

號碼(No.): ETR23301875

日期(Date): 14-Mar-2023

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昇貿科技股份有限公司 (SHENMAO TECHNOLOGY INC.) 桃園市觀音區大潭里大潭北路665號 (NO. 665, DATAN N. RD., GUANYIN DIST., TAOYUAN CITY 328, TAIWAN)

以下測試樣品係由申請廠商所提供及確認 (The following sample(s) was/were submitted and identified by the applicant as):

樣品名稱(Sample Name) 樣品型號(Style/Item No.) 	:	LEAD-FREE BGA SPHERE PF699-S (96.45Sn/3.0Ag/0.5Cu/0.05Ni)
收件日(Sample Receiving Date) 測試期間(Testing Period)	:	08-Mar-2023 08-Mar-2023 to 14-Mar-2023
測試需求(Test Requested) :	(1)	依據客戶指定,參考RoHS 2011/65/EU Annex II及其修訂指令(EU) 2015/863測 試鎘、鉛、汞、六價鉻、多溴聯苯、多溴聯苯醚, DBP, BBP, DEHP, DIBP。(As specified by client, with reference to RoHS 2011/65/EU Annex II and amending Directive (EU) 2015/863 to determine Cadmium, Lead, Mercury, Cr(VI), PBBs, PBDEs, DBP, BBP, DEHP, DIBP contents in the submitted sample(s).)
測試結果(Test Results)   :	(2)	其他測試項目請見下一頁。 (Please refer to next pages for the other item(s).) 請參閱下一頁 (Please refer to following pages.)

Troy Chand / Department Malage Signed for and on behalf SĞS TAIWAN LTD. Chemical Laboratory - Taipei



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SGS Taiwan Ltd. 台灣檢驗科技股份有限公司



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#### 測試部位敘述 (Test Part Description)

No.1 : 銀色金屬 (SILVER COLORED METAL)

#### 測試結果 (Test Results)

測試項目	測試方法	單位	MDL	結果
(Test Items)	(Method)	(Unit)		(Result)
				No.1
鎘 (Cd) (Cadmium (Cd))	參考IEC 62321-5: 2013.以感應耦合電漿發射光 譜儀分析。(With reference to IEC 62321-5:	mg/kg	2	n.d.
鉛 (Pb) (Lead (Pb))	2013, analysis was performed by ICP-OES.)	mg/kg	2	13.4
汞 (Hg) (Mercury (Hg))	參考IEC 62321-4: 2013+ AMD1: 2017 · 以感應耦 合電漿發射光譜儀分析。(With reference to IEC 62321-4: 2013+ AMD1: 2017, analysis was performed by ICP-OES.)	mg/kg	2	n.d.
六價鉻 (Hexavalent Chromium) Cr(VI) (#2)	參考IEC 62321-7-1: 2015 · 以紫外光-可見光分光 光度計分析。(With reference to IEC 62321-7-1: 2015, analysis was performed by UV-VIS.)	µg/cm²	0.1	n.d.
一溴聯苯 (Monobromobiphenyl)		mg/kg	5	n.d.
二溴聯苯 (Dibromobiphenyl)		mg/kg	5	n.d.
三溴聯苯 (Tribromobiphenyl)		mg/kg	5	n.d.
四溴聯苯 (Tetrabromobiphenyl)		mg/kg	5	n.d.
五溴聯苯 (Pentabromobiphenyl)	參考IEC 62321-6: 2015 · 以氣相層析儀/質譜儀分	mg/kg	5	n.d.
六溴聯苯 (Hexabromobiphenyl)	析。(With reference to IEC 62321-6: 2015,	mg/kg	5	n.d.
七溴聯苯 (Heptabromobiphenyl)	analysis was performed by GC/MS.)	mg/kg	5	n.d.
八溴聯苯 (Octabromobiphenyl)	]	mg/kg	5	n.d.
九溴聯苯 (Nonabromobiphenyl)		mg/kg	5	n.d.
十溴聯苯 (Decabromobiphenyl)		mg/kg	5	n.d.
多溴聯苯總和 (Sum of PBBs)		mg/kg	-	n.d.

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桃園市觀音區大潭里大潭北路665號 (NO. 665, DATAN N. RD., GUANYIN DIST., TAOYUAN CITY 328, TAIWAN)

測試項目 (Test Items)	測試方法 (Method)	單位 (Unit)	MDL	結果 (Result) No.1
一溴聯苯醚 (Monobromodiphenyl ether)		mg/kg	5	n.d.
二溴聯苯醚 (Dibromodiphenyl ether)		mg/kg	5	n.d.
三溴聯苯醚 (Tribromodiphenyl ether)		mg/kg	5	n.d.
四溴聯苯醚 (Tetrabromodiphenyl ether)		mg/kg	5	n.d.
五溴聯苯醚 (Pentabromodiphenyl ether)	參考IEC 62321-6: 2015 · 以氣相層析儀/質譜儀分	mg/kg	5	n.d.
六溴聯苯醚 (Hexabromodiphenyl ether)	析。(With reference to IEC 62321-6: 2015,	mg/kg	5	n.d.
七溴聯苯醚 (Heptabromodiphenyl ether)	analysis was performed by GC/MS.)	mg/kg	5	n.d.
八溴聯苯醚 (Octabromodiphenyl ether)		mg/kg	5	n.d.
九溴聯苯醚 (Nonabromodiphenyl ether)		mg/kg	5	n.d.
十溴聯苯醚 (Decabromodiphenyl ether)		mg/kg	5	n.d.
多溴聯苯醚總和 (Sum of PBDEs)		mg/kg	-	n.d.
鄰苯二甲酸丁苯甲酯 (BBP) (Butyl benzyl phthalate (BBP))	參考IEC 62321-8: 2017 · 以氣相層析儀/質譜儀分 析。(With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.)	mg/kg	50	n.d.
鄰苯二甲酸二丁酯 (DBP) (Dibutyl phthalate (DBP))	參考IEC 62321-8: 2017 · 以氣相層析儀/質譜儀分 析。(With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.)	mg/kg	50	n.d.
鄰苯二甲酸二(2-乙基己基)酯 (DEHP) (Di- (2-ethylhexyl) phthalate (DEHP))	參考IEC 62321-8: 2017 · 以氣相層析儀/質譜儀分 析。(With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.)	mg/kg	50	n.d.
鄰苯二甲酸二異丁酯 (DIBP) (Diisobutyl phthalate (DIBP))	參考IEC 62321-8: 2017 · 以氣相層析儀/質譜儀分 析。(With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.)	mg/kg	50	n.d.
鄰苯二甲酸二異癸酯 (DIDP) (Diisodecyl phthalate (DIDP)) (CAS No.: 26761-40- 0, 68515-49-1)	參考IEC 62321-8: 2017 · 以氣相層析儀/質譜儀分 析。(With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.)	mg/kg	50	n.d.
鄰苯二甲酸二異壬酯 (DINP) (Diisononyl phthalate (DINP)) (CAS No.: 28553-12- 0, 68515-48-0)	參考IEC 62321-8: 2017 · 以氣相層析儀/質譜儀分 析。(With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.)	mg/kg	50	n.d.
鄰苯二甲酸二正辛酯 (DNOP) (Di-n-octyl phthalate (DNOP)) (CAS No.: 117-84-0)	參考IEC 62321-8: 2017 · 以氣相層析儀/質譜儀分 析。(With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.)	mg/kg	50	n.d.

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SGS Taiwan Ltd. 台灣檢驗科技股份有限公司



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桃園市觀音區大潭里大潭北路665號 (NO. 665, DATAN N. RD., GUANYIN DIST., TAOYUAN CITY 328, TAIWAN)

測試項目 (Test Items)	測試方法 (Method)	單位 (Unit)	MDL	結果 (Result) No.1
六溴環十二烷及所有主要被辨別出的異構物 (HBCDD) (α- HBCDD, β- HBCDD, γ- HBCDD) (Hexabromocyclododecane (HBCDD) and all major diastereoisomers identified (α- HBCDD, β- HBCDD, γ- HBCDD)) (CAS No.: 25637-99-4, 3194-55-6 (134237-51-7, 134237-50-6, 134237-52-8))	參考IEC 62321: 2008 · 以氣相層析儀/質譜儀分 析。(With reference to IEC 62321: 2008, analysis was performed by GC/MS.)	mg/kg	5	n.d.
氯 (Cl) (Chlorine (Cl)) (CAS No.: 22537- 15-1)	參考BS EN 14582: 2016 · 以離子層析儀分析。 (With reference to BS EN 14582: 2016, analysis was performed by IC.)	mg/kg	50	n.d.
溴 (Br) (Bromine (Br)) (CAS No.: 10097- 32-2)	參考BS EN 14582: 2016 · 以離子層析儀分析。 (With reference to BS EN 14582: 2016, analysis was performed by IC.)	mg/kg	50	n.d.
全氟辛烷磺酸及其鹽類 (PFOS and its salts) (CAS No.: 1763-23-1 and its salts)	參考CEN/TS 15968: 2010 · 以液相層析串聯質譜 儀分析。(With reference to CEN/TS 15968: 2010, analysis was performed by LC/MS/MS.)	mg/kg	0.01	n.d.
全氟辛酸及其鹽類 (PFOA and its salts) (CAS No.: 335-67-1 and its salts)	參考CEN/TS 15968: 2010 · 以液相層析串聯質譜 儀分析。(With reference to CEN/TS 15968: 2010, analysis was performed by LC/MS/MS.)	mg/kg	0.01	n.d.
多氯聯苯 (PCBs) (Polychlorinated biphenyls (PCBs))	參考US EPA 3550C: 2007 · 以氣相層析儀/質譜儀 分析。(With reference to US EPA 3550C: 2007, analysis was performed by GC/MS.)	mg/kg	0.5	n.d.
多氯奈 (PCNs) (Polychlorinated naphthalene (PCNs))	參考US EPA 3550C: 2007.以氣相層析儀/質譜儀 分析。(With reference to US EPA 3550C: 2007, analysis was performed by GC/MS.)	mg/kg	5	n.d.
多氯三聯苯 (PCTs) (Polychlorinated terphenyls (PCTs))	參考US EPA 3550C: 2007.以氣相層析儀/質譜儀 分析。(With reference to US EPA 3550C: 2007, analysis was performed by GC/MS.)	mg/kg	0.5	n.d.
短鏈氯化石蠟(C10-C13) (SCCP) (Short Chain Chlorinated Paraffins(C10-C13) (SCCP)) (CAS No.: 85535-84-8)	參考ISO 18219-1: 2021 · 以氣相層析儀/質譜儀分 析。(With reference to ISO 18219-1: 2021, analysis was performed by GC/MS.)	mg/kg	50	n.d.

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測試項目 (Test Items)	測試方法 (Method)	單位 (Unit)	MDL	結果 (Result)
三丁基錫 (TBT) (Tributyl tin (TBT))	参考ISO 17353: 2004 · 以氣相層析儀/火焰光度偵 測器分析。(With reference to ISO 17353: 2004, analysis was performed by GC/FPD.)	mg/kg	0.03	No.1 n.d.
氧化雙三丁基錫 (TBTO) (Bis(tributyltin) oxide (TBTO)) (CAS No.: 56-35-9)	由三丁基錫測試結果計算得之。(Calculated from the result of Tributyl Tin (TBT).)	mg/kg	0.03 🛦	n.d.
三苯基錫 (TPT) (Triphenyl tin (TPT))	參考ISO 17353: 2004.以氣相層析儀/火焰光度偵 測器分析。(With reference to ISO 17353: 2004, analysis was performed by GC/FPD.)	mg/kg	0.03	n.d.
二丁基錫 (DBT) (Dibutyl tin (DBT))	參考ISO 17353: 2004 · 以氣相層析儀/火焰光度偵 測器分析。(With reference to ISO 17353: 2004, analysis was performed by GC/FPD.)	mg/kg	0.03	n.d.
二辛基錫 (DOT) (Dioctyl tin (DOT))	參考ISO 17353: 2004 · 以氣相層析儀/火焰光度偵 測器分析。(With reference to ISO 17353: 2004, analysis was performed by GC/FPD.)	mg/kg	0.03	n.d.
聚氯乙烯 (Polyvinyl chloride) (PVC)	參考ASTM E1252: 2021 · 以傅立葉轉換紅外線光 譜儀及焰色法分析。(With reference to ASTM E1252: 2021, analysis was performed by FT-IR and Flame Test.)	**	-	Negative
砷 (As) (Arsenic (As)) (CAS No.: 7440- 38-2)	參考US EPA 3052: 1996 · 以感應耦合電漿發射光 譜儀分析。(With reference to US EPA 3052: 1996, analysis was performed by ICP-OES.)	mg/kg	2	n.d.
鈹 (Be) (Beryllium (Be)) (CAS No.: 7440- 41-7)	參考US EPA 3052: 1996 · 以感應耦合電漿發射光 譜儀分析。(With reference to US EPA 3052: 1996, analysis was performed by ICP-OES.)	mg/kg	2	n.d.
銻 (Sb) (Antimony (Sb)) (CAS No.: 7440- 36-0)	參考US EPA 3052: 1996,以感應耦合電漿發射光 譜儀分析。(With reference to US EPA 3052: 1996, analysis was performed by ICP-OES.)	mg/kg	2	13.2

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### 測試報告

### **Test Report**

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#### 備註(Note):

- 1. mg/kg = ppm ; 0.1wt% = 0.1% = 1000ppm
- 2. MDL = Method Detection Limit (方法偵測極限值)
- 3. n.d. = Not Detected (未檢出); 小於MDL / Less than MDL
- 4. "-" = Not Regulated (無規格值)
- 5. \*\*= Qualitative analysis (No Unit) 定性分析(無單位)
- 6. Negative = Undetectable 陰性(未偵測到); Positive = Detectable 陽性(已偵測到)
- 7. 全氟辛烷磺酸及其鹽類包含等物質 (PFOS and its salts including): CAS No.: 1763-23-1, 2795-39-3, 29457-72-5, 29081-56-9, 70225-14-8, 56773-42-3, 251099-16-8, 307-35-7, 91036-71-4, 4021-47-0 and others.
- 8. 全氟辛酸及其鹽類包含等物質 (PFOA and its salts including): CAS No.: 335-67-1, 335-95-5, 2395-00-8, 335-93-3, 335-66-0, 3825-26-1 and others.
- 9. (#2) =

a. 當六價鉻結果大於0.13 µg/cm<sup>2</sup> · 表示樣品表層含有六價鉻。(The sample is positive for Cr(VI) if the Cr(VI) concentration is greater than 0.13 µg/cm<sup>2</sup>. The sample coating is considered to contain Cr(VI).) b. 當六價鉻結果為n.d. (濃度小於0.10 µg/cm<sup>2</sup>) · 表示表層不含六價鉻。(The sample is negative for Cr(VI) if Cr(VI) is n.d. (concentration less than 0.10 µg/cm<sup>2</sup>). The coating is considered a non-Cr(VI) based coating) c. 當六價鉻結果介於 0.10 及 0.13 µg/cm<sup>2</sup> 時 · 無法確定塗層是否含有六價鉻。(The result between 0.10 µg/cm<sup>2</sup> and 0.13 µg/cm<sup>2</sup> is considered to be inconclusive - unavoidable coating variations may influence the determination.)

10. ▲: MDL是針對元素/測試化合物之評估。(The MDL was evaluated for element / tested substance.)

AX	A	F		
氧化雙三丁基錫 (Bis(tributyltin)oxide) (TBTO)	三丁基錫 (Tributyl Tin) (TBT)	1.0276		

參數換算表 (Parameter Conversion Table):

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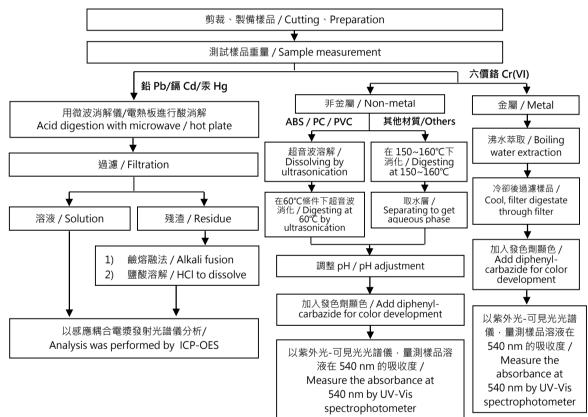
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#### 重金屬流程圖 / Analytical flow chart of heavy metal

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 )



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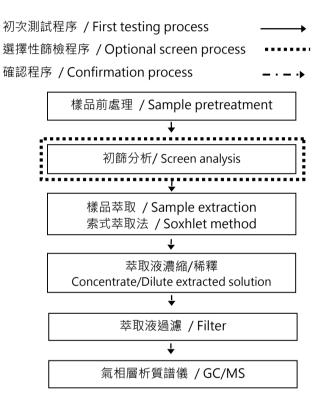
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#### 多溴聯苯/多溴聯苯醚分析流程圖 / Analytical flow chart - PBBs/PBDEs



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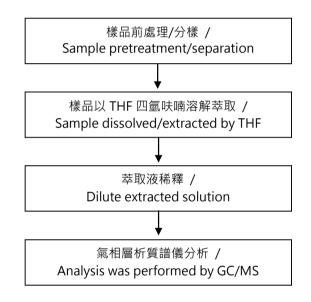
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可塑劑分析流程圖 / Analytical flow chart - Phthalate

【測試方法/Test method: IEC 62321-8】



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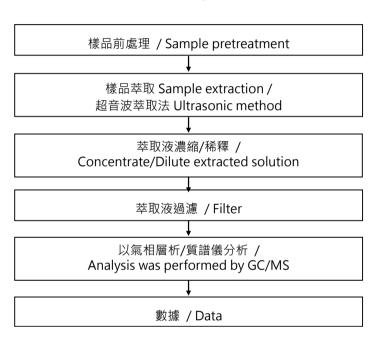
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#### 六溴環十二烷分析流程圖 / Analytical flow chart - HBCDD

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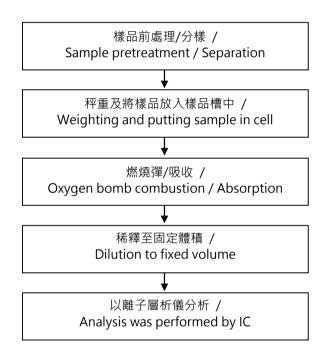
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鹵素分析流程圖 / Analytical flow chart - Halogen

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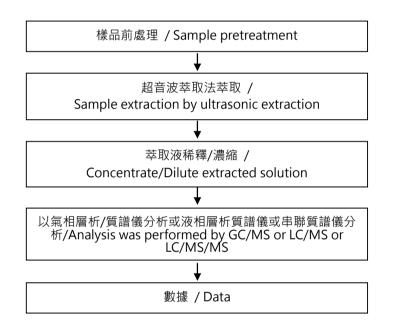
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# 全氟化合物(包含全氟辛酸/全氟辛烷磺酸/其相關化合物等等)分析流程圖 / Analytical flow chart – PFAS (including PFOA/PFOS/its related compound, etc.)



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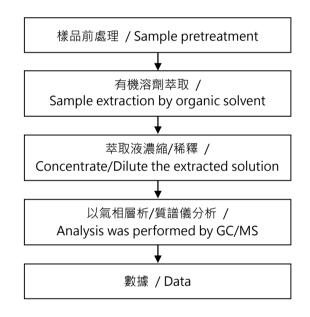
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#### 分析流程圖 / Analytical flow chart

【適用於:多氯聯苯、多氯奈、多氯三聯苯、滅蟻靈、氯化石蠟、DBBT】

\*Apply to: PCBs, PCNs, PCTs, Mirex, Chlorinated Paraffins, DBBT



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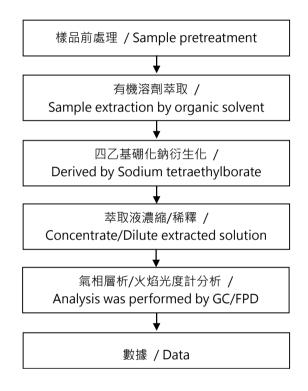
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#### 有機錫分析流程圖 / Analytical flow chart - Organic-Tin



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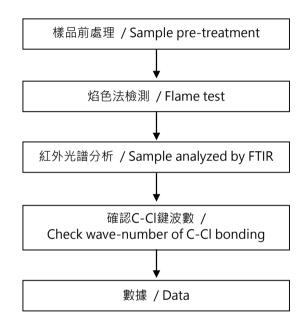
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#### 聚氯乙烯物質判定分析流程圖 / Analysis flow chart - PVC



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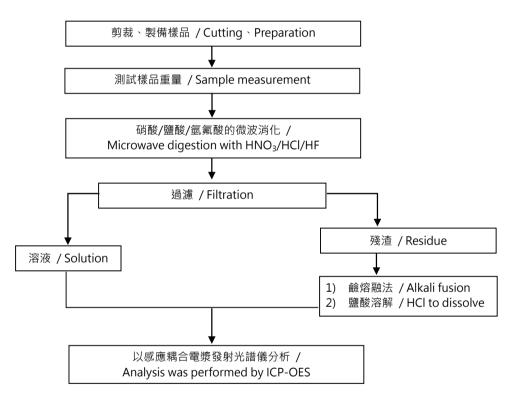
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#### 元素(含重金屬)分析流程圖 / Analytical flow chart of elements (Heavy metal included)

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.

【參考方法/Reference method:US EPA 3051A、US EPA 3052】



\* US EPA 3051A 方法未添加氫氟酸 / US EPA 3051A method does not add HF.

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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.)



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