



ICP Test Report Certification Packet

Company name: Littelfuse, Inc.

Product Series: Silicon Protection Array

Product #: SP3012-06UTG, SP3012-04UTG, SP0524PUTG,

Issue Date: January 7, 2014

It is hereby certified by Littelfuse, Inc. that there is neither RoHS (EU Directive_2002/95/EC & RoHS 2_Eu Directive_2011/65/EU) -restricted substance nor such use, for materials to be used for unit parts, for packing/packaging materials, and for additives and the like in the manufacturing processes.

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

Issued by: 
JORDANUFF H. CABILAN

[Global EHS Engineer]

(31) Parts, sub-materials and unit parts

This document covers the Silicon Protection Array RoHS-Compliant series products manufactured by Littelfuse, Inc.

< Raw Materials Used

Please see Table 1

(31) The ICP data on all measurable substances

Please see appropriate pages as identified 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	N/A	A194 Leadframe	3-21
2	N/A	Tin	22-30
3	8006NS	Adhesive	31-44
4	N/A	Au Bonding Wire	45-59
5	CEL-9220HF	Epoxy Molding Compound	60-76
6	N/A	IC Wafer	77-83

測試報告 Test Report

號碼(No.) : KA/2013/C1366R1 日期(Date) : 2013/12/30 頁數(Page) : 1 of 19

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)	: A194/C194 Cu ALLOY
收件日期(Sample Receiving Date)	: 2013/12/23
測試期間(Testing Period)	: 2013/12/23 TO 2013/12/27
送樣廠商(Sample Submitted By)	: ASM HK

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


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



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測試報告

Test Report

號碼(No.) : KA/2013/C1366R1 日期(Date) : 2013/12/30 頁數(Page) : 2 of 19

ASM HK

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測試結果(Test Results)

測試部位(PART NAME) NO.1 : 紅銅色 A194/C194 Cu ALLOY (RED COPPERY A194/C194 Cu 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 62321-5: 2013方法, 以感應耦合電漿原子發射光譜儀檢測. / With reference to IEC 62321-5: 2013 and performed by ICP-AES.	2	n.d.
鉛 / Lead (Pb)	mg/kg	參考IEC 62321-5: 2013方法, 以感應耦合電漿原子發射光譜儀檢測. / With reference to IEC 62321-5: 2013 and performed by ICP-AES.	2	n.d.
汞 / Mercury (Hg)	mg/kg	參考IEC 62321-4: 2013方法, 以感應耦合電漿原子發射光譜儀檢測. / With reference to IEC 62321-4: 2013 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

號碼(No.) : KA/2013/C1366R1 日期(Date) : 2013/12/30 頁數(Page) : 3 of 19

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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, 用感應耦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.
三氧化二銻 / Antimony trioxide (Sb2O3)*** (CAS No.: 1309-64-4)	mg/kg	參考US EPA 3052方法, 用感應耦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.	-	n.d.
鈹 / Beryllium (Be)	mg/kg	參考US EPA 3052方法, 用感應耦合電漿原子發射光譜儀檢測鈹含量. / With reference to US EPA Method 3052 for Beryllium Content. Analysis was performed by ICP-AES.	2	n.d.

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測試報告

Test Report

號碼(No.) : KA/2013/C1366R1 日期(Date) : 2013/12/30 頁數(Page) : 4 of 19

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
多氯聯苯 / Polychlorinated Biphenyls (PCBs)	mg/kg	參考US EPA 3540C方法, 以氣相層析質譜儀 (GC/MS) 檢測。 / With reference to US EPA 3540C method. Analysis was performed by GC/MS.	0.5	n.d.
多氯奈 / Polychlorinated Naphthalene (PCNs)	mg/kg	參考US EPA 3540C方法, 以氣相層析質譜儀 (GC/MS) 檢測。 / With reference to US EPA 3540C method. Analysis was performed by GC/MS.	5	n.d.
多氯三聯苯 / Polychlorinated Terphenyls (PCTs)	mg/kg	參考US EPA 3540C方法, 以氣相層析質譜儀 (GC/MS) 檢測。 / With reference to US EPA 3540C method. Analysis was performed by GC/MS.	0.5	n.d.
短鏈氯化石蠟 / Alkanes, C10-13, chloro (Short Chain Chlorinated Paraffins) (CAS No.: 085535-84-8)	%	參考US EPA 3540C: 1996方法, 以氣相層析儀/電子捕獲偵測器檢測。 / With reference to US EPA 3540C: 1996 method. Analysis was performed by GC/ECD.	0.01	n.d.
六溴環十二烷及所有主要被辨別出的異構物 / 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	參考IEC 62321: 2008方法, 以氣相層析/質譜儀檢測。 / With reference to IEC 62321: 2008 method. Analysis was performed by GC/MS.	5	n.d.

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測試報告

Test Report

號碼(No.) : KA/2013/C1366R1 日期(Date) : 2013/12/30 頁數(Page) : 5 of 19

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
聚氯乙稀 / PVC	**	以紅外光譜分析及焰色法檢測. / Analysis was performed by FTIR and FLAME Test.	-	Negative
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.
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.

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測試報告

Test Report

號碼(No.) : KA/2013/C1366R1 日期(Date) : 2013/12/30 頁數(Page) : 6 of 19

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
有機錫 / Organic-tin compounds				
三丁基錫 / Tributyl Tin (TBT)	mg/kg	本測試參考ISO 17353: 2004方法, 以氣相層析儀/火焰光度偵測器檢測. / With reference to ISO 17353: 2004. Analysis was performed by GC/FPD.	0.03	n.d.
三苯基錫 / Triphenyl Tin (TphT)			0.03	n.d.
三丁基錫氧化物 / Tributyl Tin Oxide (TBTO)*** (CAS No.: 56-35-9)			-	n.d.
二丁基錫 / Dibutyl Tin (DBT)			0.03	n.d.
二辛基錫 / Dioctyl Tin (DOT)			0.03	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)	%	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, 68515-49-1)	%	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, 68515-48-0)	%	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.

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測試報告

Test Report

號碼(No.) : KA/2013/C1366R1 日期(Date) : 2013/12/30 頁數(Page) : 7 of 19

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
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.
鄰苯二甲酸二異丁酯 / DIBP (Di-isobutyl phthalate) (CAS No.: 84-69-5)	%	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.

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 cm² tested areas . / 該溶液濃度 \geq 0.02 mg/kg with 50 cm² (tested areas)

7. 聚氯乙烯(PVC):Negative = Undetectable 陰性(未偵測到); Positive = Detectable 陽性(已偵測到)
8. 聚氯乙烯測試由SGS其他實驗室執行 (The PVC test was subcontracted to other SGS Laboratory.)
9. ***: 該物質是由"三丁基錫", "三苯基錫"或各別元素(例如: 銻)之測試結果計算得知。
其MDL是針對"三丁基錫", "三苯基錫"或元素(例如: 銻)之評估。
(The substance was calculated by the test results of Tributyl Tin, Triphenyl Tin or element (Ex. Antimony). The MDL is evaluated for Tributyl Tin, Triphenyl Tin or element (Ex. Antimony))
10. 此份報告替代之前之報告 (號碼 KA/2013/C1366). (This report supersedes all previous documents bearing the, test report number KA/2013/C1366.)

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

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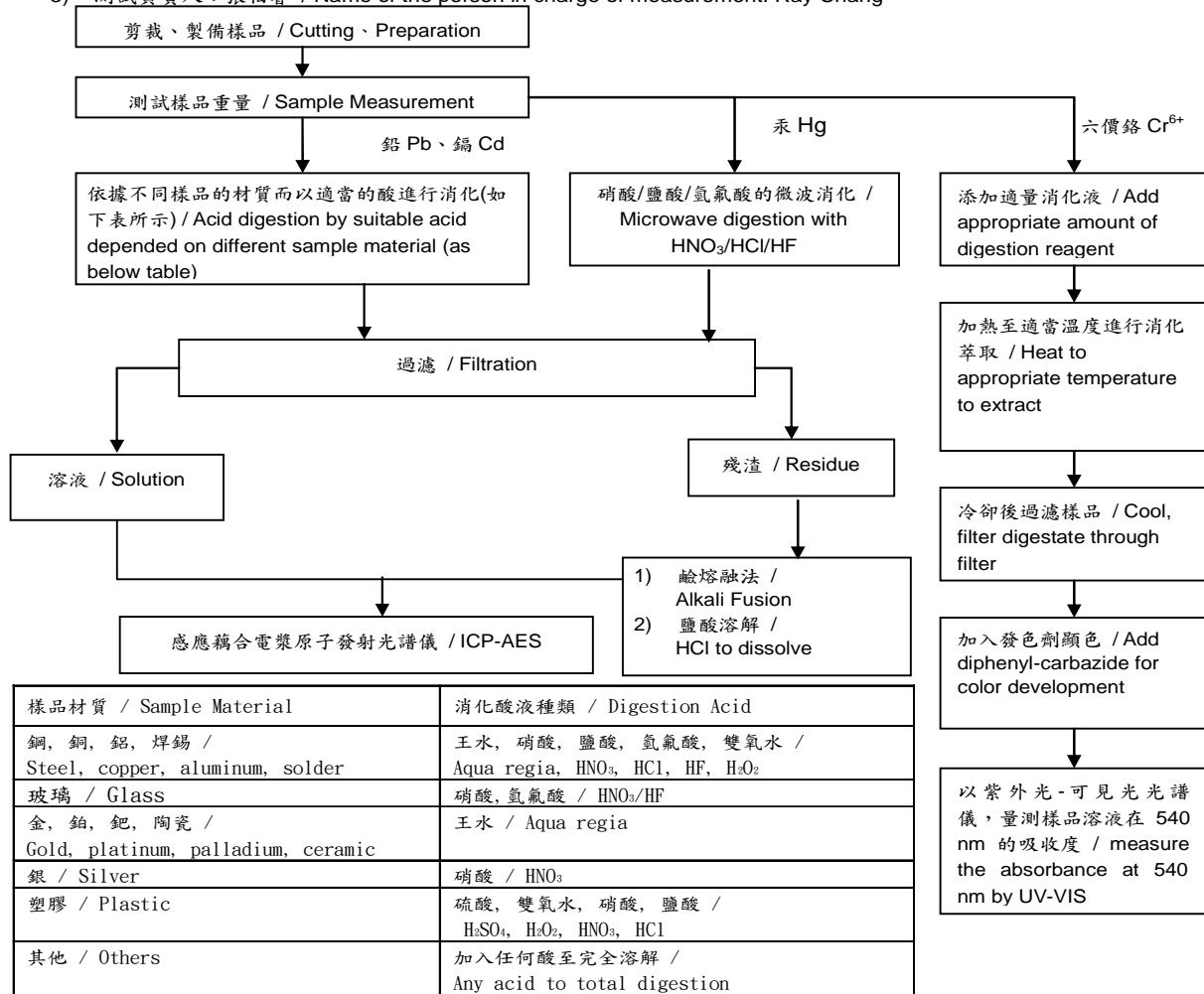
測試報告 Test Report

號碼(No.) : KA/2013/C1366R1 日期(Date) : 2013/12/30 頁數(Page) : 8 of 19

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。(六價鉻測試方法除外) / These samples were dissolved totally by pre-conditioning method according to below flow chart. (Cr⁶⁺ test method excluded)
- 2) 測試人員：劉俊宏 / Name of the person who made measurement: Jony Liu
- 3) 測試負責人：張伯容 / Name of the person in charge of measurement: Ray Chang



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.

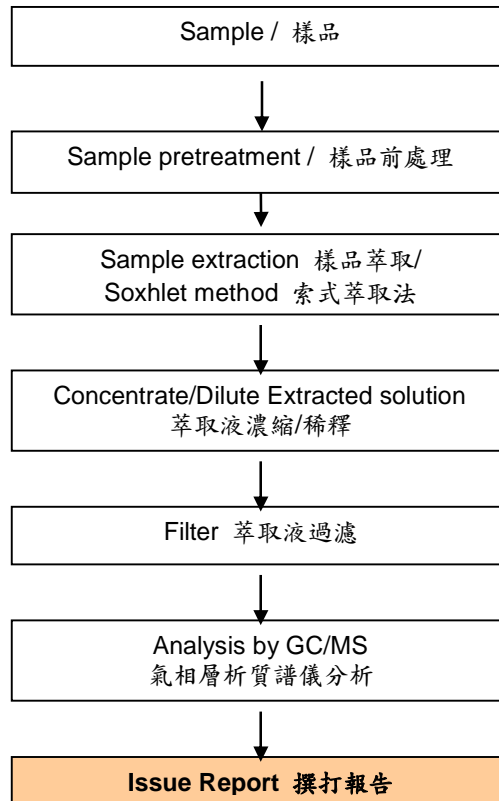
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多溴聯苯/多溴聯苯醚 分析流程圖 / PBB/PBDE analytical FLOW CHART

- 1) 測試人員：陳威錚 / Name of the person who made measurement: Dorothy Chen
2) 測試負責人：張伯睿 / Name of the person in charge of measurement: Ray Chang



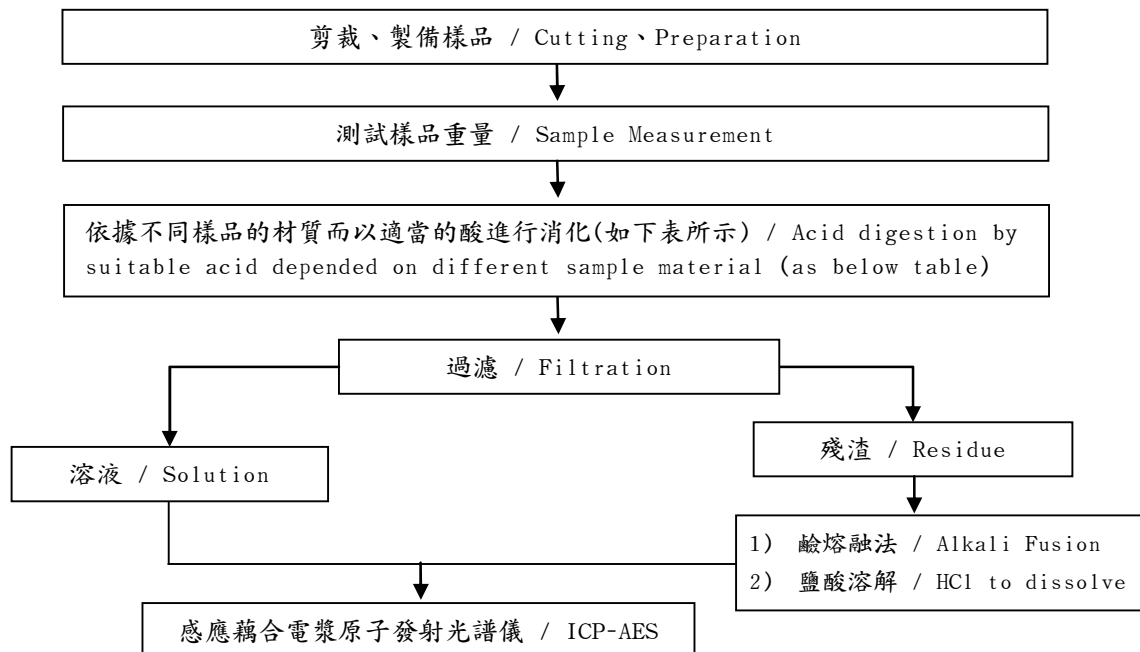
ASM HK

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：劉俊宏 / Name of the person who made measurement: Jony Liu
- 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 ₂ O ₂
玻璃 / Glass	硝酸,氫氟酸 / HNO ₃ /HF
金,鉑,鈱,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 ₂ SO ₄ , H ₂ O 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

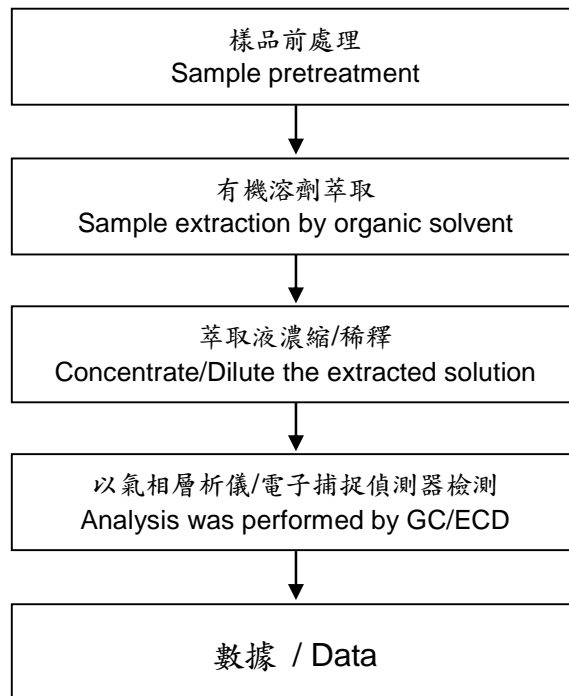
4/F, WATSON CENTRE, 16 KUNG YIP ST., KWAI CHUNG, HONG KONG (ASM HK)

含氯阻燃劑分析流程 /

Chlorinated Flame retardant analytical flow chart

- 1) 測試人員：陳威錚 / Name of the person who made measurement: Dorothy Chen
- 2) 測試負責人：張伯睿 / Name of the person in charge of measurement: Ray Chang

- 參考方法(Reference method): USEPA 3540
- 測試項目(Test Items): PCBs, CP, MCCP / 多氯聯苯, 氯化石蠟, 中鏈氯化石蠟



ASM HK

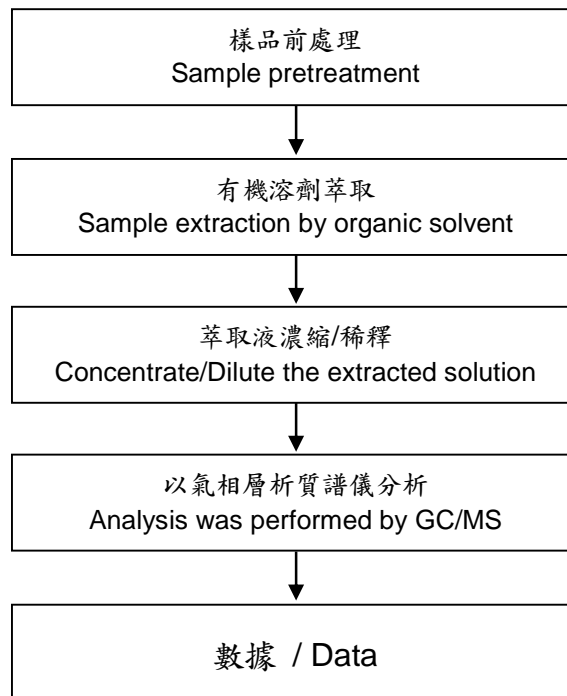
4/F, WATSON CENTRE, 16 KUNG YIP ST., KWAI CHUNG, HONG KONG (ASM HK)

含氯阻燃劑分析流程 /

Chlorinated Flame retardant analytical flow chart

- 1) 測試人員：陳威錚 / Name of the person who made measurement: Dorothy Chen
- 2) 測試負責人：張伯睿 / Name of the person in charge of measurement: Ray Chang

- 參考方法(Reference method): US EPA 8270D, US EPA 3540
- 測試項目(Test Items): PCNs, PCTs, Mirex / 多氯奈, 多氯三聯苯, 滅蟻靈,

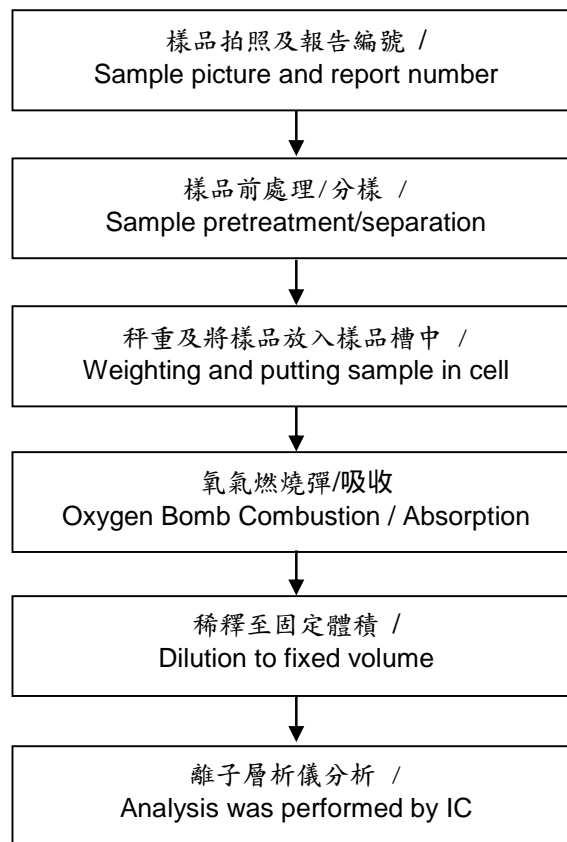


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鹵素分析流程圖 / Analytical flow chart of halogen content

- 1) 測試人員：洪秀真 / 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

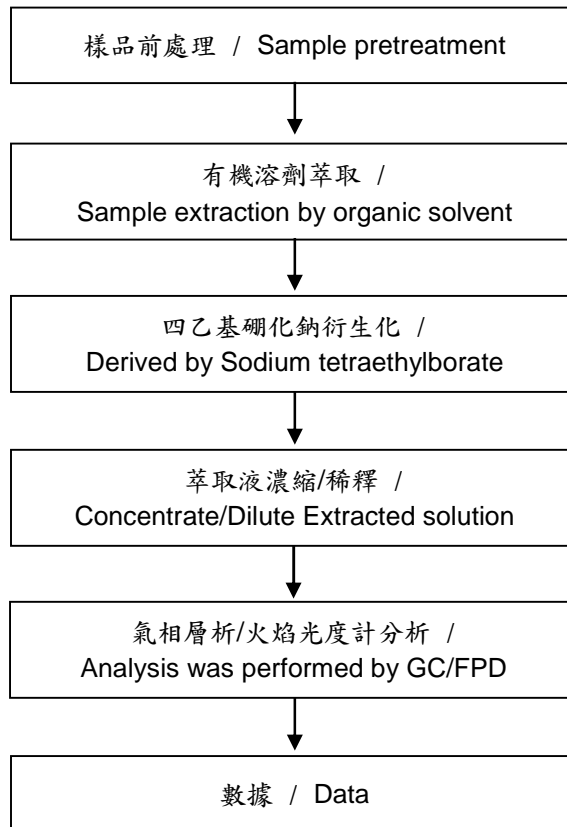


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有機錫分析流程圖 / Analytical flow chart of Organic-Tin content

- 1) 測試人員：陳威錚 / Name of the person who made measurement: Dorothy Chen
- 2) 測試負責人：張伯睿 / Name of the person in charge of measurement: Ray Chang

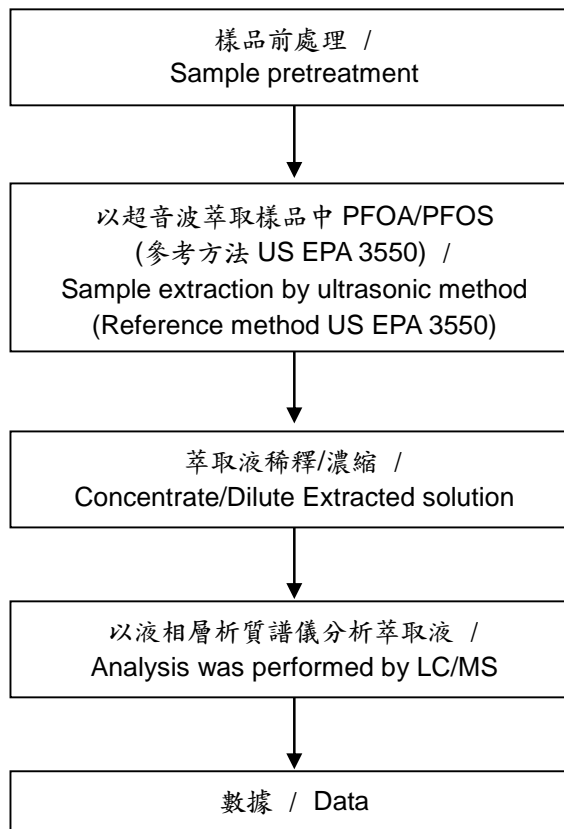


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4/F, WATSON CENTRE, 16 KUNG YIP ST., KWAI CHUNG, HONG KONG (ASM HK)

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

- 1)測試人員：黃璟璵 / Name of the person who made measurement: Ginny Huang
2)測試負責人：張伯睿 / Name of the person in charge of measurement: Ray Chang



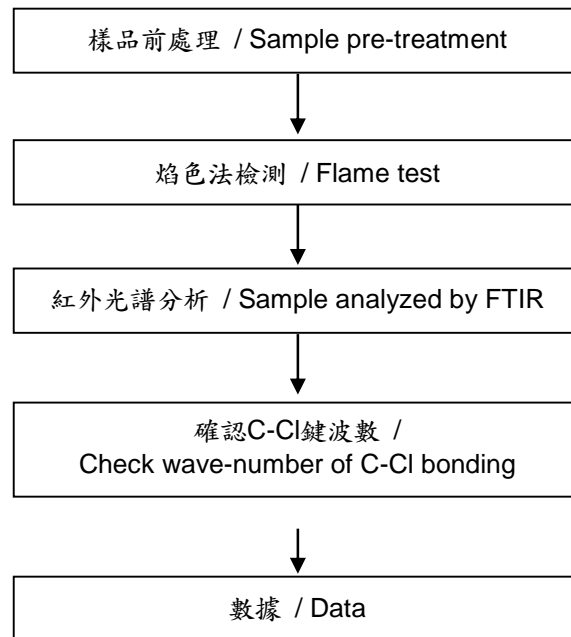
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聚氯乙稀物質判定分析流程圖 /

Analysis flow chart for determination of PVC in material

- 1) 測試人員：邱韻如 / Name of the person who made measurement: Joyce Chiu
2) 測試負責人：林立翔 / Name of the person in charge of measurement: Roger Lin



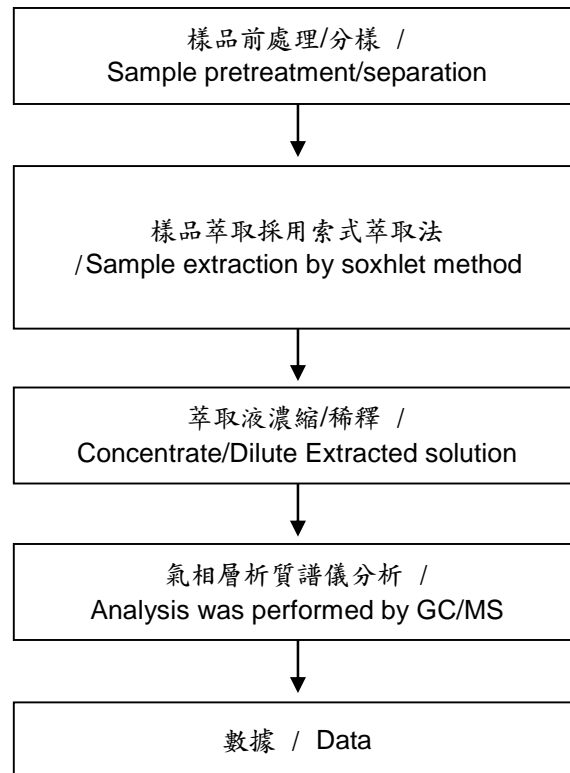
ASM HK

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

1) 測試人員：陳威錚 / Name of the person who made measurement: Dorothy Chen

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

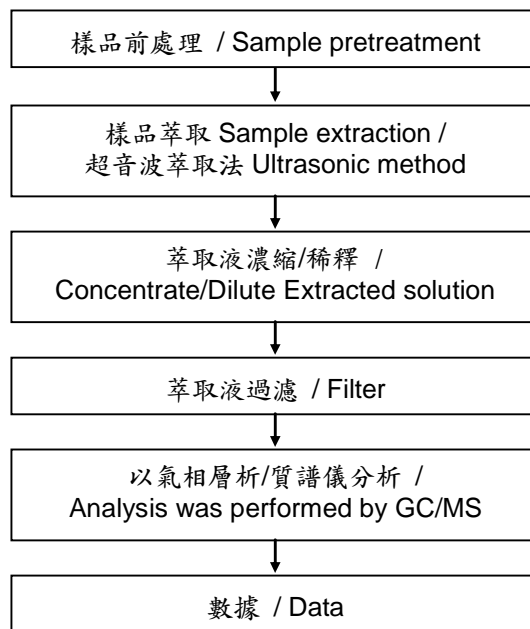


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六溴環十二烷分析流程圖 / HBCDD analytical flow chart

- 測試人員：陳威錚 / Name of the person who made measurement: Dorothy Chen
- 測試負責人：張伯睿 / Name of the person in charge of measurement: Ray Chang



測試報告 Test Report

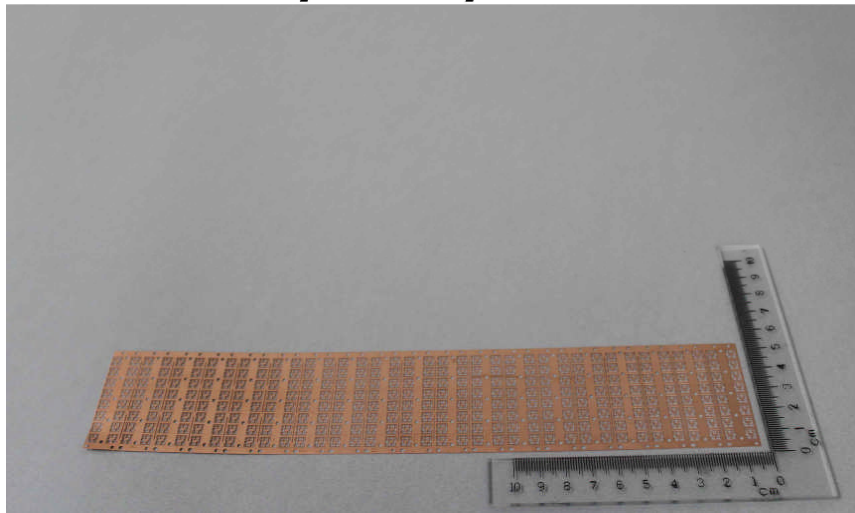
號碼(No.) : KA/2013/C1366R1 日期(Date) : 2013/12/30 頁數(Page) : 19 of 19

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

KA/2013/C1366



** 報告結尾(End of Report) **

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SGS Taiwan Ltd.
台灣檢驗科技股份有限公司

No. 61, Kai-Fa Road, Nanzih Export Processing Zone, Kaohsiung, Taiwan /
t + 886 (07)301 2121

f + 886 (07)3010867

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www.tw.sgs.com

Member of the SGS Group

Test Report

No. CANEC1300172715

Date: 11 Jan 2013

Page 1 of 9

YUNNAN TIN CO.,LTD.

49#MIDDLE OF CHANGYUAN ROAD,KUNMING NATIONAL HIGH&NEW TECH INDUSTRY DEVELOPMENT
ZONE,KUNMING,YUNNAN
CHINA

The following sample(s) was/were submitted and identified on behalf of the clients as : Tin Ingot

SGS Job No. : CP13-000464 - GZ

Model No. : Sn99.90AA

Date of Sample Received : 05 Jan 2013

Testing Period : 05 Jan 2013 - 11 Jan 2013

Test Requested : Selected test(s) as requested by client.

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

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

Conclusion : Based on the performed tests on submitted samples, the results of Lead, Mercury, Cadmium, Hexavalent chromium, Polybrominated biphenyls (PBB), Polybrominated diphenyl ethers (PBDE) comply with the limits as set by RoHS Directive 2011/65/EU Annex II; recasting 2002/95/EC.

Signed for and on behalf of
SGS-CSTC Ltd.



Trophy Zhang
Approved Signatory

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Test Report

No. CANEC1300172715

Date: 11 Jan 2013

Page 2 of 9

Test Results :

Test Part Description :

Specimen No.	SGS Sample ID	Description
1	CAN13-001727.004	Silvery metal

Remarks :

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

RoHS Directive 2011/65/EU

Test Method : With reference to IEC 62321:2008

- (1) Determination of Cadmium by ICP-OES.
- (2) Determination of Lead by ICP-OES.
- (3) Determination of Mercury by ICP-OES.
- (4) Determination of Hexavalent Chromium by Spot test / Colorimetric Method using UV-Vis.
- (5) Determination of PBBs / PBDEs by GC-MS.

Test Item(s)	Limit	Unit	MDL	004
Cadmium (Cd)	100	mg/kg	2	ND
Lead (Pb)	1,000	mg/kg	2	60
Mercury (Hg)	1,000	mg/kg	2	ND
Hexavalent Chromium (CrVI)	-	-	◇	Negative
Sum of PBBs	1,000	mg/kg	-	ND
Monobromobiphenyl	-	mg/kg	5	ND
Dibromobiphenyl	-	mg/kg	5	ND
Tribromobiphenyl	-	mg/kg	5	ND
Tetrabromobiphenyl	-	mg/kg	5	ND
Pentabromobiphenyl	-	mg/kg	5	ND
Hexabromobiphenyl	-	mg/kg	5	ND
Heptabromobiphenyl	-	mg/kg	5	ND
Octabromobiphenyl	-	mg/kg	5	ND
Nonabromobiphenyl	-	mg/kg	5	ND
Decabromobiphenyl	-	mg/kg	5	ND
Sum of PBDEs	1,000	mg/kg	-	ND
Monobromodiphenyl ether	-	mg/kg	5	ND

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Test Report

No. CANEC1300172715

Date: 11 Jan 2013

Page 3 of 9

<u>Test Item(s)</u>	<u>Limit</u>	<u>Unit</u>	<u>MDL</u>	<u>004</u>
Dibromodiphenyl ether	-	mg/kg	5	ND
Tribromodiphenyl ether	-	mg/kg	5	ND
Tetrabromodiphenyl ether	-	mg/kg	5	ND
Pentabromodiphenyl ether	-	mg/kg	5	ND
Hexabromodiphenyl ether	-	mg/kg	5	ND
Heptabromodiphenyl ether	-	mg/kg	5	ND
Octabromodiphenyl ether	-	mg/kg	5	ND
Nonabromodiphenyl ether	-	mg/kg	5	ND
Decabromodiphenyl ether	-	mg/kg	5	ND

Notes :

(1) The maximum permissible limit is quoted from directive 2011/65/EU, Annex II

(2) ♦Spot-test:

Negative = Absence of CrVI coating, Positive = Presence of CrVI coating;

(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:

Negative = Absence of CrVI coating

Positive = Presence of CrVI coating; the detected concentration in boiling-water-extraction solution is equal or greater than 0.02 mg/kg with 50 cm² sample surface area.

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.

Halogen

Test Method : With reference to EN 14582: 2007, analysis was performed by Ion Chromatograph (IC).

<u>Test Item(s)</u>	<u>Unit</u>	<u>MDL</u>	<u>004</u>
Fluorine (F)	mg/kg	50	ND
Chlorine (Cl)	mg/kg	50	ND
Bromine (Br)	mg/kg	50	ND
Iodine (I)	mg/kg	50	ND

Hexabromocyclododecane (HBCDD)

Test Method : Determination of HBCDD by GC-MS based on IEC 62321:2008.

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Test Report

No. CANEC1300172715

Date: 11 Jan 2013

Page 4 of 9

<u>Test Item(s)</u>	<u>Unit</u>	<u>MDL</u>	<u>004</u>
Hexabromocyclododecane (HBCDD)	mg/kg	10	ND

Notes :

- (1) Reference Information: Directive 2011/65/EU recasting RoHS directive 2002/95/EC:
Hexabromocyclododecane (HBCDD) is considered as a priority for risk evaluation and substance restriction.

Phthalate

Test Method : Determination of phthalates by GC-MS based on EN 14372:2004.

<u>Test Item(s)</u>	<u>Unit</u>	<u>MDL</u>	<u>004</u>
Dibutyl Phthalate (DBP)	% (w/w)	0.003	ND
Benzylbutyl Phthalate (BBP)	% (w/w)	0.003	ND
Bis-(2-ethylhexyl) Phthalate (DEHP)	% (w/w)	0.003	ND

Notes :

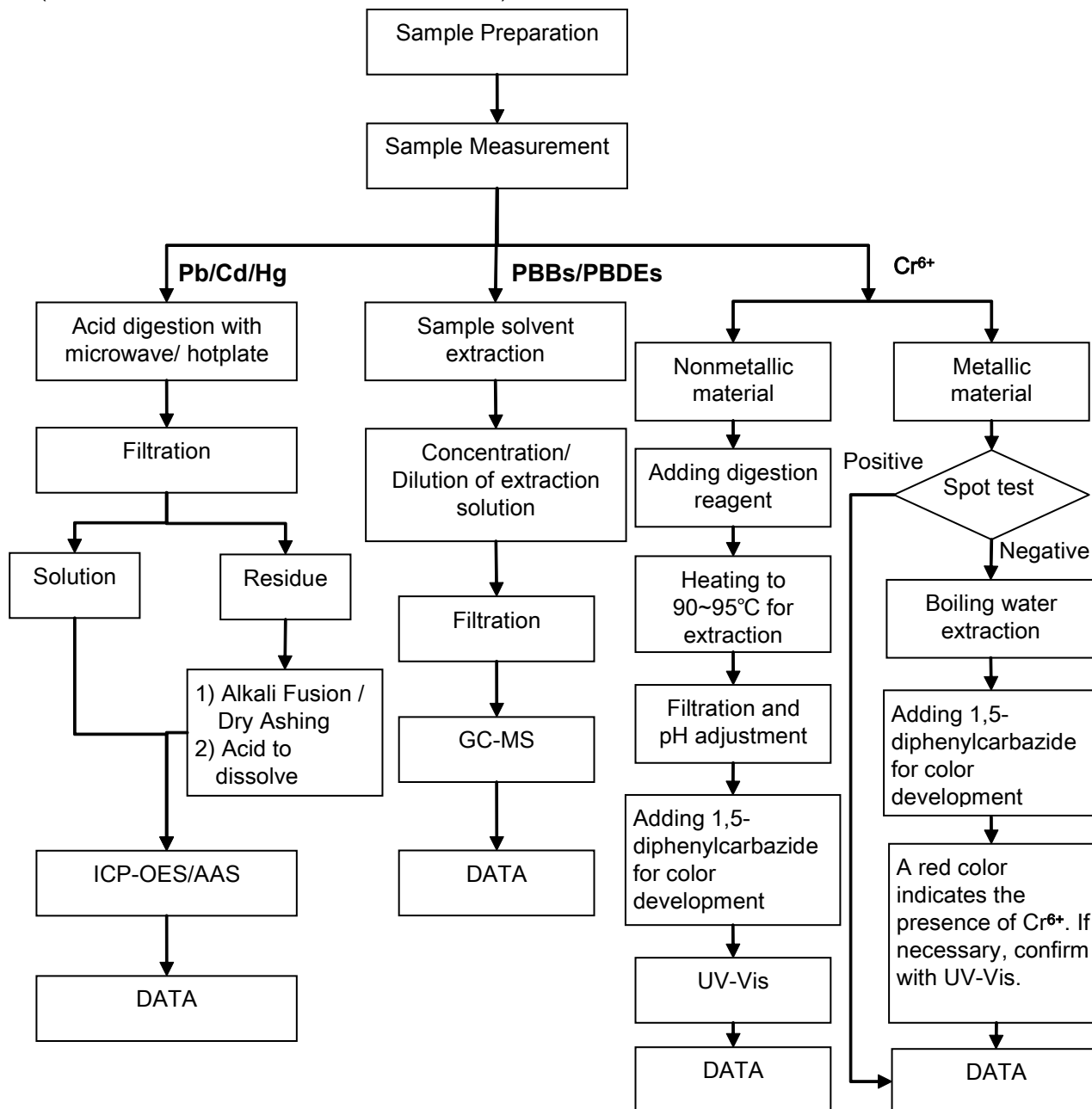
- (1) Reference Information: Directive 2011/65/EU recasting RoHS directive 2002/95/EC:
Bis (2-ethylhexyl) phthalate (DEHP), Butyl benzyl phthalate (BBP) and Dibutyl phthalate (DBP) are considered as a priority for risk evaluation and substance restriction.

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ATTACHMENTS

RoHS Testing Flow Chart

- 1) Name of the person who made testing: Michael Tso / Cutey Yu
- 2) Name of the person in charge of testing: Adams Yu / Yolanda Wei
- 3) These samples were dissolved totally by pre-conditioning method according to below flow chart (Cr⁶⁺ and PBBs/PBDEs test method excluded).

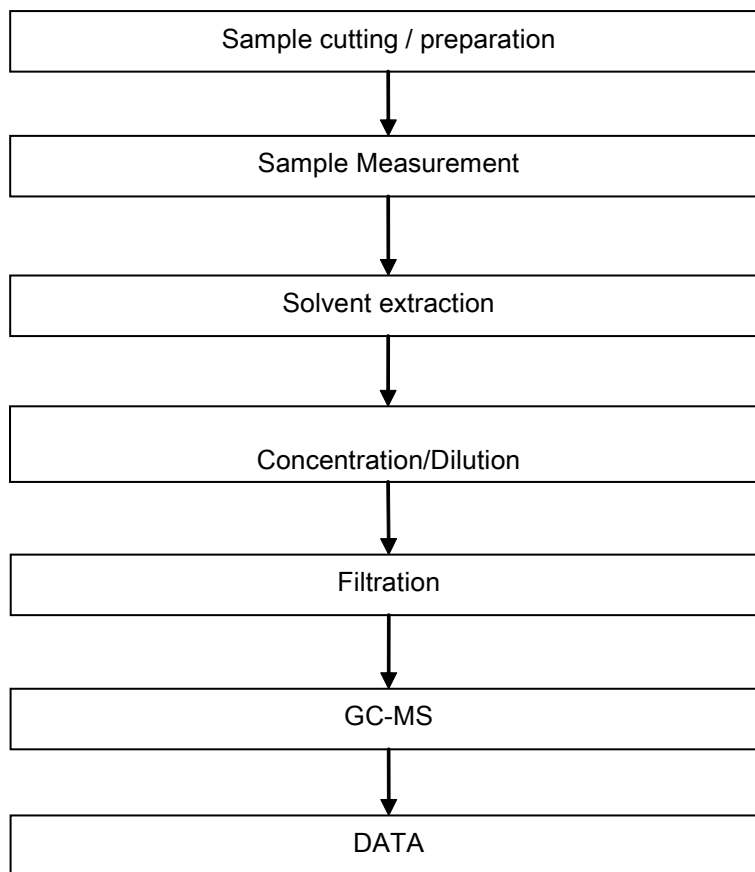


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ATTACHMENTS

HBCDD Testing Flow Chart

- 1) Name of the person who made testing: Cutey Yu
- 2) Name of the person in charge of testing: Yolanda Wei

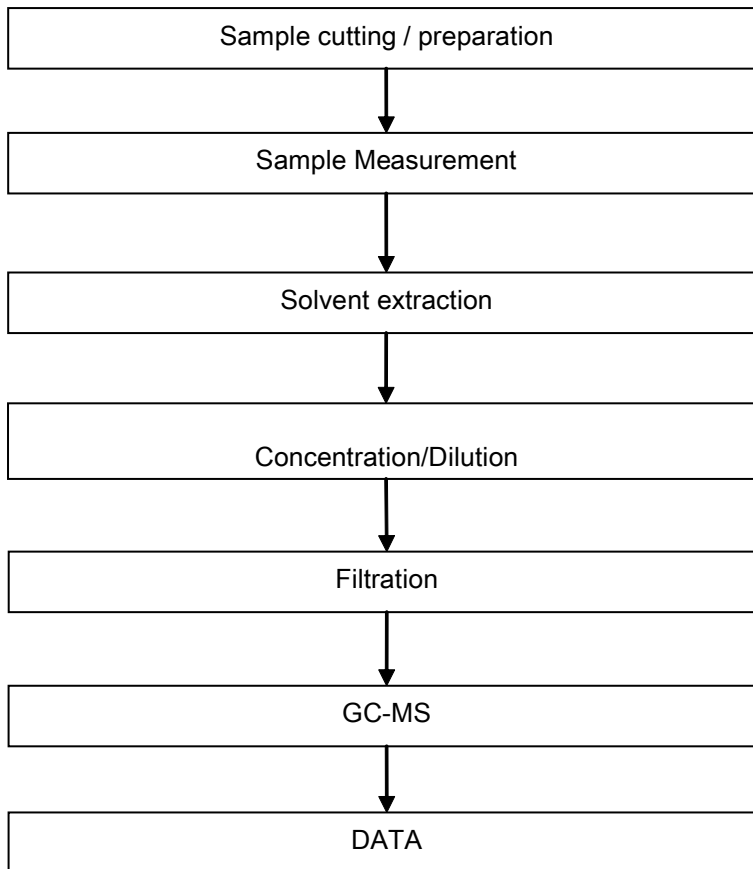


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ATTACHMENTS

Phthalates Testing Flow Chart

- 1) Name of the person who made testing: Liu Qiong
- 2) Name of the person in charge of testing: Yolanda Wei

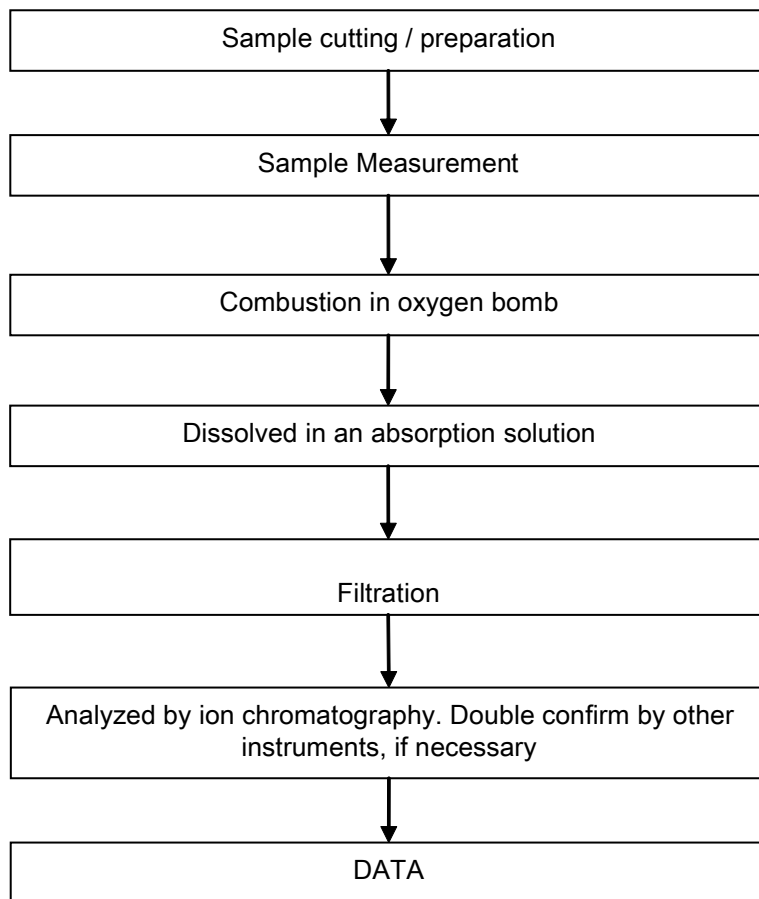


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ATTACHMENTS

Halogen Testing Flow Chart

- 1) Name of the person who made testing: Bella Wang
- 2) Name of the person in charge of testing: Adams Yu



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Test Report

No. CANEC1300172715

Date: 11 Jan 2013

Page 9 of 9

Sample photo:



SGS authenticate the photo on original report only

*** End of Report ***

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Test Report No. F690101/LF-CTSAYAA13-36969A

Issued Date: 2013. 08. 05 Page 1 of 4

To: **HENKEL TECHNOLOGIES**
6th Fl. Daeryung techno town II
569-21, Gasan-dong
Geumcheon-gu
Seoul
Korea

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

SGS File No. : AYAA13-36969A
Product Name : 8006NS
Item No./Part No. : N/A
Received Date : 2013. 07. 31
Test Period : 2013. 08. 01 to 2013. 08. 05
Test Results : For further details, please refer to following page(s)
Test Performed : SGS Korea tested the sample(s) selected by applicant with following results.

Timothy Jeon
Jinhee Kim
Cindy Park
Jerry Jung/ Testing Person

SGS Korea Co., Ltd.

Jeff Jang / Chemical Lab Mgr



Test Report No. F690101/LF-CTSAYAA13-36969A

Issued Date: 2013. 08. 05 Page 2 of 4

Sample No. : AYAA13-36969A.001

Sample Description : 8006NS

Item No./Part No. : N/A

Materials : Paste

Heavy Metals

Test Items	Unit	Test Method	MDL	Results
Cadmium (Cd)	mg/kg	With reference to IEC 62321:2008, ICP	0.5	N.D.
Lead (Pb)	mg/kg	With reference to IEC 62321:2008, ICP	5	N.D.
Mercury (Hg)	mg/kg	With reference to IEC 62321:2008, ICP	2	N.D.
Hexavalent Chromium (Cr VI)	mg/kg	With reference to IEC 62321:2008, UV-VIS	1	N.D.

Flame Retardants-PBBs/PBDEs

Test Items	Unit	Test Method	MDL	Results
Monobromobiphenyl	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Dibromobiphenyl	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Tribromobiphenyl	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Tetrabromobiphenyl	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Pentabromobiphenyl	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Hexabromobiphenyl	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Heptabromobiphenyl	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Octabromobiphenyl	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Nonabromobiphenyl	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Decabromobiphenyl	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Monobromodiphenyl ether	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Dibromodiphenyl ether	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Tribromodiphenyl ether	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Tetrabromodiphenyl ether	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Pentabromodiphenyl ether	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Hexabromodiphenyl ether	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Heptabromodiphenyl ether	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Octabromodiphenyl ether	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Nonabromodiphenyl ether	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Decabromodiphenyl ether	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.

NOTE:

- (1) N.D. = Not detected.(<MDL)
- (2) mg/kg = ppm
- (3) MDL = Method Detection Limit
- (4) - = No regulation
- (5) Negative = Undetectable / Positive = Detectable
- (6) ** = Qualitative analysis (No Unit)
- (7) * = Boiling-water-extraction:
Negative = Absence of CrVI coating
Positive = Presence of CrVI coating; the detected concentration in boiling-water-extraction solution is equal or greater than 0.02 mg/kg with 50 cm² sample surface area.

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Picture of Sample as Received:



NOTE:

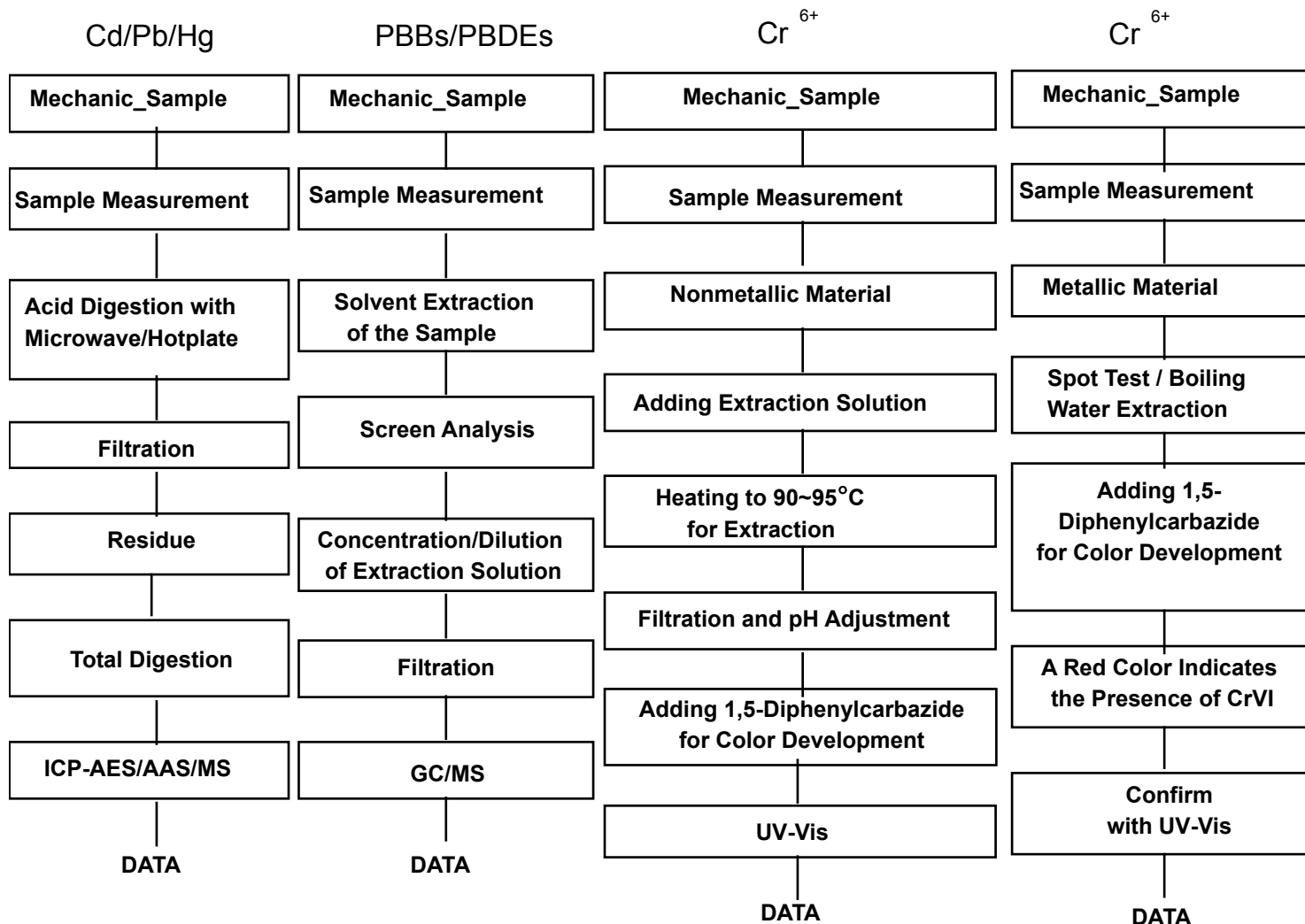
- (1) N.D. = Not detected.(<MDL)
- (2) mg/kg = ppm
- (3) MDL = Method Detection Limit
- (4) - = No regulation
- (5) Negative = Undetectable / Positive = Detectable
- (6) ** = Qualitative analysis (No Unit)
- (7) * = Boiling-water-extraction:
 Negative = Absence of CrVI coating
 Positive = Presence of CrVI coating; the detected concentration in boiling-water-extraction solution is equal or greater than 0.02 mg/kg with 50 cm2 sample surface area.



Test Report No. F690101/LF-CTSAYAA13-36969A

Issued Date: 2013. 08. 05 Page 4 of 4

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



The samples were dissolved totally by pre-conditioning method according to above flow chart for Cd,Pb,Hg.

Section Chief : Gilsae Yi

*** End ***

NOTE:

- (1) N.D. = Not detected.(<MDL)
- (2) mg/kg = ppm
- (3) MDL = Method Detection Limit
- (4) - = No regulation
- (5) Negative = Undetectable / Positive = Detectable
- (6) ** = Qualitative analysis (No Unit)
- (7) * = Boiling-water-extraction:
Negative = Absence of CrVI coating
Positive = Presence of CrVI coating; the detected concentration in boiling-water-extraction solution is equal or greater than 0.02 mg/kg with 50 cm² sample surface area.

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Test Report No. F690101/LF-CTSAYAA13-36969B

Issued Date: 2013. 08. 05 Page 1 of 3

To: **HENKEL TECHNOLOGIES**
6th Fl. Daeryung techno town II
569-21, Gasan-dong
Geumcheon-gu
Seoul
Korea

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

SGS File No. : AYAA13-36969B
Product Name : 8006NS
Item No./Part No. : N/A
Received Date : 2013. 07. 31
Test Period : 2013. 08. 01 to 2013. 08. 05
Test Results : For further details, please refer to following page(s)
Test Performed : SGS Korea tested the sample(s) selected by applicant with following results.

Timothy Jeon
Jinhee Kim
Cindy Park
Jerry Jung/ Testing Person

SGS Korea Co., Ltd.

Jeff Jang / Chemical Lab Mgr



Test Report No. F690101/LF-CTSAYAA13-36969B

Issued Date: 2013. 08. 05 Page 2 of 3

Sample No. : AYAA13-36969B.001

Sample Description : 8006NS

Item No./Part No. : N/A

Materials : Paste

Halogen Content

Test Items	Unit	Test Method	MDL	Results
Bromine(Br)	mg/kg	BS EN 14582:2007 , IC	30	N.D.
Chlorine(Cl)	mg/kg	BS EN 14582:2007 , IC	30	324
Fluorine(F)	mg/kg	BS EN 14582:2007 , IC	30	N.D.
Iodine(I)	mg/kg	BS EN 14582:2007 , IC	50	N.D.

Picture of Sample as Received:



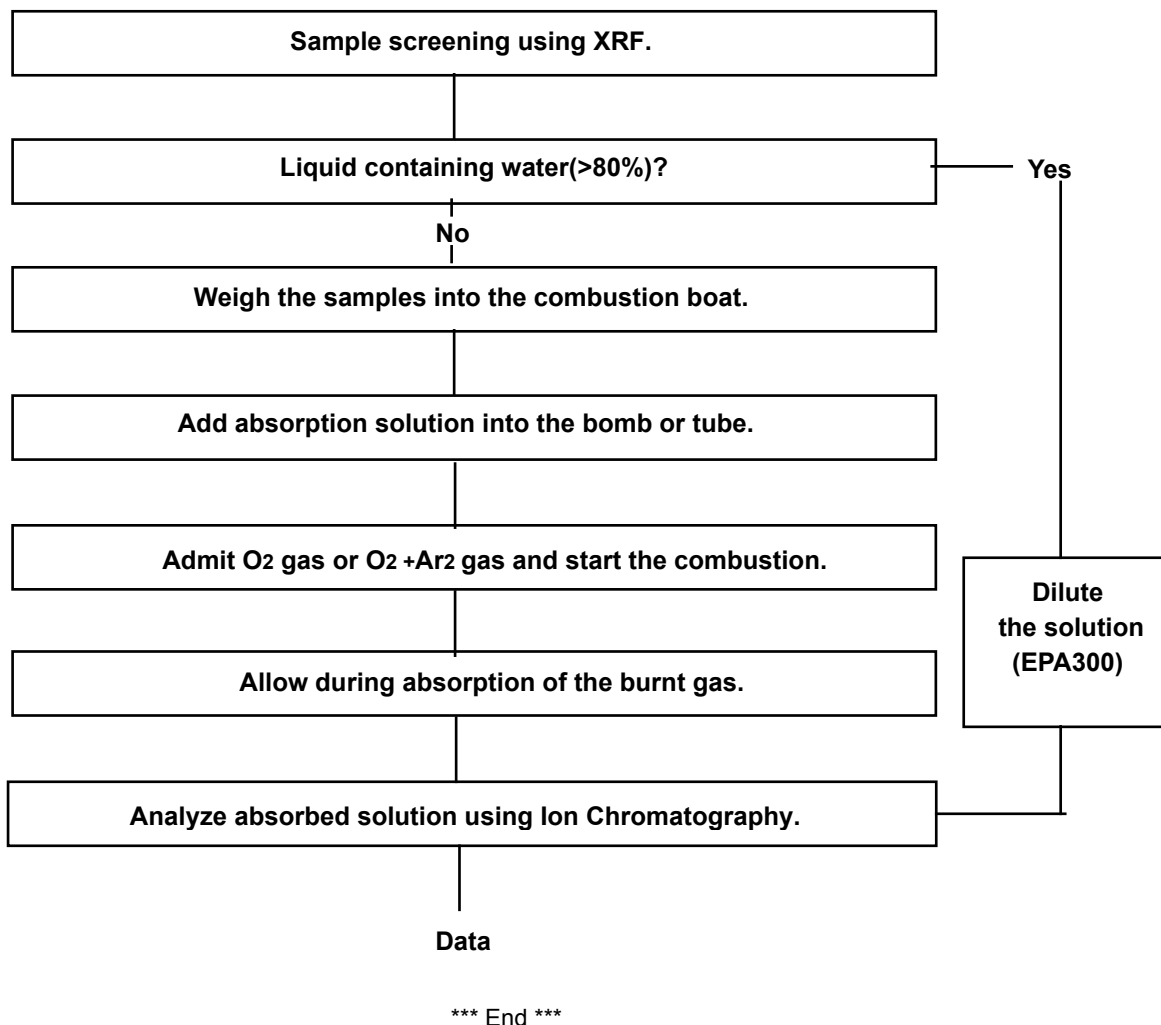
NOTE:

- (1) N.D. = Not detected.(<MDL)
- (2) mg/kg = ppm
- (3) MDL = Method Detection Limit
- (4) - = No regulation
- (5) ** = Qualitative analysis (No Unit)
- (6) Negative = Undetectable / Positive = Detectable

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Flow Chart for Halogen Test



NOTE:

- (1) N.D. = Not detected.(<MDL)
- (2) mg/kg = ppm
- (3) MDL = Method Detection Limit
- (4) - = No regulation
- (5) ** = Qualitative analysis (No Unit)
- (6) Negative = Undetectable / Positive = Detectable



Test Report No. F690101/LF-CTSAYAA13-36969C

Issued Date: 2013. 08. 06 Page 1 of 7

To: **HENKEL TECHNOLOGIES**
6th Fl. Daeryung techno town II
569-21, Gasan-dong
Geumcheon-gu
Seoul
Korea

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

SGS File No. : AYAA13-36969C
Product Name : 8006NS
Item No./Part No. : N/A
Received Date : 2013. 07. 31
Test Period : 2013. 08. 01 to 2013. 08. 06
Test Results : For further details, please refer to following page(s)
Test Performed : SGS Korea tested the sample(s) selected by applicant with following results.

Timothy Jeon
Jinhee Kim
Cindy Park
Jerry Jung/ Testing Person

SGS Korea Co., Ltd.

Jeff Jang / Chemical Lab Mgr



Test Report No. F690101/LF-CTSAYAA13-36969C

Issued Date: 2013. 08. 06 Page 2 of 7

Sample No. : AYAA13-36969C.001

Sample Description : 8006NS

Item No./Part No. : N/A

Materials : Paste

Heavy Metals

Test Items	Unit	Test Method	MDL	Results
Antimony (Sb)	mg/kg	With reference to EPA 3052(1996), US EPA 6010B(1996), ICP	10	N.D.
Phosphorous (P)	mg/kg	With reference to EPA 3052(1996), US EPA 6010B(1996), ICP	10	N.D.

Phthalates

Test Items	Unit	Test Method	MDL	Results
Di-(2-ethylhexyl) phthalate (DEHP)	mg/kg	With reference to ASTM D3421-75 , GC-MS	50	N.D.
Dibutyl phthalate (DBP)	mg/kg	With reference to ASTM D3421-75 , GC-MS	50	N.D.
Butylbenzyl phthalate (BBP)	mg/kg	With reference to ASTM D3421-75 , GC-MS	50	N.D.
Diisodecyl phthalate (DIDP)	mg/kg	With reference to ASTM D3421-75 , GC-MS	50	N.D.
Diisononyl phthalate (DINP)	mg/kg	With reference to ASTM D3421-75 , GC-MS	50	N.D.
Di-n-octyl phthalate (DNOP)	mg/kg	With reference to ASTM D3421-75 , GC-MS	50	N.D.
Diisobutyl Phthalate (DIBP)	mg/kg	With reference to ASTM D3421-75 , GC-MS	50	N.D.

Flame Retardants

Test Items	Unit	Test Method	MDL	Results
Hexabromocyclododecane (HBCDD)	mg/kg	USEPA 3540C, LC/MS	5	N.D.

Other(s)

Test Items	Unit	Test Method	MDL	Results
PFOA (Perfluorooctanoic acid)	mg/kg	US EPA 3540C/3550C, LC/MS	1	N.D.
PFOS (Perfluorooctane Sulfonates-Acid/Metal Salt/Amide)	mg/kg	US EPA 3540C/3550C, LC/MS	1	N.D.

NOTE:

- (1) N.D. = Not detected.(<MDL)
- (2) mg/kg = ppm
- (3) MDL = Method Detection Limit
- (4) - = No regulation
- (5) ** = Qualitative analysis (No Unit)
- (6) Negative = Undetectable / Positive = Detectable

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Picture of Sample as Received:

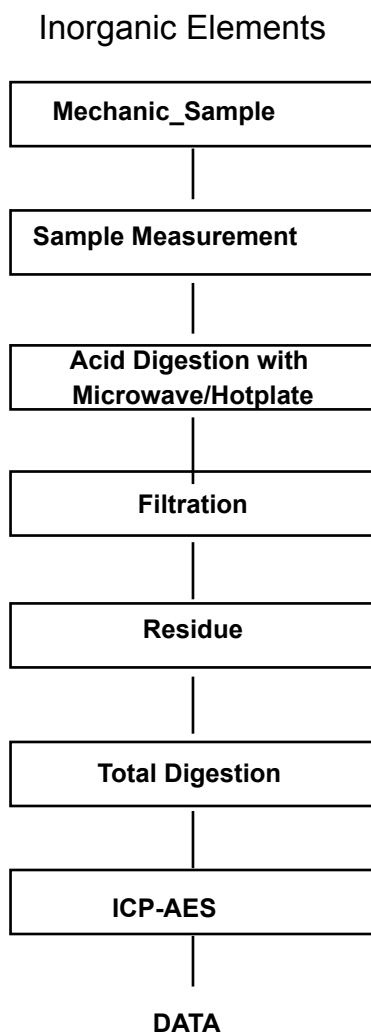


NOTE:

- (1) N.D. = Not detected.(<MDL)
- (2) mg/kg = ppm
- (3) MDL = Method Detection Limit
- (4) - = No regulation
- (5) ** = Qualitative analysis (No Unit)
- (6) Negative = Undetectable / Positive = Detectable



Flow Chart for Inorganic Elements Testing

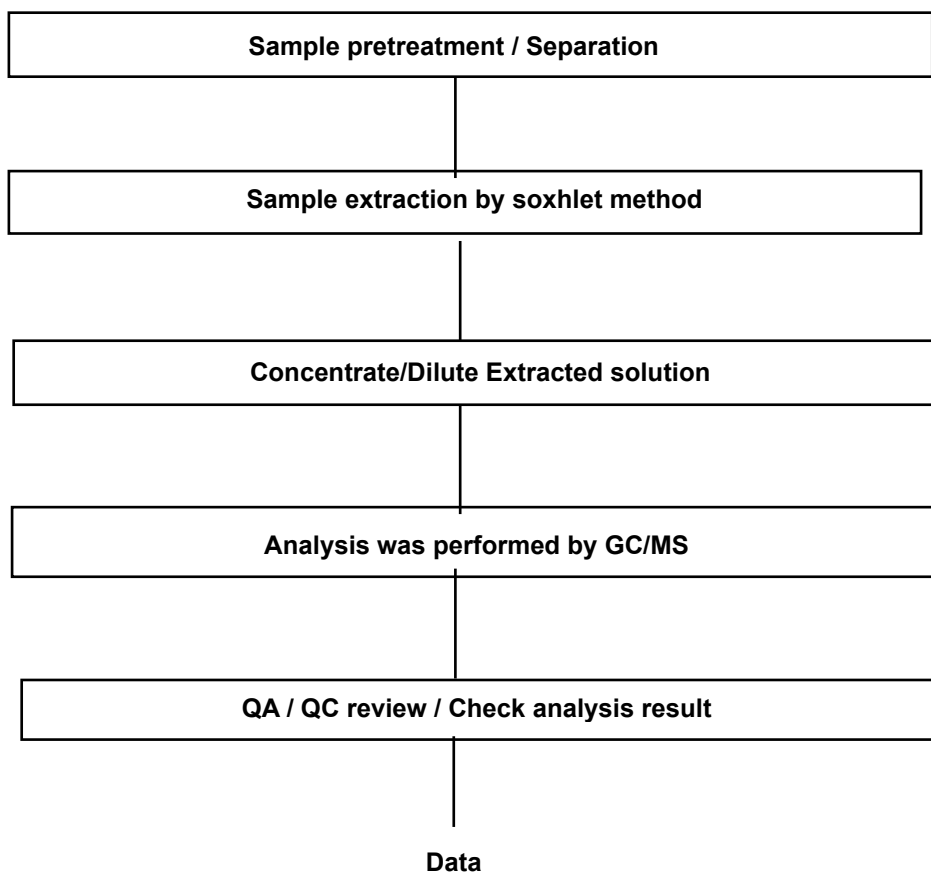


NOTE:

- (1) N.D. = Not detected.(<MDL)
- (2) mg/kg = ppm
- (3) MDL = Method Detection Limit
- (4) - = No regulation
- (5) ** = Qualitative analysis (No Unit)
- (6) Negative = Undetectable / Positive = Detectable



Flow Chart for Phthalate Test

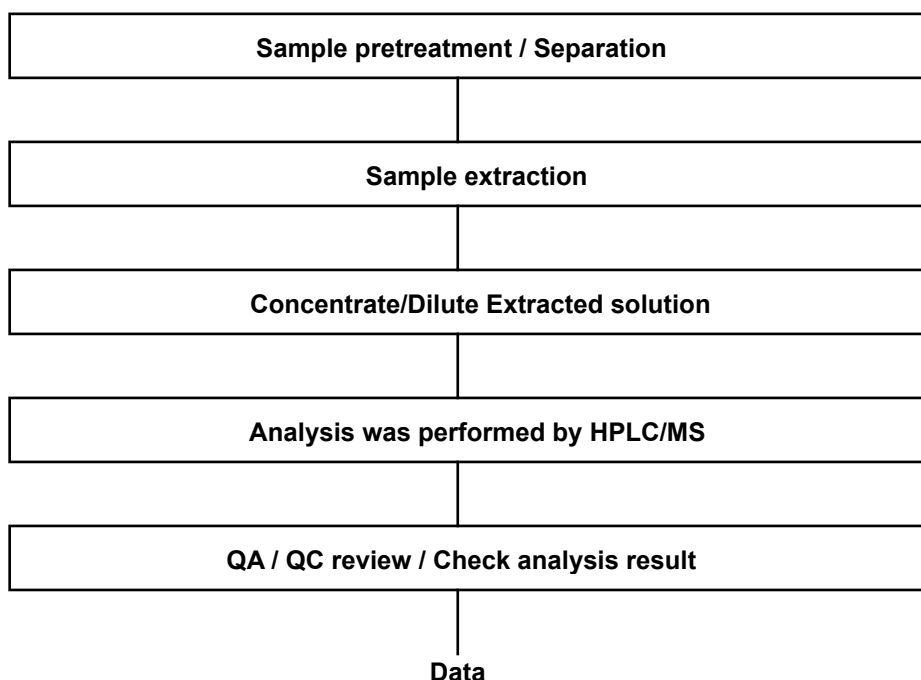


NOTE:

- (1) N.D. = Not detected.(<MDL)
- (2) mg/kg = ppm
- (3) MDL = Method Detection Limit
- (4) - = No regulation
- (5) ** = Qualitative analysis (No Unit)
- (6) Negative = Undetectable / Positive = Detectable



Flow Chart for PFOS/PFOA Test

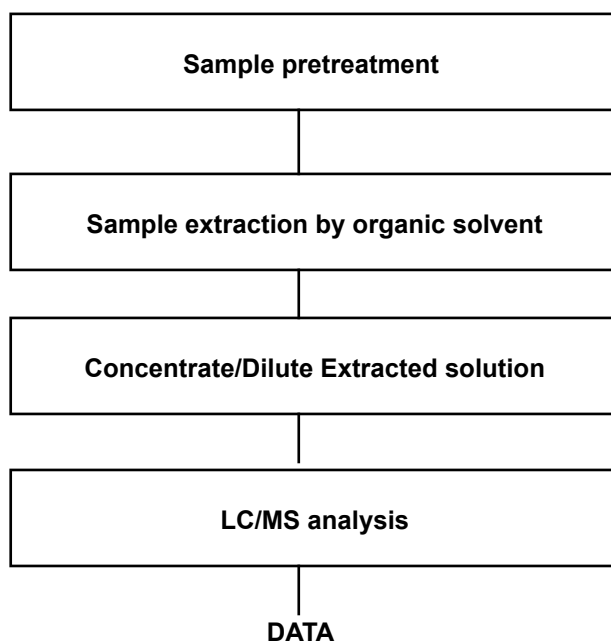


NOTE:

- (1) N.D. = Not detected.(<MDL)
- (2) mg/kg = ppm
- (3) MDL = Method Detection Limit
- (4) - = No regulation
- (5) ** = Qualitative analysis (No Unit)
- (6) Negative = Undetectable / Positive = Detectable



Testing Flow Chart for HBCD



*** End ***

NOTE:

- (1) N.D. = Not detected.(<MDL)
- (2) mg/kg = ppm
- (3) MDL = Method Detection Limit
- (4) - = No regulation
- (5) ** = Qualitative analysis (No Unit)
- (6) Negative = Undetectable / Positive = Detectable

Test Report

No. CTSSA/22191/13+KA/2013/A0723
CTS Ref. CTSSA/13/3207/Tanaka

Date : 01/11/2013

Page: 1 of 15

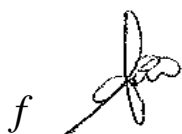
TANAKA ELECTRONICS (M) SDN BHD
PLOT 11, PHASE IV, BAYAN LEPAS FREE INDUSTRIAL ZONE
11900 PENANG, MALAYSIA

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

Sample Description	:	Au Bonding Wire
Sample Receiving Date	:	10/10/2013
Testing Period	:	10/10/2013 to 17/10/2013
Date Completed	:	17/10/2013
Reporting Date	:	01/11/2013

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	:	Ng Jing Wei, Cho Kar Yen, Tan Li Wei, Teh Pui Sean , Lim Meng Hoe Tay Siam Pine & Yee Sook Wai

SGS LABORATORY SERVICES (M) SDN. BHD.



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

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SGS Laboratory Services (M) Sdn. Bhd.
(Company No. 63972-M)

No.26, Jalan Anggerik Vanilla 31/93, Kota Kemuning, 40460 Shah Alam, Selangor Darul Ehsan, Malaysia
t +6(03) 5121 2320 f +6 (03) 5121 9082 www.sgs.com

Test Report

No. CTSSA/22191/13+KA/2013/A0723
CTS Ref. CTSSA/13/3207/Tanaka

Date : 01/11/2013

Page: 2 of 15

Test results:

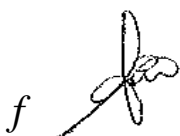
Test Part Description :

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

SGS LABORATORY SERVICES (M) SDN. BHD.



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

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Test Report

No. CTSSA/22191/13+KA/2013/A0723
CTS Ref. CTSSA/13/3207/Tanaka

Date : 01/11/2013

Page: 3 of 15

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

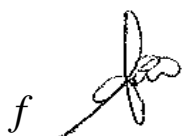
b. Positive means the presence of Cr(VI) on the tested areas;

The detected concentration in 50 mL boiling water extraction solution is equal or greater than 0.02 mg/kg with 50 cm² 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 Report

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CTS Ref. CTSSA/13/3207/Tanaka

Date : 01/11/2013

Page: 4 of 15

Test results by chemical method:

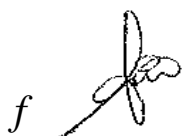
Test Item (s):	Unit	Method	Result	MDL
Antimony (Sb)	mg/kg	With reference to EPA Method 3051A, and performed by ICP-OES	N.D.	2
Magnesium (Mg)	mg/kg	With reference to EPA Method 3051A, and performed by ICP-OES	N.D.	2
Beryllium (Be)	mg/kg	With reference to EPA Method 3051A, and performed by ICP-OES	5	2
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
(d) --- = Not Conducted
(e) "-" = Not regulated
(f) ** = Qualitative analysis (no unit)
(g) MDL= Method Detection Limit
(h) Negative = Undetectable / Positive = Detectable

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Test Report

No. CTSSA/22191/13+KA/2013/A0723
CTS Ref. CTSSA/13/3207/Tanaka

Date : 01/11/2013

Page: 5 of 15

Test results by chemical method:

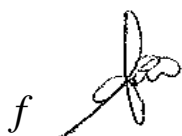
Test Item (s):	Unit	Method	Result	MDL
Hexabromocyclododecane (HBCDD)	mg/kg	Based on EPA 3540C, and performed by GC-MS	N.D.	10
Phthalates	---	---	---	---
DBP (Di-butyl phthalate)	%	With reference to Chromatographia Vol.47, No.784, 1998. Analysis was performed by GC/MS.	N.D.	0.003
DEHP (Di-(2-ethylhexyl 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
*Di-isobutyl phthalate (DIBP)	%	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
(e) * = The above result is extracted from the Report No. CTSSA/22889/13

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Test Report

No. CTSSA/22191/13+KA/2013/A0723
CTS Ref. CTSSA/13/3207/Tanaka

Date : 01/11/2013

Page: 6 of 15

Test Part Description :

Sample Description : Au Bonding Wire

Test results:

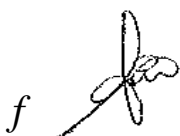
Test Item (s):	Unit	Method	Result	MDL
Dimethyl Fumarate (CAS No. 624-49-7)	mg/kg	With reference to US EPA 3550C method. Analysis was performed by GC/MS.	N.D.	0.1
Perfluorooctane sulfonates (PFOS) PFOS – Acid, Metal Salt, Amide	mg/kg	With reference to US EPA 3540C: 1996 method for PFOS content. Analysis 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
*Polychlorinated Naphthalene (PCNs)	mg/kg	With reference to US EPA 3540C method. Analysis was performed by GC/MS	N.D.	5
*Polychlorinated Terphenyls (PCTs)	mg/kg	With reference to US EPA 3540C method. Analysis was performed by GC/MS	N.D.	0.5

Note : (a) mg/kg = ppm
(b) N.D. = Not Detected
(c) MDL = Method Detection Limit
(d) --- = Not Conducted
(e) * = The above tests were subcontracted to SGS Taiwan based on report no. KA/2013/A0723

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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Test Report

No. CTSSA/22191/13+KA/2013/A0723
CTS Ref. CTSSA/13/3207/Tanaka

Date : 01/11/2013

Page: 7 of 15

Test Part Description :

Sample Description : Au Bonding Wire

TANAKA ELECTRONICS (M) SDN BHD
CTSSA/22191/13+KA/2013/A0723



SGS authenticate the photo on original report only

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Test Report

No. CTSSA/22191/13+KA/2013/A0723
CTS Ref. CTSSA/13/3207/Tanaka

Date : 01/11/2013

Page: 8 of 15

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. 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

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 µm membrane filter
↓
Analyses by GC-MS (with appropriate dilution)

6. 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)

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Test Report

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CTS Ref. CTSSA/13/3207/Tanaka

Date : 01/11/2013

Page: 9 of 15

DETERMINATION OF HALOGEN CONTENT

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


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 (HNO₃) – Microwave
↓
"Totally Dissolved"
↓
Filtration
↓
Analyses by ICP

FLOW CHART FOR PVC DETECTION WITH FTIR

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

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Test Report

No. CTSSA/22191/13+KA/2013/A0723
CTS Ref. CTSSA/13/3207/Tanaka

Date : 01/11/2013

Page: 10 of 15

DETERMINATION OF HBCDD CONTENT

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)

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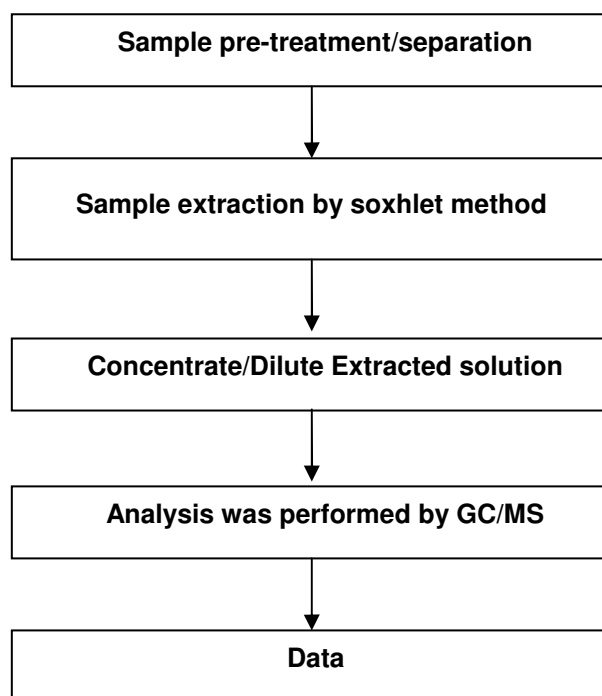
Test Report

No. CTSSA/22191/13+KA/2013/A0723
CTS Ref. CTSSA/13/3207/Tanaka

Date : 01/11/2013

Page: 11 of 15

Analytical flow chart of Phthalates Content



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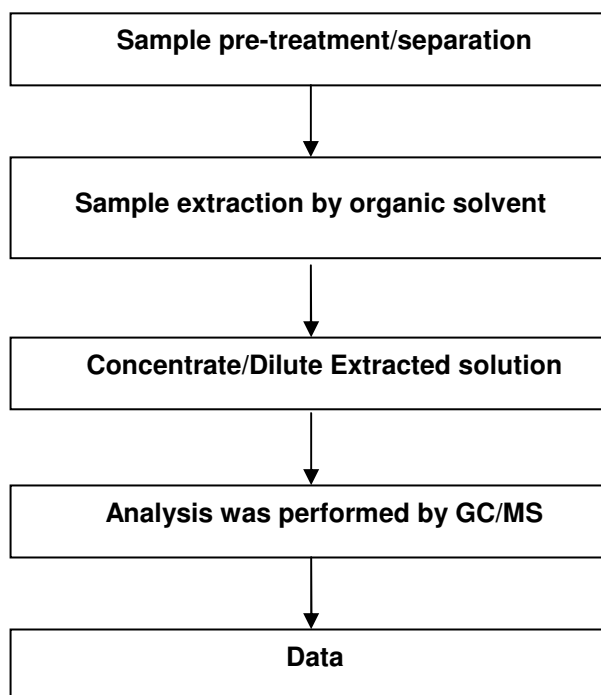
Test Report

No. CTSSA/22191/13+KA/2013/A0723
CTS Ref. CTSSA/13/3207/Tanaka

Date : 01/11/2013

Page: 12 of 15

Analytical Flow Chart for Dimethyl Fumarate



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

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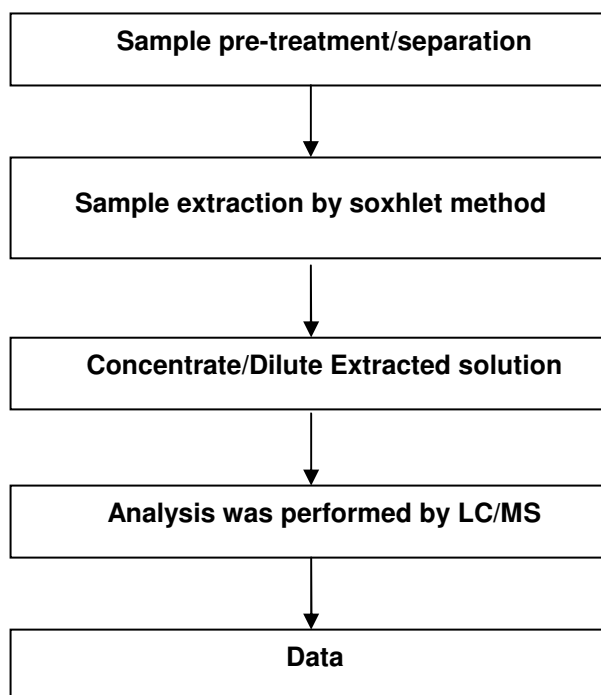
Test Report

No. CTSSA/22191/13+KA/2013/A0723
CTS Ref. CTSSA/13/3207/Tanaka

Date : 01/11/2013

Page: 13 of 15

Analytical Flow Chart of PFOS & PFOA Content



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Test Report

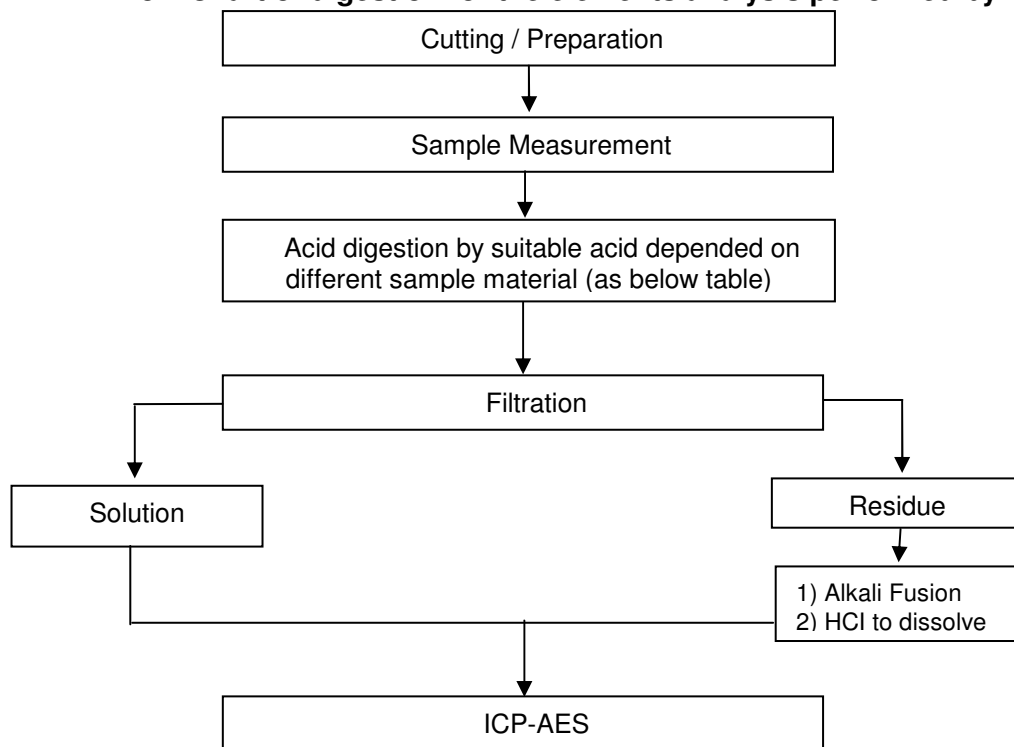
No. CTSSA/22191/13+KA/2013/A0723
CTS Ref. CTSSA/13/3207/Tanaka

Date : 01/11/2013

Page: 14 of 15

- 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 ₂ O ₂
Glass	HNO ₃ /HF
Gold, platinum, palladium, ceramic	Aqua regia
Silver	HNO ₃
Plastic	H ₂ SO ₄ , H ₂ O ₂ , HNO ₃ , HCl
Others	Any acid to total digestion

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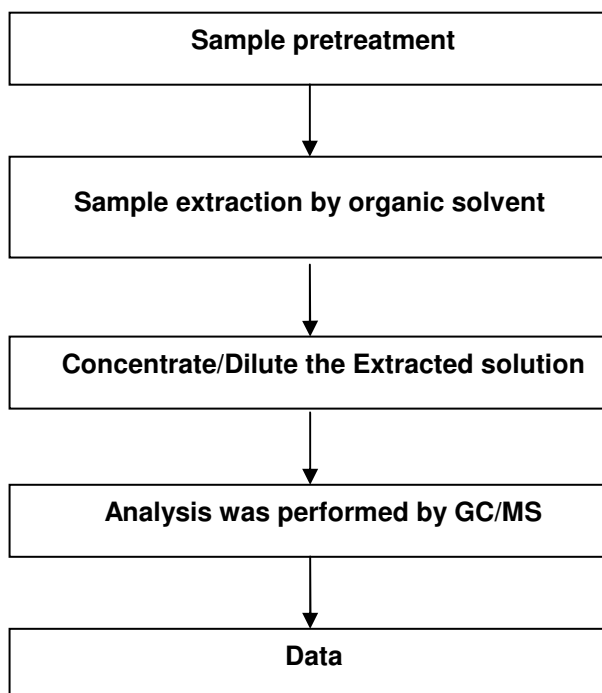
Date : 01/11/2013

Page: 15 of 15

Chlorinated Flame retardant analytical Flow Chart

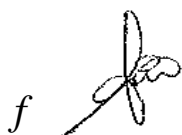
- 1) Name of the person who made measurement: Anson Tsao
- 2) Name of the person in charge of measurement: Ray Chang

- Reference method: US EPA 8270D, US EPA 3540
- Test Item: PCNs, PCTs, Mirex
-



**** End of Report ****

SGS LABORATORY SERVICES (M) SDN. BHD.



CHONG KIEN LEN
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Test Report

No. : CE/2013/41591 Date : 2013/04/22 Page : 1 of 8

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).


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

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Test Report

No. : CE/2013/41591 Date : 2013/04/22 Page : 2 of 8

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
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.
Antimony (Sb)	mg/kg	With reference to US EPA Method 3052. Analysis was performed by ICP-AES.	2	n.d.
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)	mg/kg		50	n.d.
Halogen-Bromine (Br) (CAS No.: 10097-32-2)	mg/kg		50	n.d.
Halogen-Iodine (I) (CAS No.: 14362-44-8)	mg/kg		50	n.d.
Sum of PBBs	mg/kg	With reference to IEC 62321: 2008 and performed by GC/MS.	-	n.d.
Monobromobiphenyl	mg/kg		5	n.d.
Dibromobiphenyl	mg/kg		5	n.d.
Tribromobiphenyl	mg/kg		5	n.d.
Tetrabromobiphenyl	mg/kg		5	n.d.
Pentabromobiphenyl	mg/kg		5	n.d.
Hexabromobiphenyl	mg/kg		5	n.d.
Heptabromobiphenyl	mg/kg		5	n.d.
Octabromobiphenyl	mg/kg		5	n.d.
Nonabromobiphenyl	mg/kg		5	n.d.
Decabromobiphenyl	mg/kg		5	n.d.

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Test Report

No. : CE/2013/41591 Date : 2013/04/22 Page : 3 of 8

HITACHI CHEMICAL CO., LTD.

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



Test Item(s)	Unit	Method	MDL	Result
				No.1
Sum of PBDEs	mg/kg	With reference to IEC 62321: 2008 and performed by GC/MS.	-	n.d.
Monobromodiphenyl ether	mg/kg		5	n.d.
Dibromodiphenyl ether	mg/kg		5	n.d.
Tribromodiphenyl ether	mg/kg		5	n.d.
Tetrabromodiphenyl ether	mg/kg		5	n.d.
Pentabromodiphenyl ether	mg/kg		5	n.d.
Hexabromodiphenyl ether	mg/kg		5	n.d.
Heptabromodiphenyl ether	mg/kg		5	n.d.
Octabromodiphenyl ether	mg/kg		5	n.d.
Nonabromodiphenyl ether	mg/kg		5	n.d.
Decabromodiphenyl ether	mg/kg		5	n.d.

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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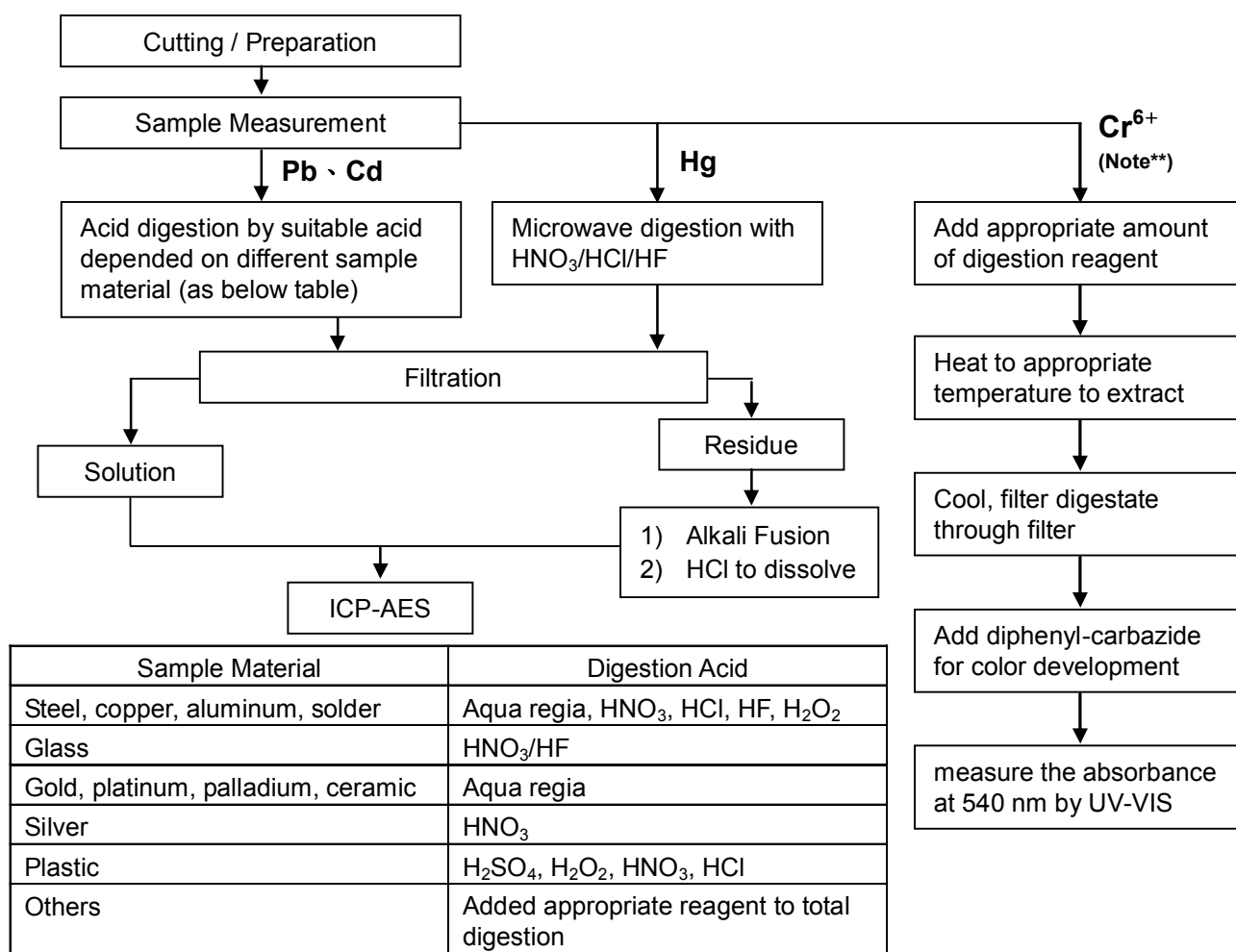
No. : CE/2013/41591 Date : 2013/04/22 Page : 4 of 8

HITACHI CHEMICAL CO., LTD.

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



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



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

Test Report

No. : CE/2013/41591 Date : 2013/04/22 Page : 5 of 8

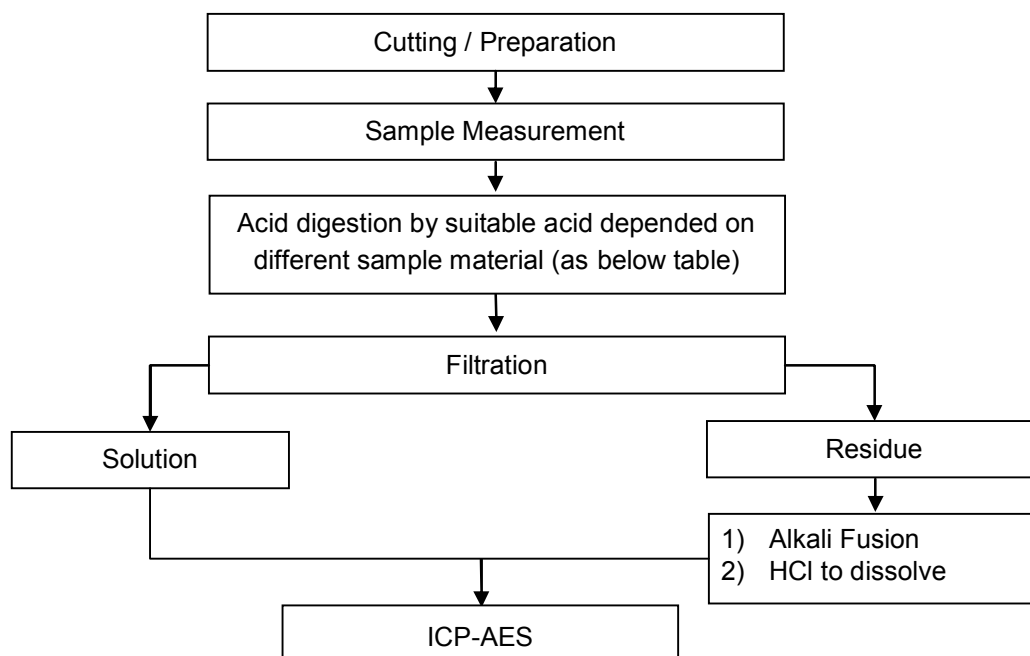
HITACHI CHEMICAL CO., LTD.

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



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

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No. : CE/2013/41591 Date : 2013/04/22 Page : 6 of 8

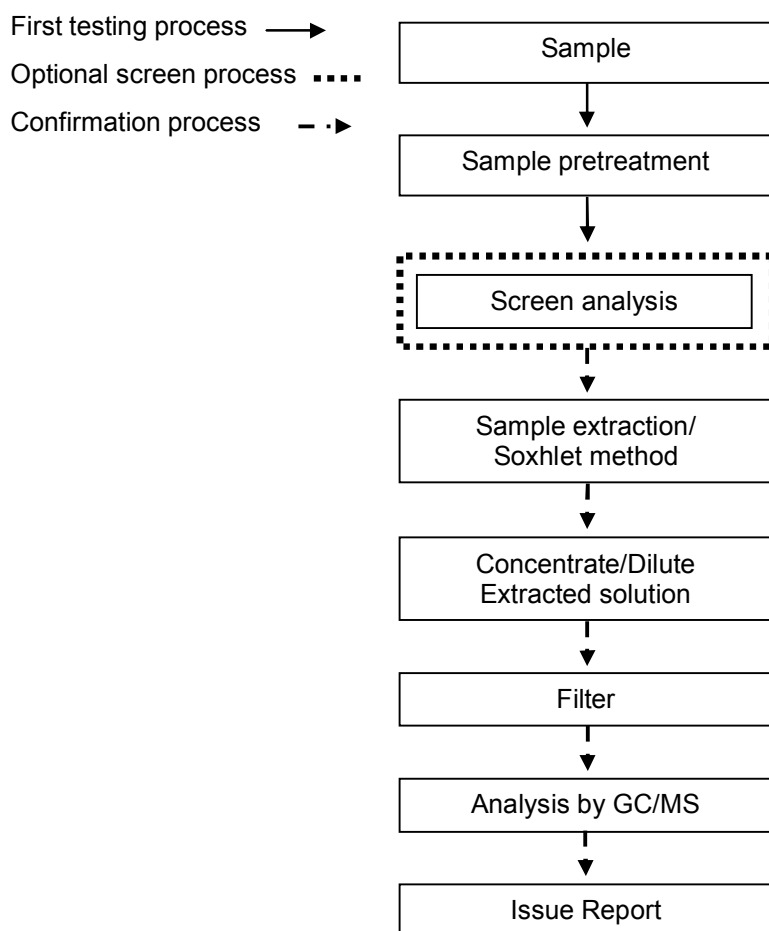
HITACHI CHEMICAL CO., LTD.

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



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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No. : CE/2013/41591 Date : 2013/04/22 Page : 7 of 8

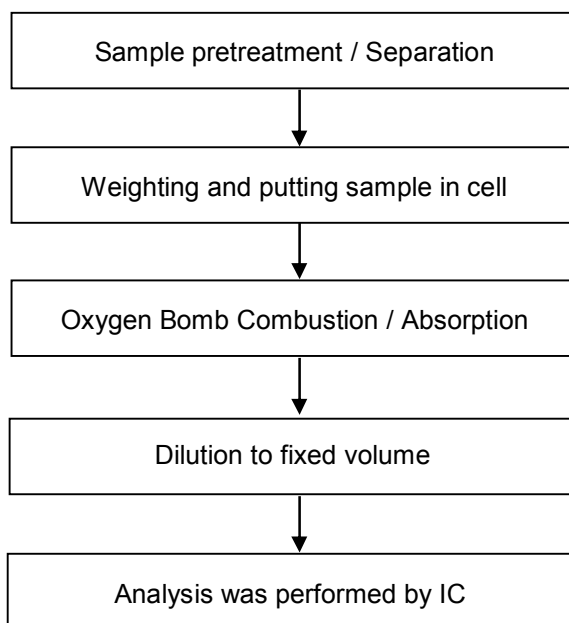
HITACHI CHEMICAL CO., LTD.

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



Analytical flow chart of halogen content

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



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Test Report

No. : CE/2013/41591 Date : 2013/04/22 Page : 8 of 8

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



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

CE/2013/41591



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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).



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

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Test Report

No. : CE/2013/41593 Date : 2013/04/22 Page : 2 of 9

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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Test Report

No. : CE/2013/41593 Date : 2013/04/22 Page : 3 of 9

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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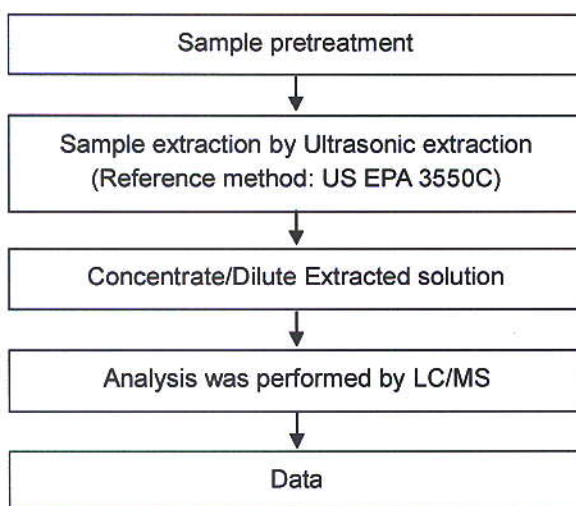
No. : CE/2013/41593 Date : 2013/04/22 Page : 4 of 9

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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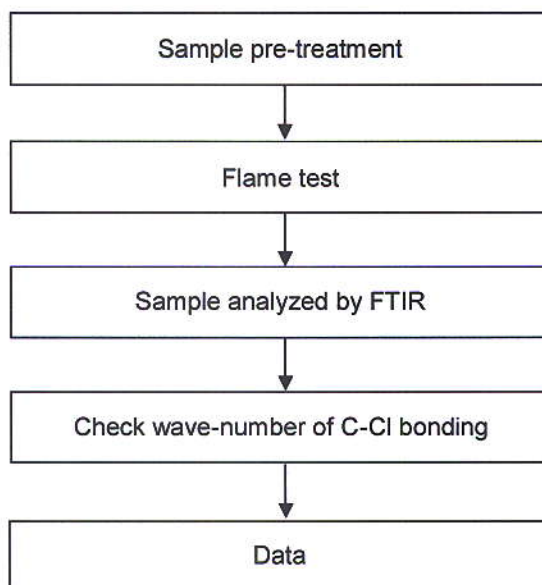
No. : CE/2013/41593 Date : 2013/04/22 Page : 5 of 9

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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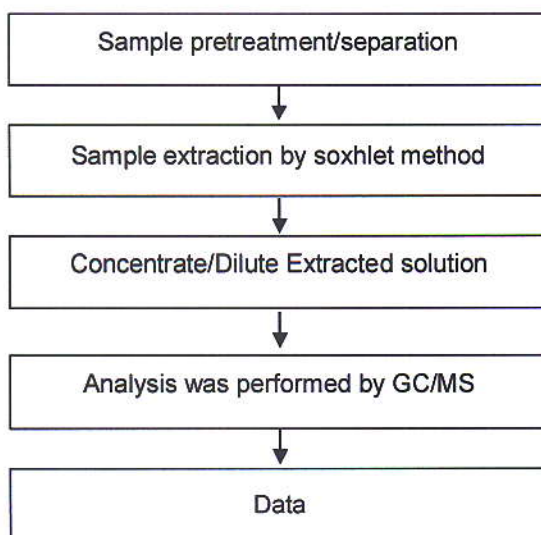
No. : CE/2013/41593 Date : 2013/04/22 Page : 6 of 9

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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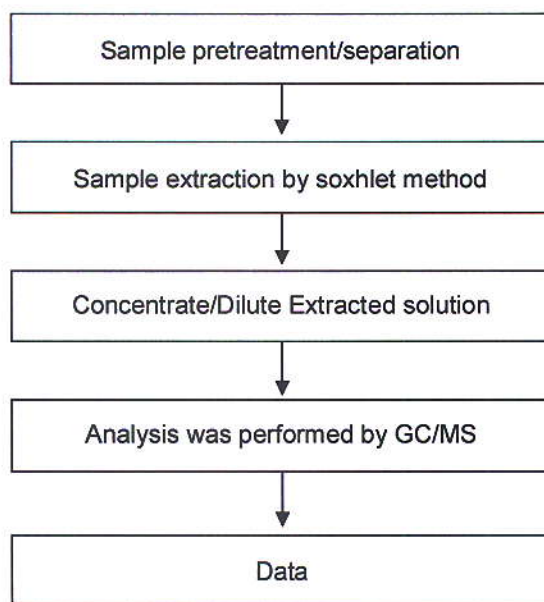
No. : CE/2013/41593 Date : 2013/04/22 Page : 7 of 9

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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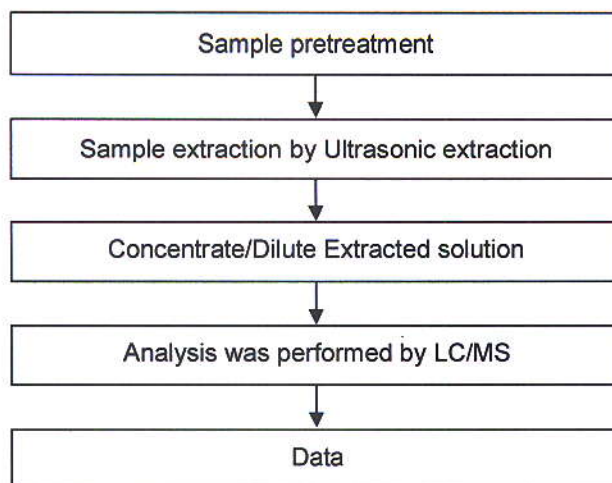
No. : CE/2013/41593 Date : 2013/04/22 Page : 8 of 9

HITACHI CHEMICAL CO., LTD.
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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Test Report

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

HITACHI CHEMICAL CO., LTD.
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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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Test Report

No. : CE/2012/C1068F

Date : 2013/01/18

Page: 1 of 7

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).


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

Page: 2 of 7

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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Test Report

No. : CE/2012/C1068F

Date : 2013/01/18

Page: 3 of 7

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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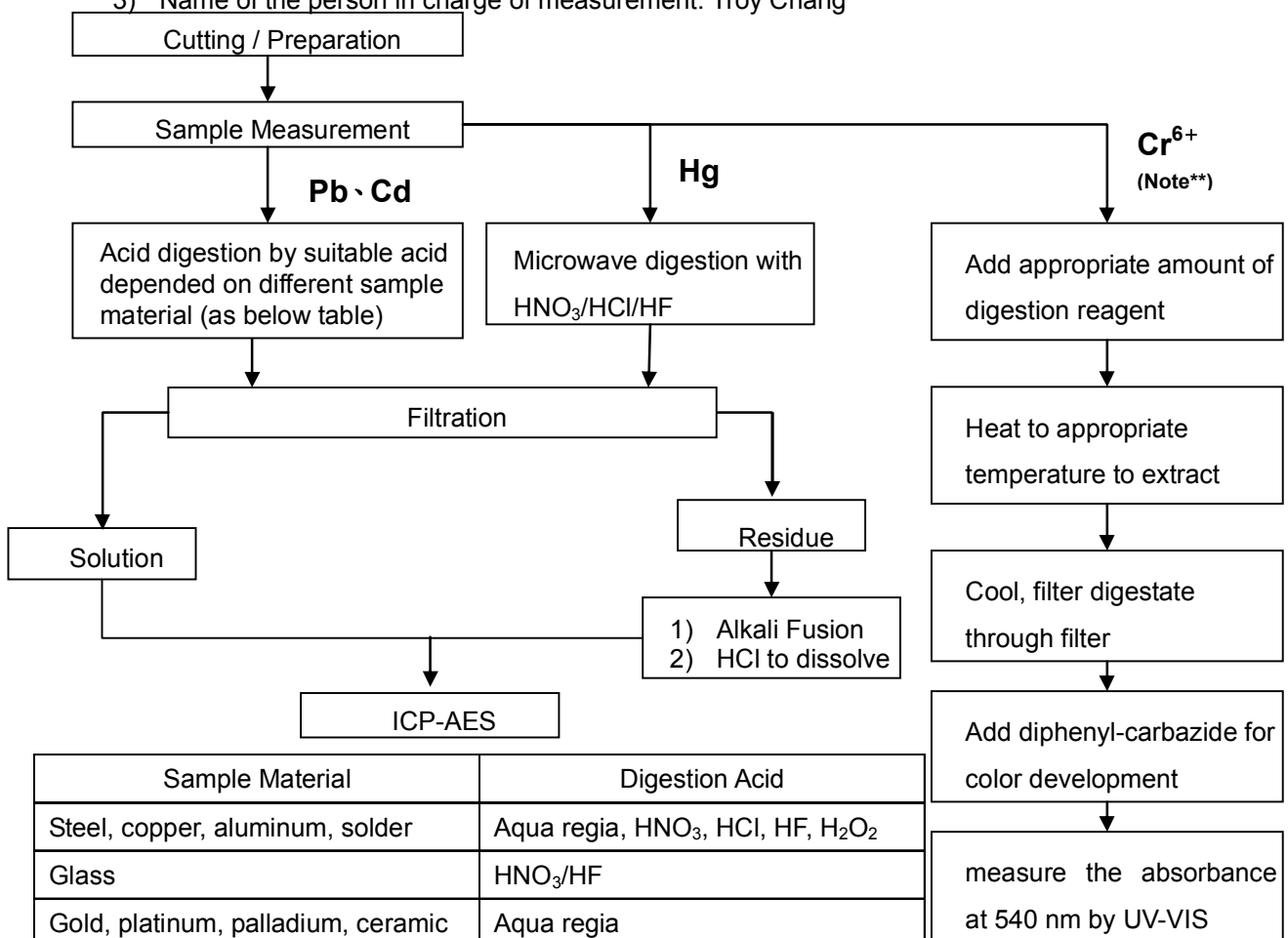
Page: 4 of 7

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.
(Cr⁶⁺ test method excluded)
- 2) Name of the person who made measurement: Climbgreat Yang
- 3) Name of the person in charge of measurement: Troy Chang



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

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

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No. : CE/2012/C1068F

Date : 2013/01/18

Page: 5 of 7

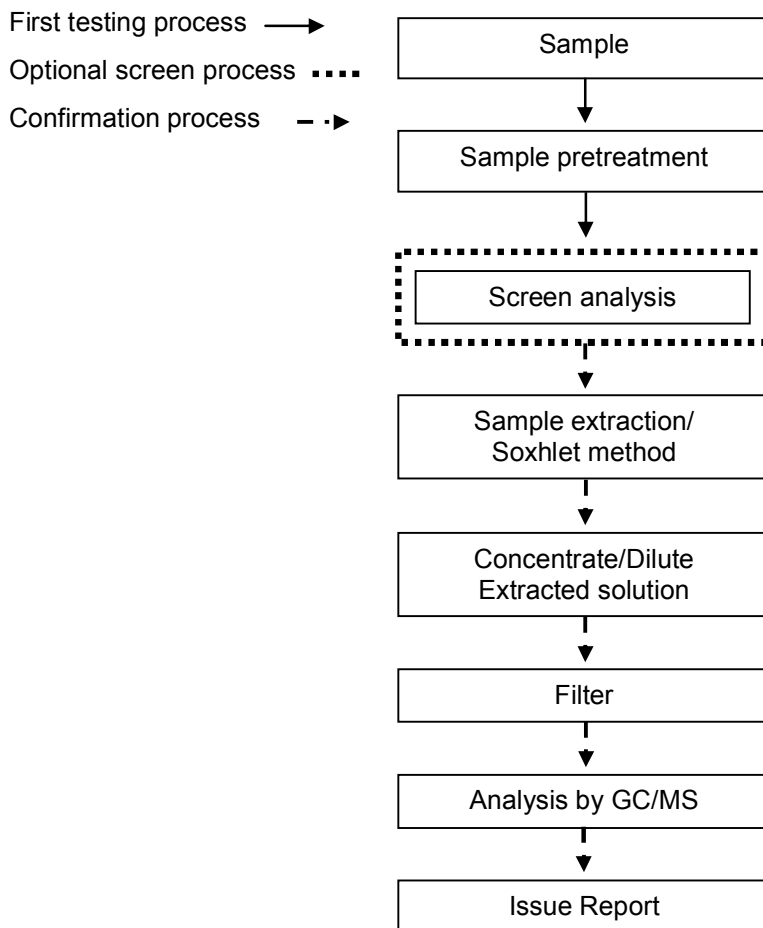
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NO. 3, INNOVATION RD 1, SCIENCE BASED INDUSTRIAL PARK, HSIN-CHU, TAIWAN, R. O. C.

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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No. : CE/2012/C1068F

Date : 2013/01/18

Page: 6 of 7

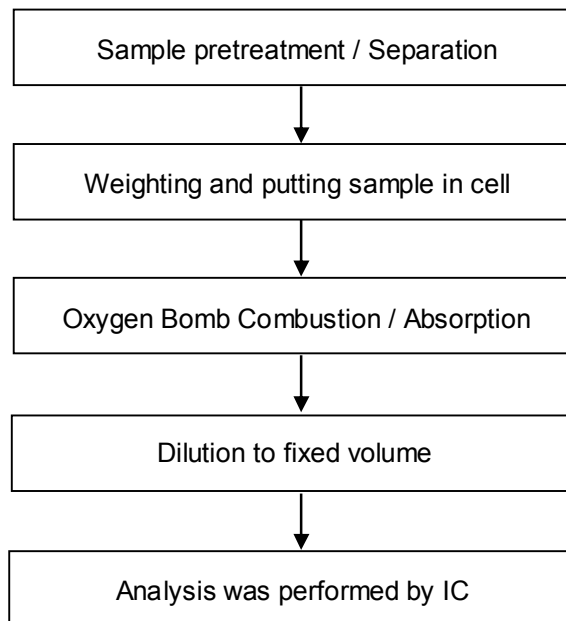
EPISIL TECHNOLOGIES INC.



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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Test Report

No. : CE/2012/C1068F

Date : 2013/01/18

Page: 7 of 7

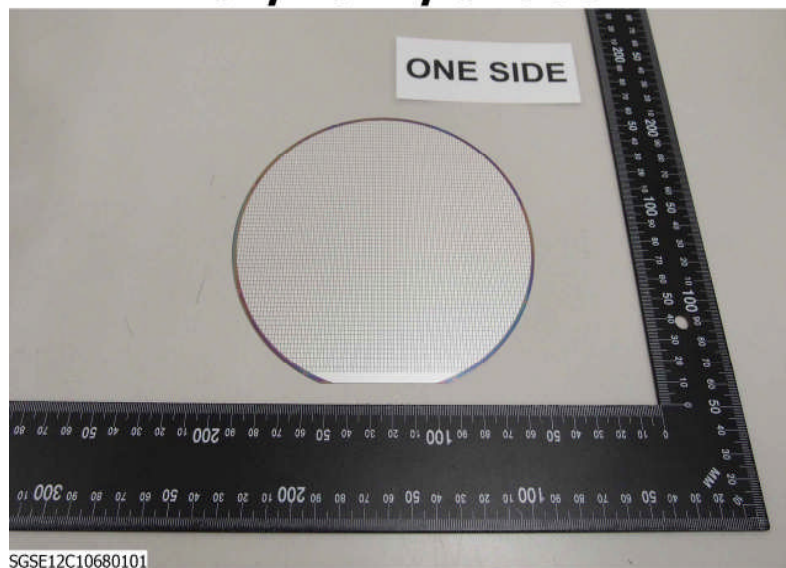
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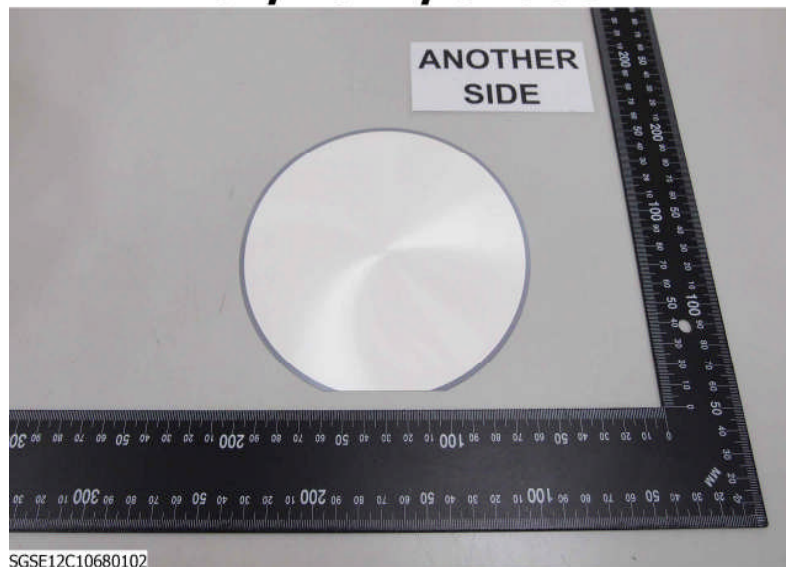


* The tested sample / part is marked by an arrow if it's shown on the photo. *

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