品或塗層材料中不得超過1μg/m^2。(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/m^2.)

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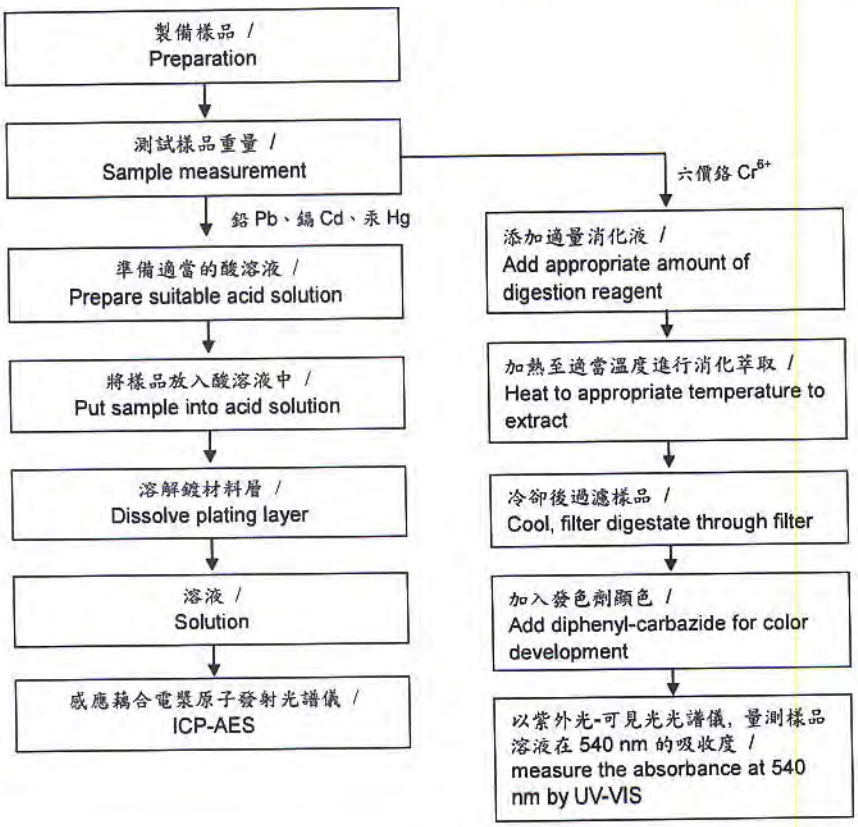
ASM HK

4/F, WATSON CENTRE, 16 KUNG YIP ST., KWAI CHUNG. HONG KONG(ASM HK)

鍍層重金屬測試流程圖 /
Flow Chart of Stripping method for metal analysis

1) 根據以下的流程圖之條件，樣品之外部鍍層已完全溶解已完全溶解。(六價鉻測試方法除外) / The plating layer of samples were dissolved totally by pre-conditioning metho according to below flow chart. (Cr6+ test method excluded)
2) 測試人員：張俊雄 / Name of the person who made measurement: Alex Chang
3) 測試負責人：張伯睿 / Name of the person in charge of measurement: Ray Chang



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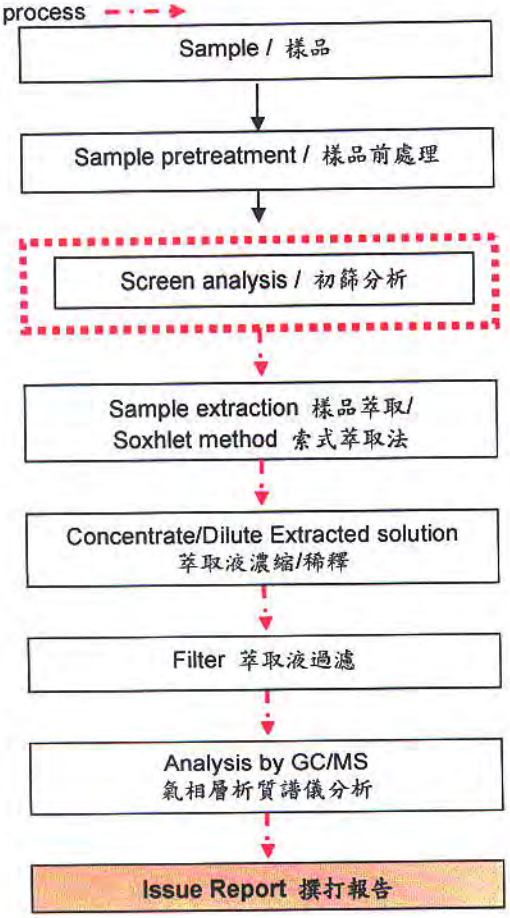
多溴聯苯/多溴聯苯醚 分析流程圖 / PBB/PBDE analytical FLOW CHART

1)測試人員：曹嘉琪 / Name of the person who made measurement: Anson Tsao
2)測試負責人：張伯睿 / Name of the person in charge of measurement: Ray Chang

初次測試程序 / First testing process ——→
選擇性篩檢程序 / Optional screen process ·····
確認程序 / Confirmation process - · - →



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測試報告
Test Report

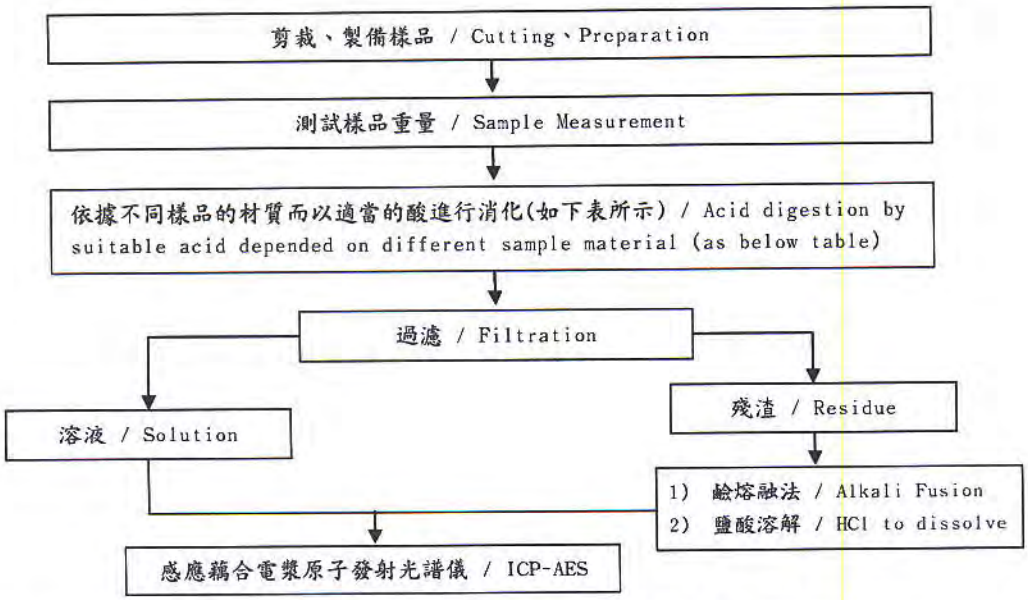
ASM HK

4/F, WATSON CENTRE, 16 KUNG YIP ST., KWAI CHUNG. HONG KONG(ASM HK)

1) 根據以下的流程圖之條件，樣品已完全溶解。 / These samples were dissolved totally by pre-conditioning method according to below flow chart.
2) 測試人員：張俊雄 / Name of the person who made measurement: Alex Chang
3) 測試負責人：張伯睿 / Name of the person in charge of measurement: Ray Chang

元素以 ICP-AES 分析的消化流程圖

(Flow Chart of digestion for the elements analysis performed by ICP-AES)



鋼,銅,鋁,焊錫 / Steel, copper, aluminum, solder	王水,硝酸,鹽酸,氫氟酸,雙氧水 / Aqua regia, HNO_3, HCl, HF, H_2O_2
玻璃 / Glass	硝酸,氫氟酸 / HNO_3/HF
金,鉑,鈀,陶瓷 / Gold, platinum, palladium, ceramic	王水 / Aqua regia
銀 / Silver	硝酸 / HNO_3
塑膠 / Plastic	硫酸,雙氧水,硝酸,鹽酸 / H_2SO_4, H_2O_2, HNO_3, HCl
其他 / Others	加入任何酸至完全溶解 / Any acid to total digestion

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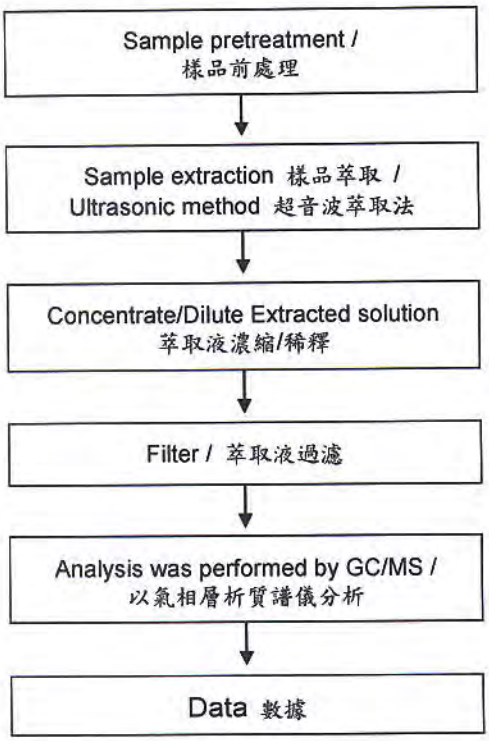
六溴環十二烷分析流程圖 / HBCDD Analytical FLOW CHART

1) 測試人員：曹嘉琪/ Name of the person who made measurement: Anson Tsao
2) 測試負責人：張伯睿/ Name of the person in charge of measurement: Ray Chang



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測試報告
Test Report

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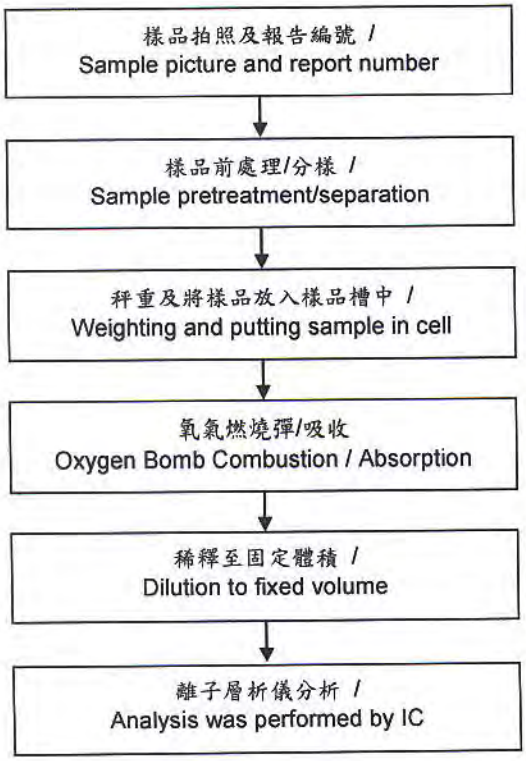
4/F, WATSON CENTRE, 16 KUNG YIP ST., KWAI CHUNG. HONG KONG(ASM HK)

鹵素分析流程圖 / Analytical flow chart of halogen content

1) 測試人員：洪秀眞/ Name of the person who made measurement: Jean Hung

2) 測試負責人：張伯睿/ Name of the person in charge of measurement: Ray Chang



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測試報告
Test Report

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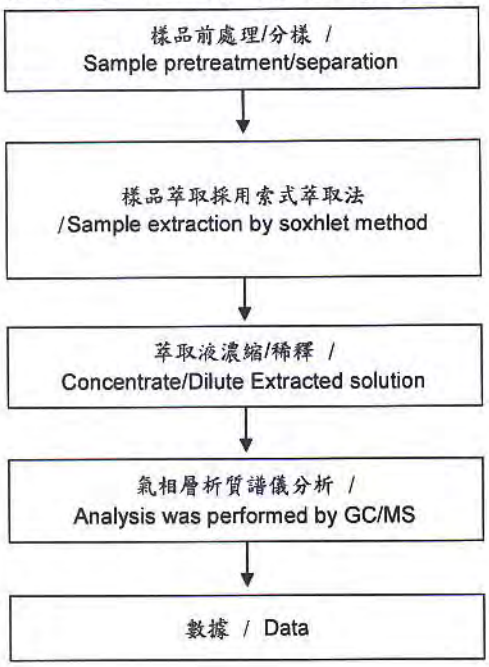
可塑劑分析流程圖 / Analytical flow chart of phthalate content

1)測試人員：曹嘉琪 / Name of the person who made measurement: Anson Tsao

2)測試負責人：張伯睿 / Name of the person in charge of measurement: Ray Chang



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Test Report

ASM HK

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* 照片中如有箭頭標示，則表示爲實際檢測之樣品/部位. *
(The tested sample / part is marked by an arrow if it's shown on the photo.)

KA/2012/C2130

** 報告結尾(End of Report) **

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測試報告
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以下測試樣品係由客户送樣，且由客户聲稱並經客户確認如下 (The following samples was/were submitted and identified by/on behalf of the client as):

樣品名稱(Sample Description)	:	Pd PLATING MATERIAL
收件日期(Sample Receiving Date)	:	2012/12/25
測試期間(Testing Period)	:	2012/12/25 TO 2013/01/04
送樣廠商(Sample Submitted By)	:	ASM HK

==========

測試結果(Test Results) : 請見下一頁 (Please refer to next pages).

Ray Chang

Ray Chang / Asst. Manager
Signed for and on behalf of
SGS Taiwan Limited

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測試結果(Test Results)

測試部位(PART NAME) NO.1 : 銀色 Pd PLATING MATERIAL (SILVER Pd PLATING MATERIAL)

測試項目 (Test Items)	單位 (Unit)	測試方法 (Method)	方法偵測極限值 (MDL)	結果 (Result) NO.1
鎘 / Cadmium (Cd)	mg/kg	酸洗脫鍍層，參考IEC 62321: 2008方法，以感應耦合電漿原子發射光譜儀檢測. / IEC 62321: 2008 application of modified digestion by surface etching and performed by ICP-AES.	2	n.d.
鉛 / Lead (Pb)	mg/kg	酸洗脫鍍層，參考IEC 62321: 2008方法，以感應耦合電漿原子發射光譜儀檢測. / IEC 62321: 2008 application of modified digestion by surface etching and performed by ICP-AES.	2	n.d.
汞 / Mercury (Hg)	mg/kg	酸洗脫鍍層，參考IEC 62321: 2008方法，以感應耦合電漿原子發射光譜儀檢測. / IEC 62321: 2008 application of modified digestion by surface etching and performed by ICP-AES.	2	n.d.
六價鉻 / Hexavalent Chromium Cr(VI) by boiling water extraction#	**	參考IEC 62321: 2008方法，用Boiling water extraction方法檢測. / With reference to IEC 62321: 2008 and performed by boiling water extraction Method.	0.02mg/kg with 50 cm^2 surface area	Negative
多溴聯苯總和 / Sum of PBBs	mg/kg	參考IEC 62321: 2008方法，以氣相層析儀/質譜儀檢測. / With reference to IEC 62321: 2008 and performed by GC/MS.	-	n.d.
一溴聯苯 / Monobromobiphenyl			5	n.d.
二溴聯苯 / Dibromobiphenyl			5	n.d.
三溴聯苯 / Tribromobiphenyl			5	n.d.
四溴聯苯 / Tetrabromobiphenyl			5	n.d.
五溴聯苯 / Pentabromobiphenyl			5	n.d.
六溴聯苯 / Hexabromobiphenyl			5	n.d.
七溴聯苯 / Heptabromobiphenyl			5	n.d.
八溴聯苯 / Octabromobiphenyl			5	n.d.
九溴聯苯 / Nonabromobiphenyl			5	n.d.
十溴聯苯 / Decabromobiphenyl			5	n.d.

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測試項目 (Test Items)	單位 (Unit)	測試方法 (Method)	方法偵測極限值 (MDL)	結果 (Result) NO.1
多溴聯苯醚總和 / Sum of PBDEs	mg/kg	參考IEC 62321: 2008方法，以氣相層析儀/質譜儀檢測. / With reference to IEC 62321: 2008 and performed by GC/MS.	-	n.d.
一溴聯苯醚 / Monobromodiphenyl ether			5	n.d.
二溴聯苯醚 / Dibromodiphenyl ether			5	n.d.
三溴聯苯醚 / Tribromodiphenyl ether			5	n.d.
四溴聯苯醚 / Tetrabromodiphenyl ether			5	n.d.
五溴聯苯醚 / Pentabromodiphenyl ether			5	n.d.
六溴聯苯醚 / Hexabromodiphenyl ether			5	n.d.
七溴聯苯醚 / Heptabromodiphenyl ether			5	n.d.
八溴聯苯醚 / Octabromodiphenyl ether			5	n.d.
九溴聯苯醚 / Nonabromodiphenyl ether			5	n.d.
十溴聯苯醚 / Decabromodiphenyl ether			5	n.d.
銻 / Antimony (Sb)	mg/kg	參考US EPA 3052方法，用感應藕合電漿原子發射光譜儀檢測銻含量. / With reference to US EPA Method 3052 for Antimony Content. Analysis was performed by ICP-AES.	2	n.d.
六溴環十二烷 / Hexabromocyclododecane (HBCDD) (CAS No.: 25637-99-4)	mg/kg	參考US EPA 3540C: 1996方法，以氣相層析質譜儀檢測. / With reference to US EPA 3540C: 1996 method. Analysis was performed by GC/MS.	5	n.d.
全氟辛烷磺酸 / Perfluorooctane sulfonates (PFOS - Acid, Metal Salt, Amide)	mg/kg	參考US EPA 3550C: 2007方法，以液相層析/質譜儀檢測. / With reference to US EPA 3550C: 2007. Analysis was performed by LC/MS.	10	n.d.
全氟辛酸(銨) / PFOA (CAS No.: 335-67-1)	mg/kg	參考US EPA 3550C: 2007方法，以液相層析/質譜儀檢測. / With reference to US EPA 3550C: 2007. Analysis was performed by LC/MS.	10	n.d.

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測試項目 (Test Items)	單位 (Unit)	測試方法 (Method)	方法偵測極限值 (MDL)	結果 (Result) NO.1
可塑劑定量分析 / Phthalates				
鄰苯二甲酸甲苯基丁酯 / BBP (Benzyl butyl phthalate) (CAS No.: 85-68-7)	%	本測試參考EN 14372, 以氣相層析儀/質譜儀檢測之. / With reference to EN 14372. Analysis was performed by GC/MS.	0.003	n.d.
鄰苯二甲酸二丁酯 / DBP (Dibutyl phthalate) (CAS No.: 84-74-2)	%	本測試參考EN 14372, 以氣相層析儀/質譜儀檢測之. / With reference to EN 14372. Analysis was performed by GC/MS.	0.003	n.d.
鄰苯二甲酸二 (2-乙基己基)酯 / DEHP (Di- (2-ethylhexyl) phthalate) (CAS No.: 117-81-7)	%	本測試參考EN 14372, 以氣相層析儀/質譜儀檢測之. / With reference to EN 14372. Analysis was performed by GC/MS.	0.003	n.d.
鄰苯二甲酸二異癸酯 / DIDP (Di-isodecyl phthalate) (CAS No.: 26761-40-0)	%	本測試參考EN 14372, 以氣相層析儀/質譜儀檢測之. / With reference to EN 14372. Analysis was performed by GC/MS.	0.01	n.d.
鄰苯二甲酸二異壬酯 / DINP (Di-isononyl phthalate) (CAS No.: 28553-12-0)	%	本測試參考EN 14372, 以氣相層析儀/質譜儀檢測之. / With reference to EN 14372. Analysis was performed by GC/MS.	0.01	n.d.
鄰苯二甲酸二正辛酯 / DNOP (Di-n-octyl phthalate) (CAS No.: 117-84-0)	%	本測試參考EN 14372, 以氣相層析儀/質譜儀檢測之. / With reference to EN 14372. Analysis was performed by GC/MS.	0.003	n.d.

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測試項目 (Test Items)	單位 (Unit)	測試方法 (Method)	方法偵測極限值 (MDL)	結果 (Result) NO.1
鹵素 / Halogen				
鹵素 (氟) / Halogen-Fluorine (F) (CAS No.: 14762-94-8)	mg/kg	參考BS EN 14582:2007, 以離子層析儀分析. / With reference to BS EN 14582:2007. Analysis was performed by IC.	50	n.d.
鹵素 (氯) / Halogen-Chlorine (Cl) (CAS No.: 22537-15-1)	mg/kg	參考BS EN 14582:2007, 以離子層析儀分析. / With reference to BS EN 14582:2007. Analysis was performed by IC.	50	n.d.
鹵素 (溴) / Halogen-Bromine (Br) (CAS No.: 10097-32-2)	mg/kg	參考BS EN 14582:2007, 以離子層析儀分析. / With reference to BS EN 14582:2007. Analysis was performed by IC.	50	n.d.
鹵素 (碘) / Halogen-Iodine (I) (CAS No.: 14362-44-8)	mg/kg	參考BS EN 14582:2007, 以離子層析儀分析. / With reference to BS EN 14582:2007. Analysis was performed by IC.	50	n.d.

備註(Note):

1. mg/kg = ppm ; 0.1wt% = 1000ppm
2. n.d. = Not Detected (未檢出)
3. MDL = Method Detection Limit (方法偵測極限值)
4. "-" = Not Regulated (無規格值)
5. # = a. Positive means the presence of CrVI on the tested areas
   (Positive表示測試區域偵測到六價鉻)
   b. Negative means the absence of CrVI on the tested areas
   (Negative表示測試區域未偵測到六價鉻)
   The detected concentration in boiling-water-extraction solution is equal or greater than 0.02 mg/kg with 50 cm^2 tested areas . / 該溶液濃度≧0.02 mg/kg with 50 cm^2 (tested areas)

PFOS參考資訊(Reference Information) : 持久性有機污染物 POPs - (EU) 757/2010
PFOS濃度在物質或製備中不得超過0.001%(10ppm), 在半成品、成品或零部件中不得超過0.1%(1000ppm), 在紡織品或塗層材料中不得超過1μg/m^2。(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/m^2.)

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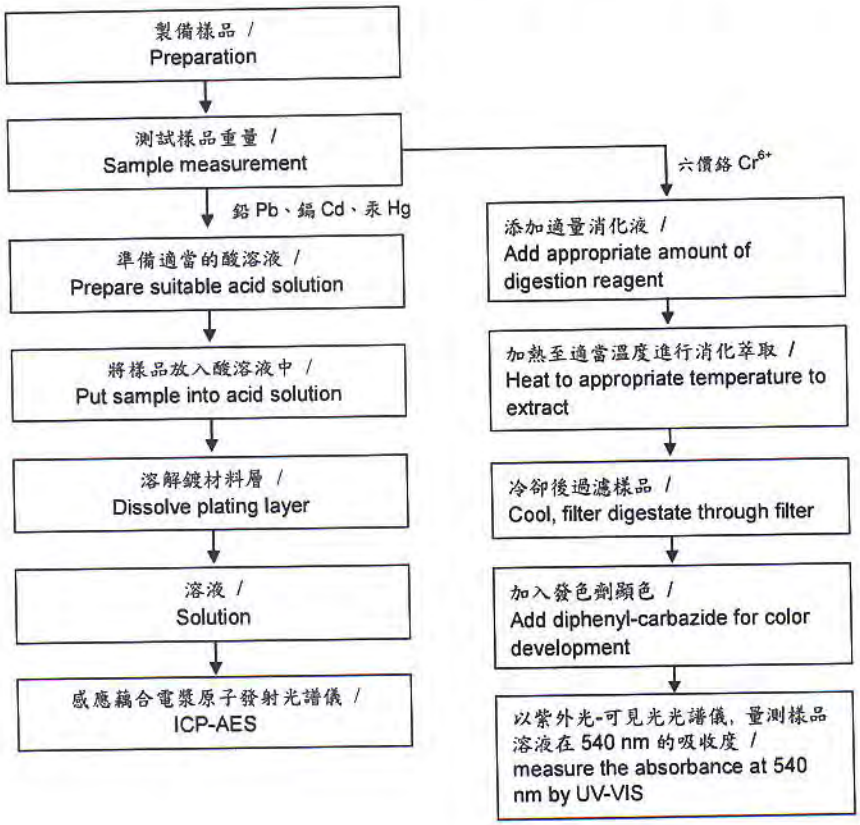
鍍層重金屬測試流程圖 /
Flow Chart of Stripping method for metal analysis

1) 根據以下的流程圖之條件，樣品之外部鍍層已完全溶解已完全溶解。(六價鉻測試方法除外) / The plating layer of samples were dissolved totally by pre-conditioning metho according to below flow chart. (Cr6+ test method excluded)
2) 測試人員：張俊雄 / Name of the person who made measurement: Alex Chang
3) 測試負責人：張伯睿 / Name of the person in charge of measurement: Ray Chang



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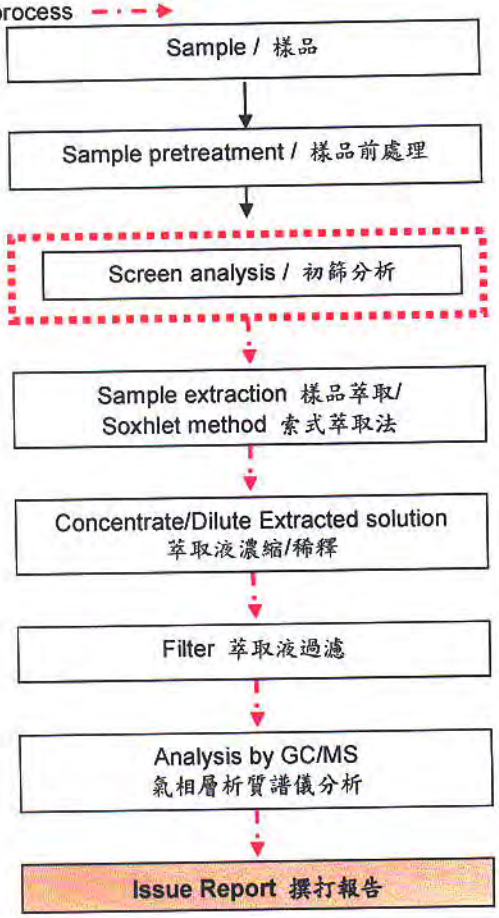
多溴聯苯/多溴聯苯醚 分析流程圖 / PBB/PBDE analytical FLOW CHART

1)測試人員：曹嘉琪 / Name of the person who made measurement: Anson Tsao
2)測試負責人：張伯睿 / Name of the person in charge of measurement: Ray Chang

初次測試程序 / First testing process ——→
選擇性篩檢程序 / Optional screen process ·····
確認程序 / Confirmation process – · – →



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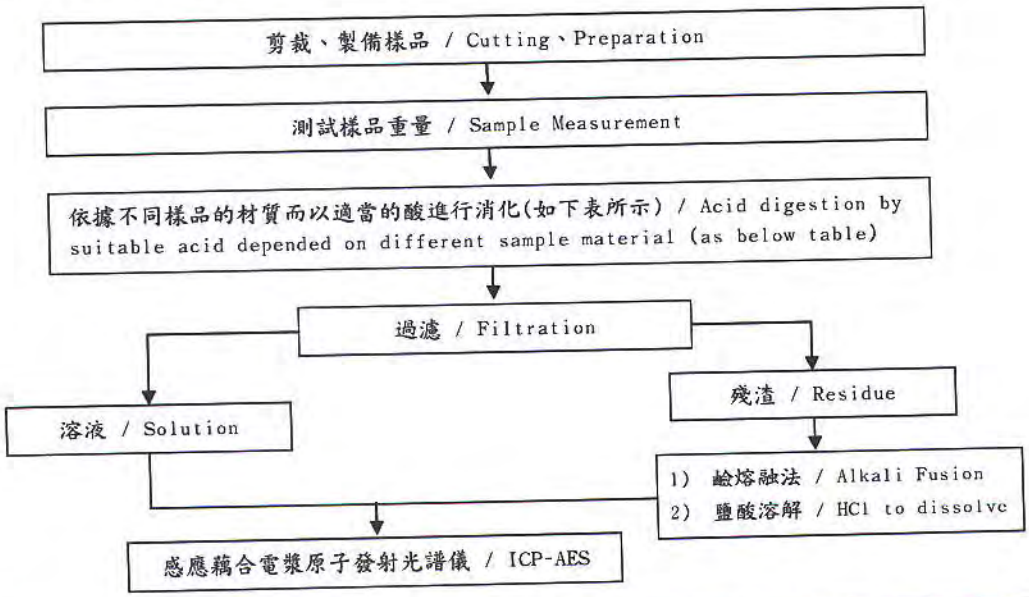
1) 根據以下的流程圖之條件，樣品已完全溶解。 / These samples were dissolved totally by pre-conditioning method according to below flow chart.
2) 測試人員：張俊雄 / Name of the person who made measurement: Alex Chang
3) 測試負責人：張伯睿 / Name of the person in charge of measurement: Ray Chang

元素以 ICP-AES 分析的消化流程圖

(Flow Chart of digestion for the elements analysis performed by ICP-AES)



鋼,銅,鋁,焊錫 / Steel, copper, aluminum, solder	王水,硝酸,鹽酸,氫氟酸,雙氧水 / Aqua regia, HNO_3, HCl, HF, H_2O_2
玻璃 / Glass	硝酸,氫氟酸 / HNO_3/HF
金,鉑,鈀,陶瓷 / Gold, platinum, palladium, ceramic	王水 / Aqua regia
銀 / Silver	硝酸 / HNO_3
塑膠 / Plastic	硫酸,雙氧水,硝酸,鹽酸 / H_2SO_4, H_2O_2, HNO_3, HCl
其他 / Others	加入任何酸至完全溶解 / Any acid to total digestion

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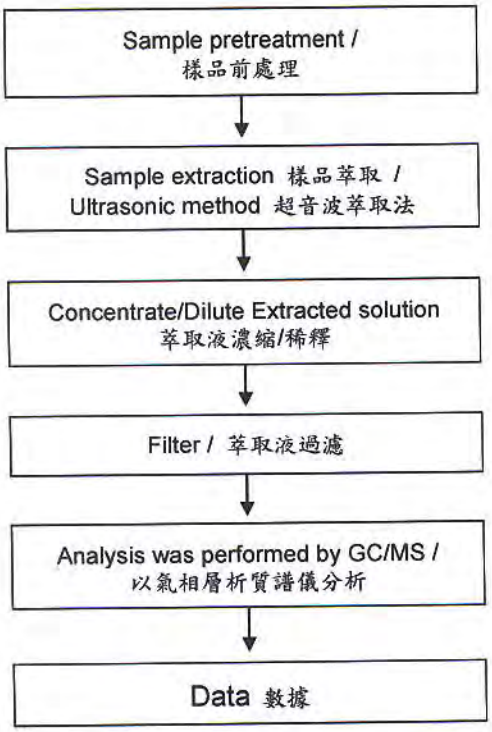
六溴環十二烷分析流程圖 / HBCDD Analytical FLOW CHART

1) 測試人員：曹嘉琪/ Name of the person who made measurement: Anson Tsao
2) 測試負責人：張伯睿/ Name of the person in charge of measurement: Ray Chang



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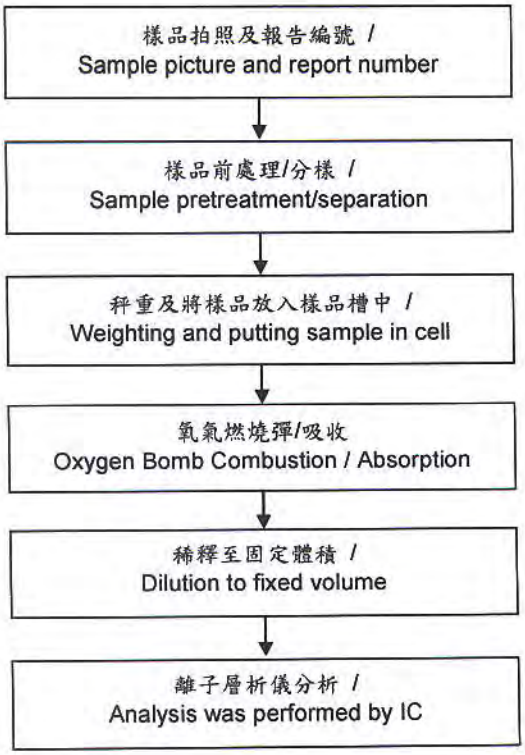
測試報告
Test Report

ASM HK

4/F, WATSON CENTRE, 16 KUNG YIP ST., KWAI CHUNG. HONG KONG(ASM HK)

鹵素分析流程圖 / Analytical flow chart of halogen content

1) 測試人員：洪秀眞/ Name of the person who made measurement: Jean Hung
2) 測試負責人：張伯睿/ Name of the person in charge of measurement: Ray Chang



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4/F, WATSON CENTRE, 16 KUNG YIP ST., KWAI CHUNG. HONG KONG(ASM HK)

可塑劑分析流程圖 / Analytical flow chart of phthalate content

1)測試人員：曹嘉琪 / Name of the person who made measurement: Anson Tsao

2)測試負責人：張伯睿 / Name of the person in charge of measurement: Ray Chang

樣品前處理/分樣 /
Sample pretreatment/separation

↓

樣品萃取採用索式萃取法
/Sample extraction by soxhlet method

↓

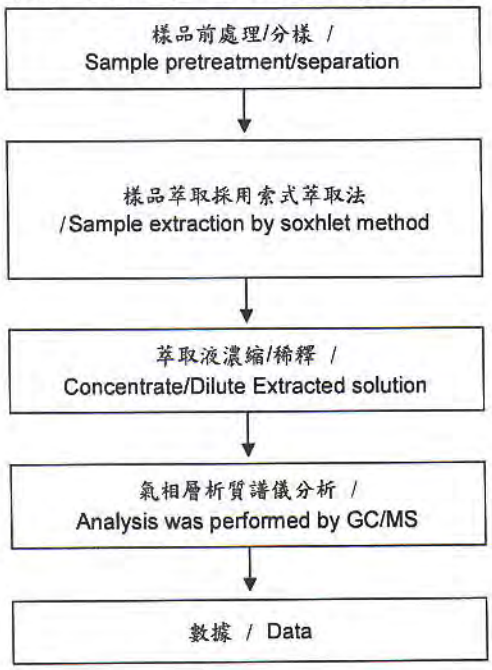
萃取液濃縮/稀釋 /
Concentrate/Dilute Extracted solution

↓

氣相層析質譜儀分析 /
Analysis was performed by GC/MS

↓

數據 / Data



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測試報告
Test Report

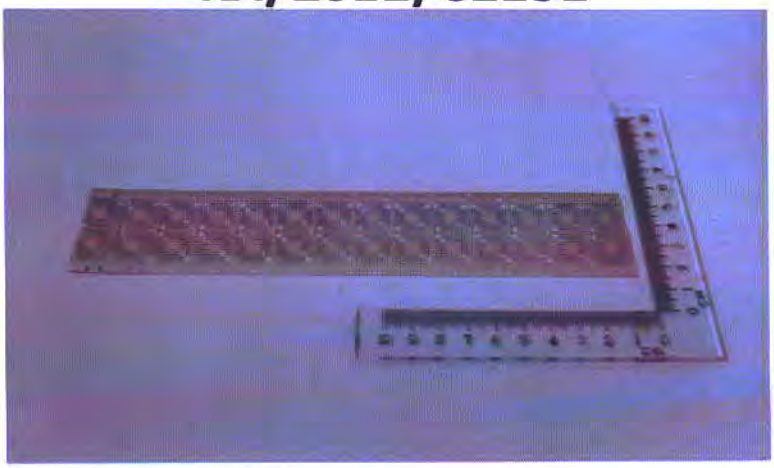
號碼(No.) : KA/2012/C2131 日期(Date) : 2013/01/04 頁數(Page) : 12 of 12

ASM HK

4/F, WATSON CENTRE, 16 KUNG YIP ST., KWAI CHUNG. HONG KONG(ASM HK)

* 照片中如有箭頭標示，則表示爲實際檢測之樣品/部位. *
(The tested sample / part is marked by an arrow if it's shown on the photo.)

KA/2012/C2131



** 報告結尾(End of Report) **

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Signature valid
For Question
Please Contact with SGS
www.tw.sgs.com

測試報告
Test Report

號碼(No.) : KA/2012/C2132 日期(Date) : 2013/01/04 頁數(Page) : 1 of 12

ASM HK

4/F, WATSON CENTRE, 16 KUNG YIP ST., KWAI CHUNG. HONG KONG (ASM HK)

以下測試樣品係由客户送樣，且由客户聲稱並經客户確認如下 (The following samples was/were submitted and identified by/on behalf of the client as)：

樣品名稱(Sample Description)	:	Au PLATING MATERIAL
收件日期(Sample Receiving Date)	:	2012/12/25
測試期間(Testing Period)	:	2012/12/25 TO 2013/01/04
送樣廠商(Sample Submitted By)	:	ASM HK

==========

測試結果(Test Results) : 請見下一頁 (Please refer to next pages).

Ray Chang

Ray Chang / Asst. Manager
Signed for and on behalf of
SGS Taiwan Limited

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測試報告
Test Report

ASM HK

4/F, WATSON CENTRE, 16 KUNG YIP ST., KWAI CHUNG. HONG KONG (ASM HK)

測試結果(Test Results)

測試部位(PART NAME) NO.1 : 紅銅色 Au PLATING MATERIAL (RED COPPERY Au PLATING MATERIAL)

測試項目 (Test Items)	單位 (Unit)	測試方法 (Method)	方法偵測極限值 (MDL)	結果 (Result) NO.1
鎘 / Cadmium (Cd)	mg/kg	酸洗脫鍍層，參考IEC 62321: 2008方法，以感應耦合電漿原子發射光譜儀檢測. / IEC 62321: 2008 application of modified digestion by surface etching and performed by ICP-AES.	2	n.d.
鉛 / Lead (Pb)	mg/kg	酸洗脫鍍層，參考IEC 62321: 2008方法，以感應耦合電漿原子發射光譜儀檢測. / IEC 62321: 2008 application of modified digestion by surface etching and performed by ICP-AES.	2	n.d.
汞 / Mercury (Hg)	mg/kg	酸洗脫鍍層，參考IEC 62321: 2008方法，以感應耦合電漿原子發射光譜儀檢測. / IEC 62321: 2008 application of modified digestion by surface etching and performed by ICP-AES.	2	n.d.
六價鉻 / Hexavalent Chromium Cr(VI) by boiling water extraction#	**	參考IEC 62321: 2008方法，用Boiling water extraction方法檢測. / With reference to IEC 62321: 2008 and performed by boiling water extraction Method.	0.02mg/kg with 50 cm^2 surface area	Negative
多溴聯苯總和 / Sum of PBBs	mg/kg	參考IEC 62321: 2008方法，以氣相層析儀/質譜儀檢測. / With reference to IEC 62321: 2008 and performed by GC/MS.	-	n.d.
一溴聯苯 / Monobromobiphenyl			5	n.d.
二溴聯苯 / Dibromobiphenyl			5	n.d.
三溴聯苯 / Tribromobiphenyl			5	n.d.
四溴聯苯 / Tetrabromobiphenyl			5	n.d.
五溴聯苯 / Pentabromobiphenyl			5	n.d.
六溴聯苯 / Hexabromobiphenyl			5	n.d.
七溴聯苯 / Heptabromobiphenyl			5	n.d.
八溴聯苯 / Octabromobiphenyl			5	n.d.
九溴聯苯 / Nonabromobiphenyl			5	n.d.
十溴聯苯 / Decabromobiphenyl			5	n.d.

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測試報告
Test Report

ASM HK

4/F, WATSON CENTRE, 16 KUNG YIP ST., KWAI CHUNG. HONG KONG (ASM HK)

測試項目 (Test Items)	單位 (Unit)	測試方法 (Method)	方法偵測極限值 (MDL)	結果 (Result) NO.1
多溴聯苯醚總和 / Sum of PBDEs	mg/kg	參考IEC 62321: 2008方法，以氣相層析儀/質譜儀檢測. / With reference to IEC 62321: 2008 and performed by GC/MS.	-	n.d.
一溴聯苯醚 / Monobromodiphenyl ether			5	n.d.
二溴聯苯醚 / Dibromodiphenyl ether			5	n.d.
三溴聯苯醚 / Tribromodiphenyl ether			5	n.d.
四溴聯苯醚 / Tetrabromodiphenyl ether			5	n.d.
五溴聯苯醚 / Pentabromodiphenyl ether			5	n.d.
六溴聯苯醚 / Hexabromodiphenyl ether			5	n.d.
七溴聯苯醚 / Heptabromodiphenyl ether			5	n.d.
八溴聯苯醚 / Octabromodiphenyl ether			5	n.d.
九溴聯苯醚 / Nonabromodiphenyl ether			5	n.d.
十溴聯苯醚 / Decabromodiphenyl ether			5	n.d.
銻 / Antimony (Sb)	mg/kg	參考US EPA 3052方法，用感應藕合電漿原子發射光譜儀檢測銻含量. / With reference to US EPA Method 3052 for Antimony Content. Analysis was performed by ICP-AES.	2	n.d.
六溴環十二烷 / Hexabromocyclododecane (HBCDD) (CAS No.: 25637-99-4)	mg/kg	參考US EPA 3540C: 1996方法，以氣相層析質譜儀檢測. / With reference to US EPA 3540C: 1996 method. Analysis was performed by GC/MS.	5	n.d.
全氟辛烷磺酸 / Perfluorooctane sulfonates (PFOS - Acid, Metal Salt, Amide)	mg/kg	參考US EPA 3550C: 2007方法，以液相層析/質譜儀檢測. / With reference to US EPA 3550C: 2007. Analysis was performed by LC/MS.	10	n.d.
全氟辛酸(銨) / PFOA (CAS No.: 335-67-1)	mg/kg	參考US EPA 3550C: 2007方法，以液相層析/質譜儀檢測. / With reference to US EPA 3550C: 2007. Analysis was performed by LC/MS.	10	n.d.

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www.tw.sgs.com
Member of the SGS Group

測試報告
Test Report

ASM HK

4/F, WATSON CENTRE, 16 KUNG YIP ST., KWAI CHUNG. HONG KONG (ASM HK)

測試項目 (Test Items)	單位 (Unit)	測試方法 (Method)	方法偵測極限值 (MDL)	結果 (Result) NO.1
可塑劑定量分析 / Phthalates				
鄰苯二甲酸甲苯基丁酯 / BBP (Benzyl butyl phthalate) (CAS No.: 85-68-7)	%	本測試參考EN 14372, 以氣相層析儀/質譜儀檢測之. / With reference to EN 14372. Analysis was performed by GC/MS.	0.003	n.d.
鄰苯二甲酸二丁酯 / DBP (Dibutyl phthalate) (CAS No.: 84-74-2)	%	本測試參考EN 14372, 以氣相層析儀/質譜儀檢測之. / With reference to EN 14372. Analysis was performed by GC/MS.	0.003	n.d.
鄰苯二甲酸二 (2-乙基己基)酯 / DEHP (Di- (2-ethylhexyl) phthalate) (CAS No.: 117-81-7)	%	本測試參考EN 14372, 以氣相層析儀/質譜儀檢測之. / With reference to EN 14372. Analysis was performed by GC/MS.	0.003	n.d.
鄰苯二甲酸二異癸酯 / DIDP (Di-isodecyl phthalate) (CAS No.: 26761-40-0)	%	本測試參考EN 14372, 以氣相層析儀/質譜儀檢測之. / With reference to EN 14372. Analysis was performed by GC/MS.	0.01	n.d.
鄰苯二甲酸二異壬酯 / DINP (Di-isononyl phthalate) (CAS No.: 28553-12-0)	%	本測試參考EN 14372, 以氣相層析儀/質譜儀檢測之. / With reference to EN 14372. Analysis was performed by GC/MS.	0.01	n.d.
鄰苯二甲酸二正辛酯 / DNOP (Di-n-octyl phthalate) (CAS No.: 117-84-0)	%	本測試參考EN 14372, 以氣相層析儀/質譜儀檢測之. / With reference to EN 14372. Analysis was performed by GC/MS.	0.003	n.d.

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測試報告
Test Report

ASM HK

4/F, WATSON CENTRE, 16 KUNG YIP ST., KWAI CHUNG. HONG KONG (ASM HK)

測試項目 (Test Items)	單位 (Unit)	測試方法 (Method)	方法偵測極限值 (MDL)	結果 (Result) NO.1
鹵素 / Halogen				
鹵素 (氟) / Halogen-Fluorine (F) (CAS No.: 14762-94-8)	mg/kg	參考BS EN 14582:2007, 以離子層析儀分析. / With reference to BS EN 14582:2007. Analysis was performed by IC.	50	n.d.
鹵素 (氯) / Halogen-Chlorine (Cl) (CAS No.: 22537-15-1)	mg/kg	參考BS EN 14582:2007, 以離子層析儀分析. / With reference to BS EN 14582:2007. Analysis was performed by IC.	50	n.d.
鹵素 (溴) / Halogen-Bromine (Br) (CAS No.: 10097-32-2)	mg/kg	參考BS EN 14582:2007, 以離子層析儀分析. / With reference to BS EN 14582:2007. Analysis was performed by IC.	50	n.d.
鹵素 (碘) / Halogen-Iodine (I) (CAS No.: 14362-44-8)	mg/kg	參考BS EN 14582:2007, 以離子層析儀分析. / With reference to BS EN 14582:2007. Analysis was performed by IC.	50	n.d.

備註(Note):

1. mg/kg = ppm ; 0.1wt% = 1000ppm
2. n.d. = Not Detected (未檢出)
3. MDL = Method Detection Limit (方法偵測極限值)
4. "-" = Not Regulated (無規格值)
5. # = a. Positive means the presence of CrVI on the tested areas
   (Positive表示測試區域偵測到六價鉻)
   b. Negative means the absence of CrVI on the tested areas
   (Negative表示測試區域未偵測到六價鉻)

The detected concentration in boiling-water-extraction solution is equal or greater than 0.02 mg/kg with 50 cm^2 tested areas . / 該溶液濃度≧0.02 mg/kg with 50 cm^2 (tested areas)

PFOS參考資訊(Reference Information) : 持久性有機污染物 POPs - (EU) 757/2010

PFOS濃度在物質或製備中不得超過0.001%(10ppm)，在半成品、成品或零部件中不得超過0.1%(1000ppm)，在紡織品或塗層材料中不得超過1μg/m^2。(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/m^2.)

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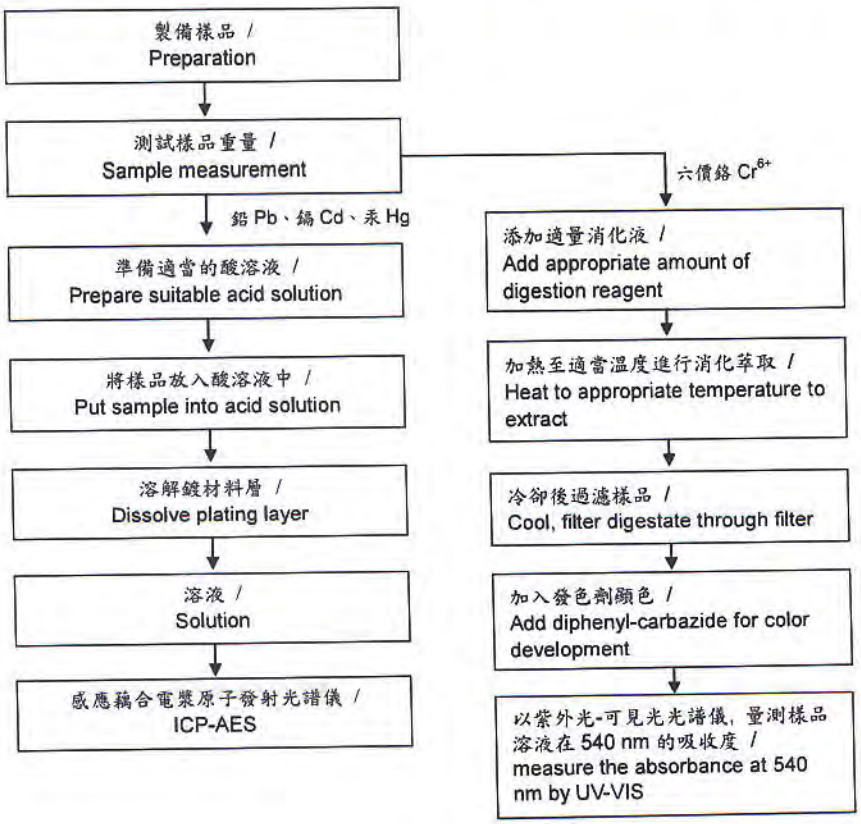
測試報告
Test Report

ASM HK

4/F, WATSON CENTRE, 16 KUNG YIP ST., KWAI CHUNG. HONG KONG (ASM HK)

鍍層重金屬測試流程圖 /
Flow Chart of Stripping method for metal analysis

1) 根據以下的流程圖之條件，樣品之外部鍍層已完全溶解已完全溶解。(六價鉻測試方法除外) / The plating layer of samples were dissolved totally by pre-conditioning metho according to below flow chart. (Cr6+ test method excluded)
2) 測試人員：張俊雄 / Name of the person who made measurement: Alex Chang
3) 測試負責人：張伯睿 / Name of the person in charge of measurement: Ray Chang



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測試報告
Test Report

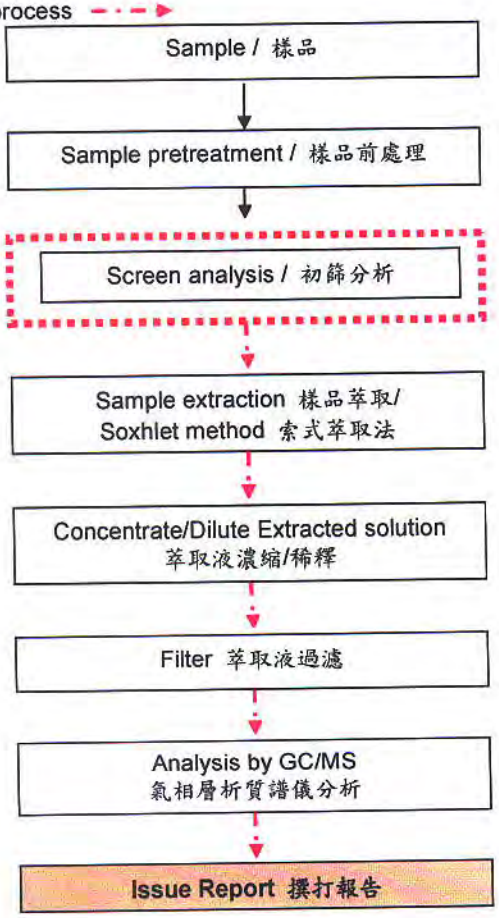
ASM HK

4/F, WATSON CENTRE, 16 KUNG YIP ST., KWAI CHUNG. HONG KONG (ASM HK)

多溴聯苯/多溴聯苯醚 分析流程圖 / PBB/PBDE analytical FLOW CHART

1)測試人員：曹嘉琪 / Name of the person who made measurement: Anson Tsao
2)測試負責人：張伯睿 / Name of the person in charge of measurement: Ray Chang

初次測試程序 / First testing process ——→
選擇性篩檢程序 / Optional screen process ·····
確認程序 / Confirmation process - · - ▶



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測試報告
Test Report

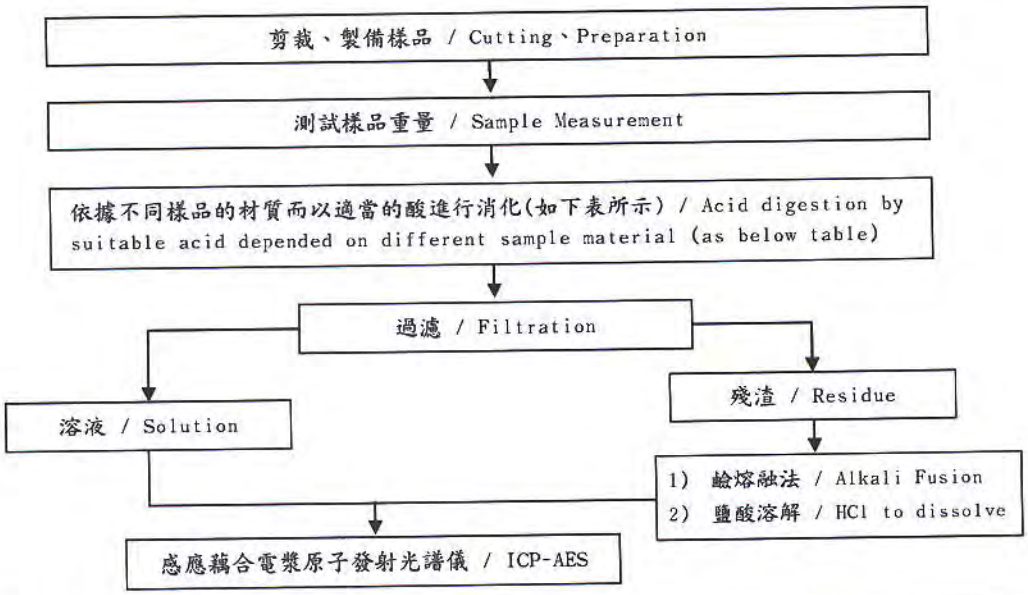
ASM HK

4/F, WATSON CENTRE, 16 KUNG YIP ST., KWAI CHUNG. HONG KONG (ASM HK)

1) 根據以下的流程圖之條件，樣品已完全溶解。 / These samples were dissolved totally by pre-conditioning method according to below flow chart.
2) 測試人員：張俊雄 / Name of the person who made measurement: Alex Chang
3) 測試負責人：張伯睿 / Name of the person in charge of measurement: Ray Chang

元素以 ICP-AES 分析的消化流程圖

(Flow Chart of digestion for the elements analysis performed by ICP-AES)



鋼,銅,鋁,焊錫 / Steel, copper, aluminum, solder	王水,硝酸,鹽酸,氫氟酸,雙氧水 / Aqua regia, HNO_3, HCl, HF, H_2O_2
玻璃 / Glass	硝酸,氫氟酸 / HNO_3/HF
金,鉑,鈀,陶瓷 / Gold, platinum, palladium, ceramic	王水 / Aqua regia
銀 / Silver	硝酸 / HNO_3
塑膠 / Plastic	硫酸,雙氧水,硝酸,鹽酸 / H_2SO_4, H_2O_2, HNO_3, HCl
其他 / Others	加入任何酸至完全溶解 / Any acid to total digestion

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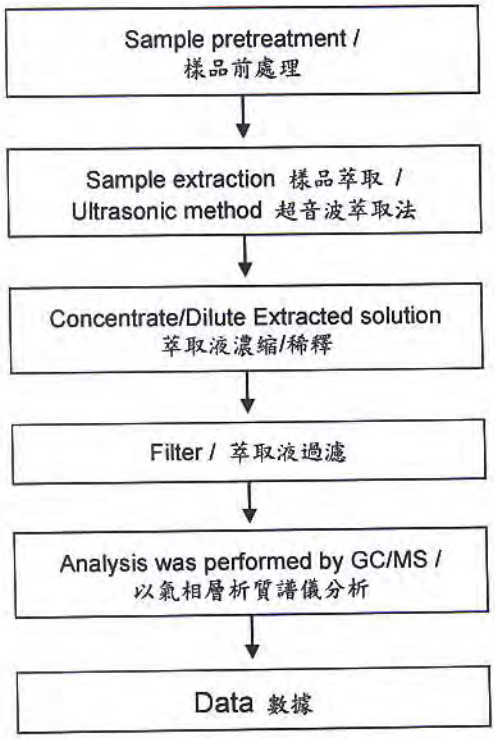
ASM HK

4/F, WATSON CENTRE, 16 KUNG YIP ST., KWAI CHUNG. HONG KONG (ASM HK)

六溴環十二烷分析流程圖 / HBCDD Analytical FLOW CHART

1) 測試人員：曹嘉琪/ Name of the person who made measurement: Anson Tsao
2) 測試負責人：張伯睿/ Name of the person in charge of measurement: Ray Chang



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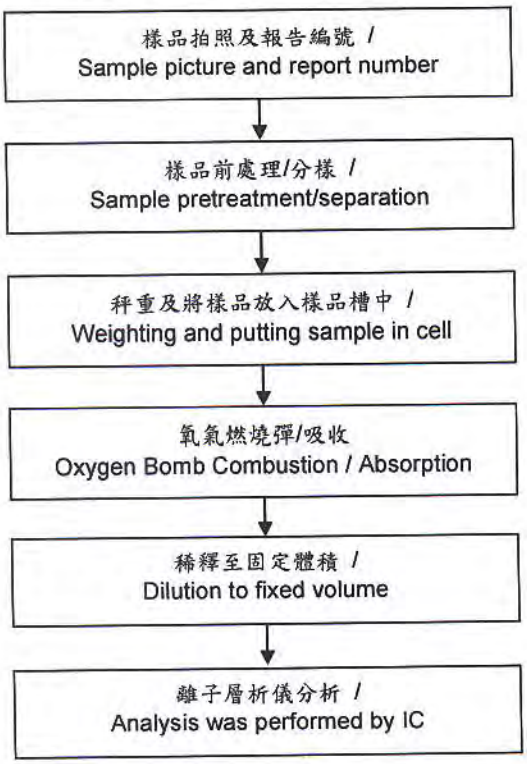
測試報告
Test Report

ASM HK

4/F, WATSON CENTRE, 16 KUNG YIP ST., KWAI CHUNG. HONG KONG (ASM HK)

鹵素分析流程圖 / Analytical flow chart of halogen content

1) 測試人員：洪秀眞/ Name of the person who made measurement: Jean Hung
2) 測試負責人：張伯睿/ Name of the person in charge of measurement: Ray Chang



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測試報告
Test Report

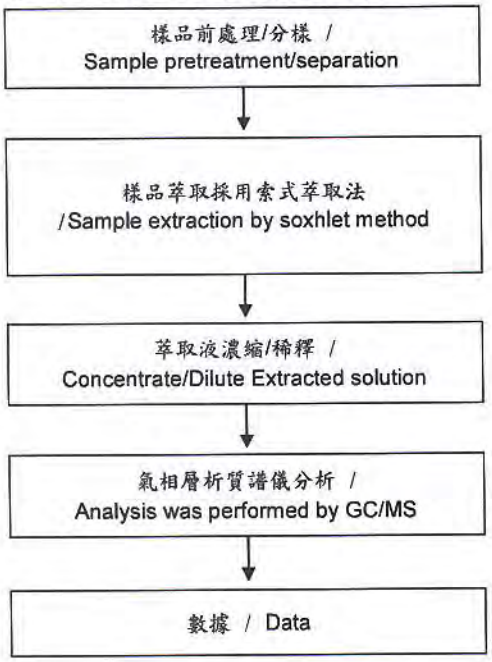
ASM HK

4/F, WATSON CENTRE, 16 KUNG YIP ST., KWAI CHUNG. HONG KONG (ASM HK)

可塑劑分析流程圖 / Analytical flow chart of phthalate content

1)測試人員：曹嘉琪 / Name of the person who made measurement: Anson Tsao

2)測試負責人：張伯睿 / Name of the person in charge of measurement: Ray Chang



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測試報告
Test Report

ASM HK

4/F, WATSON CENTRE, 16 KUNG YIP ST., KWAI CHUNG. HONG KONG (ASM HK)

* 照片中如有箭頭標示，則表示爲實際檢測之樣品/部位. *
(The tested sample / part is marked by an arrow if it's shown on the photo.)

KA/2012/C2132

** 報告結尾(End of Report) **

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Test Report

No. : CE/2012/C1068F Date : 2013/01/18

EPISIL TECHNOLOGIES INC.
NO. 3, INNOVATION RD 1, SCIENCE BASED INDUSTRIAL PARK, HSIN-CHU, TAIWAN, R. O. C.

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

Sample Description	:	IC WAFER
Style/Item No.	:	AI PROCESS
Sample Receiving Date	:	2012/12/07
Testing Period	:	2012/12/07 TO 2012/12/18

==========

Test Requested : (1) As specified by client, with reference to RoHS Directive 2011/65/EU Annex II to determine Cadmium, Lead, Mercury, Cr(VI), PBBs, PBDEs contents in the submitted sample.

(2) As specified by client, to test Halogen-Fluorine, Chlorine, Bromine, Iodine contents in the submitted sample.

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

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

SGS TAIWAN LTD

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

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Test Report

No. : CE/2012/C1068F Date : 2013/01/18

EPISIL TECHNOLOGIES INC.
NO. 3, INNOVATION RD 1, SCIENCE BASED INDUSTRIAL PARK, HSIN-CHU, TAIWAN, R. O. C.

Test Result(s)

PART NAME No.1 : MULTICOLOR WAFER

Test Item(s)	Unit	Method	MDL	Result
				No.1
Cadmium (Cd)	mg/kg	With reference to IEC 62321: 2008 and performed by ICP-AES.	2	n.d.
Lead (Pb)	mg/kg	With reference to IEC 62321: 2008 and performed by ICP-AES.	2	n.d.
Mercury (Hg)	mg/kg	With reference to IEC 62321: 2008 and performed by ICP-AES.	2	n.d.
Hexavalent Chromium Cr(VI)	mg/kg	With reference to IEC 62321: 2008 and performed by UV-VIS.	2	n.d.
Sum of PBBs	mg/kg	With reference to IEC 62321: 2008 and performed 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.

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EPISIL TECHNOLOGIES INC.
NO. 3, INNOVATION RD 1, SCIENCE BASED INDUSTRIAL PARK, HSIN-CHU, TAIWAN, R. O. C.

Test Item(s)	Unit	Method	MDL	Result
				No.1
Halogen				
Halogen-Fluorine (F) (CAS No.: 14762-94-8)	mg/kg	With reference to BS EN 14582:2007. Analysis was performed by IC.	50	n.d.
Halogen-Chlorine (Cl) (CAS No.: 22537-15-1)			50	n.d.
Halogen-Bromine (Br) (CAS No.: 10097-32-2)			50	n.d.
Halogen-Iodine (I) (CAS No.: 14362-44-8)			50	n.d.

Note :

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

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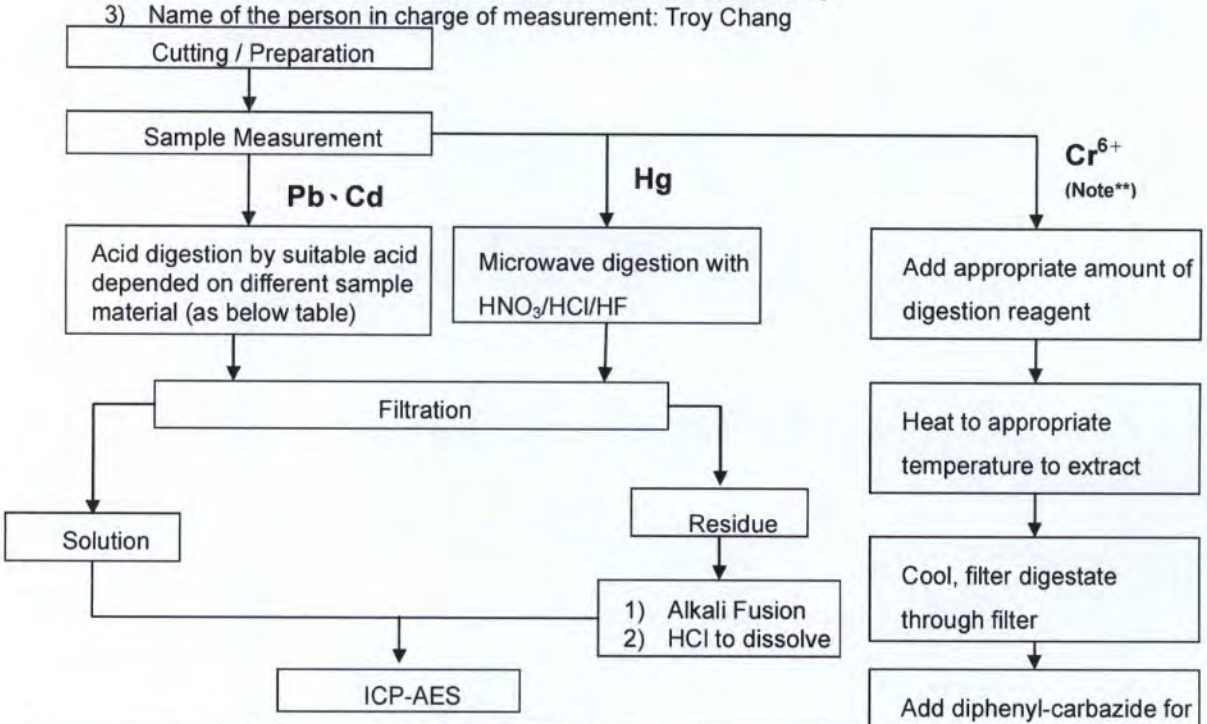
EPISIL TECHNOLOGIES INC.
NO. 3, INNOVATION RD 1, SCIENCE BASED INDUSTRIAL PARK, HSIN-CHU, TAIWAN, R. O. C.

1) These samples were dissolved totally by pre-conditioning method according to below flow chart. (Cr^{6+} 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_2O_2
Glass	HNO_3/HF
Gold, platinum, palladium, ceramic	Aqua regia
Silver	HNO_3
Plastic	H_2SO_4, H_2O_2, HNO_3, HCl
Others	Added appropriate reagent to total digestion

Note :** (1) For non-metallic material, add alkaline digestion reagent and heat to 90~95℃.
(2) For metallic material, add pure water and heat to boiling.

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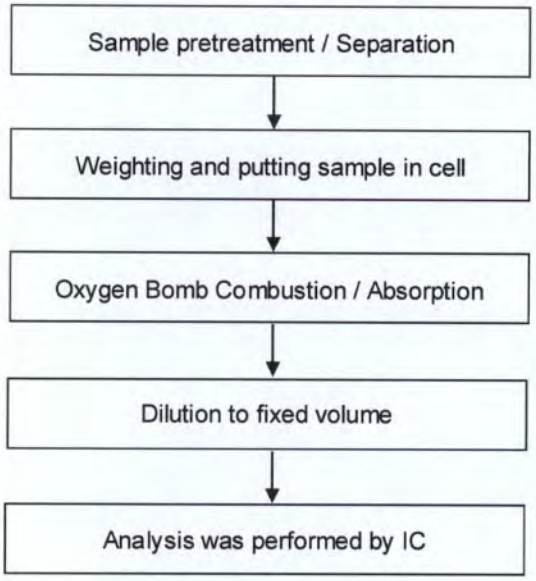
EPISIL TECHNOLOGIES INC.
NO. 3, INNOVATION RD 1, SCIENCE BASED INDUSTRIAL PARK, HSIN-CHU, TAIWAN, R. O. C.

Analytical flow chart of halogen content

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



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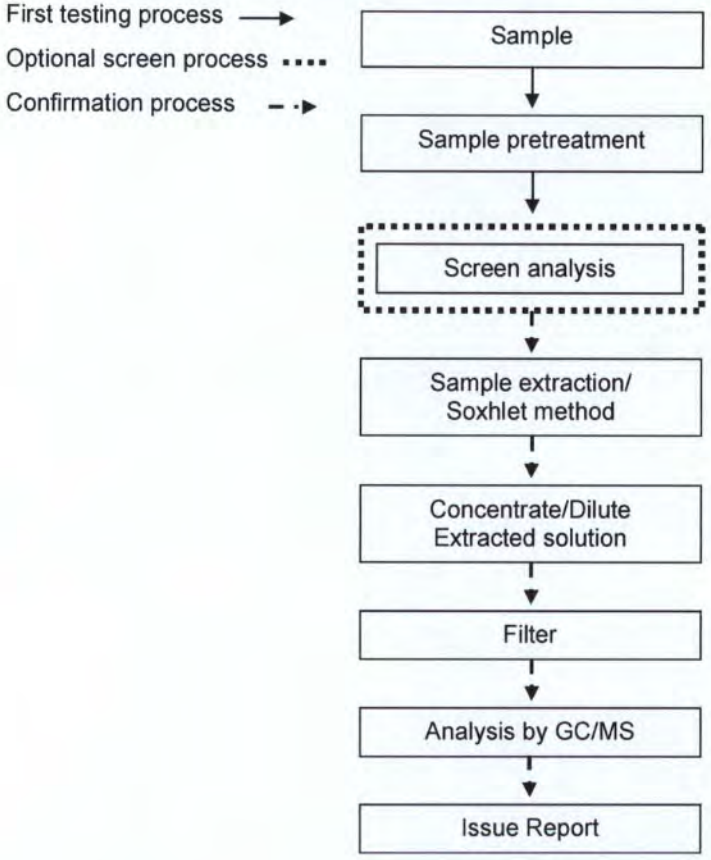
NO. 3, INNOVATION RD 1, SCIENCE BASED INDUSTRIAL PARK, HSIN-CHU, TAIWAN, R. O. C.

PBB/PBDE analytical FLOW CHART

- Name of the person who made measurement: Roman Wong
- Name of the person in charge of measurement: Troy Chang



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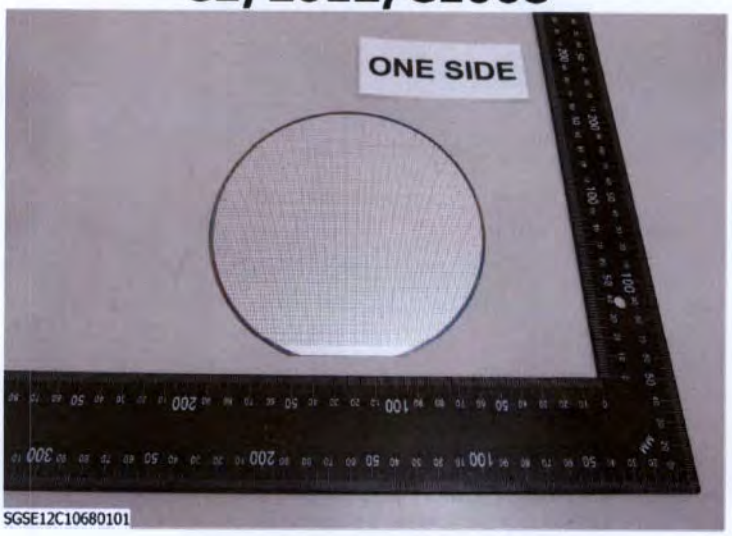
*** The tested sample / part is marked by an arrow if it's shown on the photo. ***

CE/2012/C1068



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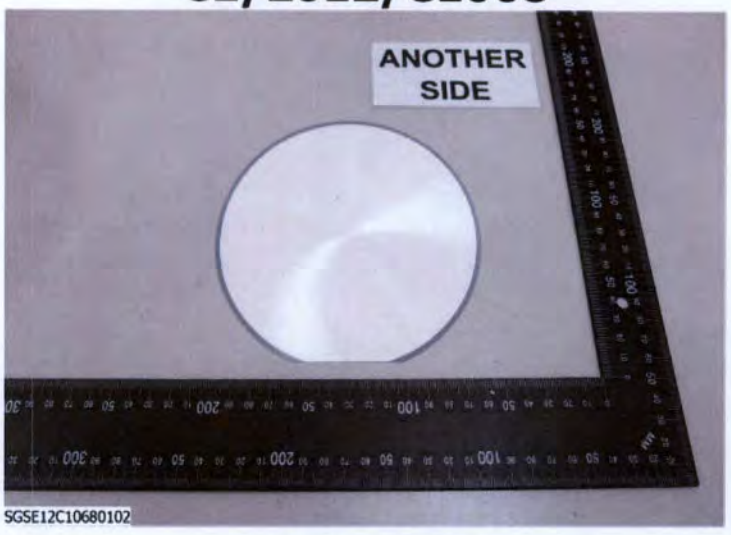
CE/2012/C1068



SGSE12C10680102

** End of Report **

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