

試驗報告

Test Report

ASM MATERIALS CHINA LTD

號碼(No.) : KA/2020/91603 日期(Date) : 2020/09/30

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BLOCK 10-17, FUQIAO INDUSTRIAL ESTATE, FUYONG, BAOAN, SHENZHEN, CHINA

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/on behalf of the applicant as):

送樣廠商(Sample Submitted By) : ASM MATERIALS CHINA LTD
樣品名稱(Sample Description) : Pd PLATING LAYER
收件日期(Sample Receiving Date) : 2020/09/22
測試期間(Testing Period) : 2020/09/22 to 2020/09/28

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).)
- (2) 其他測試項目請見下一頁. (Please refer to next pages for the other item(s).)

測試結果(Test Results)

: 請見下一頁 (Please refer to next pages).

結論(Conclusion)

- (1) 根據客戶所選擇的部位測試, 其鎘、鉛、汞、六價鉻、多溴聯苯、多溴聯苯醚, DBP, BBP, DEHP, DIBP的測試結果符合RoHS 2011/65/EU Annex II暨其修訂指令(EU) 2015/863之限值要求. (Based on the performed tests on selected part of submitted sample(s), the test results of Cadmium, Lead, Mercury, Cr(VI), PBBs, PBDEs, DBP, BBP, DEHP, DIBP comply with the limits as set by RoHS Directive (EU) 2015/863 amending Annex II to Directive 2011/65/EU.)


報告簽署人/張伯睿/博士/技術經理
Ray Chang, Ph.D./Manager -Tech
Signed for and on behalf of
SGS Taiwan Limited
化學實驗室-高雄/Chemical Laboratory Kaohsiung



PIN CODE: 976C45B0

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測試結果(Test Results)

測試部位(PART NAME) NO. 1 : 銀色鍍層 (SILVER COLORED METAL PLATING LAYER)
 測試部位(PART NAME) NO. 2 : 銀色金屬片(含鍍層) (SILVER COLORED METAL SHEET(INCLUDING THE PLATING LAYER))

測試項目 (Test Items)	單位 (Unit)	測試方法 (Method)	MDL	結果 (Result)		法規 限值 (Limit)
				NO. 1	NO. 2	
鎘 / Cadmium (Cd)	mg/kg	酸洗脫鍍層, 參考IEC 62321-5: 2013, 以感應耦合電漿發射光譜儀檢測. / IEC 62321-5: 2013 application of modified digestion by surface etching and performed by ICP-OES.	2	n. d.	---	100
鉛 / Lead (Pb)	mg/kg	酸洗脫鍍層, 參考IEC 62321-5: 2013, 以感應耦合電漿發射光譜儀檢測. / IEC 62321-5: 2013 application of modified digestion by surface etching and performed by ICP-OES.	2	17.8	---	1000
汞 / Mercury (Hg)	mg/kg	酸洗脫鍍層, 參考IEC 62321-4:2013+AMD1:2017, 以感應耦合電漿發射光譜儀檢測. / IEC 62321-4:2013+AMD1:2017 application of modified digestion by surface etching and performed by ICP-OES.	2	n. d.	---	1000
六價鉻 / Hexavalent Chromium Cr(VI)(#2)	µg/cm ²	參考IEC 62321-7-1:2015, 以UV-VIS 檢測. / With reference to IEC 62321-7-1:2015 and performed by UV-VIS.	0.10	n. d.	---	-

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測試項目 (Test Items)	單位 (Unit)	測試方法 (Method)	MDL	結果 (Result)		法規 限值 (Limit)	
				NO. 1	NO. 2		
多溴聯苯總和 / Sum of PBBs	mg/kg	參考IEC 62321-6:2015，以氣相層析 / 質譜儀檢測。 / With reference to IEC 62321-6:2015 and performed by GC/MS.	-	---	n. d.	1000	
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	mg/kg		5	---	n. d.	-	
六溴聯苯 / Hexabromobiphenyl	mg/kg		5	---	n. d.	-	
七溴聯苯 / Heptabromobiphenyl	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.	-	
多溴聯苯醚總和 / Sum of PBDEs	mg/kg		參考US EPA 3052: 1996，以感應耦合電漿發射光譜儀檢測。 / With reference to US EPA 3052: 1996. Analysis was performed by ICP-OES.	-	---	n. d.	1000
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	mg/kg			5	---	n. d.	-
六溴聯苯醚 / Hexabromodiphenyl ether	mg/kg			5	---	n. d.	-
七溴聯苯醚 / Heptabromodiphenyl ether	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.	-		
銻 / Antimony (Sb)	mg/kg	由銻結果計算得之。 / Calculated from the result of Antimony.	2	---	n. d.	-	
三氧化二銻 / Antimony trioxide (Sb ₂ O ₃) (CAS No. : 1309-64-4)	mg/kg		2 (▲)	---	n. d.	-	

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測試項目 (Test Items)	單位 (Unit)	測試方法 (Method)	MDL	結果 (Result)		法規 限值 (Limit)
				NO. 1	NO. 2	
鈹 / Beryllium (Be)	mg/kg	參考US EPA 3052: 1996, 以感應耦合電漿發射光譜儀檢測。 / With reference to US EPA 3052: 1996. Analysis was performed by ICP-OES.	2	---	n. d.	-
多氯聯苯 / Polychlorinated Biphenyls (PCBs)	mg/kg	參考US EPA 3550C: 2007, 以氣相層析/質譜儀檢測。 / With reference to US EPA 3550C: 2007. Analysis was performed by GC/MS.	0.5	---	n. d.	-
多氯萘 / Polychlorinated Naphthalene (PCNs)	mg/kg	參考US EPA 3550C: 2007, 以氣相層析/質譜儀檢測。 / With reference to US EPA 3550C: 2007. Analysis was performed by GC/MS.	5	---	n. d.	-
多氯三聯苯 / Polychlorinated Terphenyls (PCTs)	mg/kg	參考US EPA 3550C: 2007, 以氣相層析/質譜儀檢測。 / With reference to US EPA 3550C: 2007. 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. : 85535-84-8)	mg/kg	參考US EPA 3550C: 2007, 以氣相層析儀/電子補捉偵測器檢測。 / With reference to US EPA 3550C: 2007. Analysis was performed by GC/ECD.	100	---	n. d.	-
鹵素 / Halogen						
鹵素 (氟) / Halogen-Fluorine (F) (CAS No. : 14762-94-8)	mg/kg	參考BS EN 14582:2016, 以離子層析儀檢測。 / With reference to BS EN 14582:2016. Analysis was performed by IC.	50	---	n. d.	-
鹵素 (氯) / Halogen-Chlorine (Cl) (CAS No. : 22537-15-1)	mg/kg		50	---	n. d.	-
鹵素 (溴) / Halogen-Bromine (Br) (CAS No. : 10097-32-2)	mg/kg		50	---	n. d.	-
鹵素 (碘) / Halogen-Iodine (I) (CAS No. : 14362-44-8)	mg/kg		50	---	n. d.	-

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測試項目 (Test Items)	單位 (Unit)	測試方法 (Method)	MDL	結果 (Result)		法規 限值 (Limit)
				NO. 1	NO. 2	
有機錫 / Organic-tin compounds						
三丁基錫 / Tributyl Tin (TBT)	mg/kg	參考ISO 17353: 2004, 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)	mg/kg		0.03	---	n. d.	-
二丁基錫 / Dibutyl Tin (DBT)	mg/kg		0.03	---	n. d.	-
二辛基錫 / Dioctyl Tin (DOT)	mg/kg		0.03	---	n. d.	-
氧化雙三丁基錫 / Bis(tributyltin)oxide (TBTO) (CAS No.: 56-35-9)	mg/kg	參考ISO 17353: 2004, 以氣相層析儀/火焰光度偵測器檢測; 由三丁基錫測試結果計算得之。 / With reference to ISO 17353: 2004. Analysis was performed by GC/FPD. Calculated from the result of Tributyl Tin (TBT).	0.03 (▲)	---	n. d.	-
全氟辛酸及其鹽類 / PFOA and its salts (CAS No.: 335-67-1 and its salts)	mg/kg	參考CEN/TS 15968 (2010), 以液相層析/串聯質譜儀檢測。 / With reference to CEN/TS 15968 (2010). Analysis was performed by LC/MSMS.	0.01	---	n. d.	-
全氟辛烷磺酸及其鹽類 / PFOS and its salts (CAS No.: 1763-23-1 and its salts)	mg/kg	參考CEN/TS 15968 (2010), 以液相層析/串聯質譜儀檢測。 / With reference to CEN/TS 15968 (2010). Analysis was performed by LC/MSMS.	0.01	---	n. d.	-
可塑劑定量分析 / Phthalates						
鄰苯二甲酸丁苯甲酯 / BBP (Butyl Benzyl phthalate) (CAS No.: 85-68-7)	mg/kg	參考IEC 62321-8:2017, 以氣相層析/質譜儀檢測。 / With reference to IEC 62321-8:2017. Analysis was performed by GC/MS.	50	---	n. d.	1000
鄰苯二甲酸二丁酯 / DBP (Dibutyl phthalate) (CAS No.: 84-74-2)	mg/kg	參考IEC 62321-8:2017, 以氣相層析/質譜儀檢測。 / With reference to IEC 62321-8:2017. Analysis was performed by GC/MS.	50	---	n. d.	1000

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測試項目 (Test Items)	單位 (Unit)	測試方法 (Method)	MDL	結果 (Result)		法規 限值 (Limit)
				NO. 1	NO. 2	
鄰苯二甲酸二(2-乙基己基)酯 / DEHP (Di-(2-ethylhexyl) phthalate) (CAS No.: 117-81-7)	mg/kg	參考IEC 62321-8:2017, 以氣相層析 /質譜儀檢測。 / With reference to IEC 62321-8:2017. Analysis was performed by GC/MS.	50	---	n. d.	1000
鄰苯二甲酸二異丁酯 / DIBP (Di- isobutyl phthalate) (CAS No.: 84- 69-5)	mg/kg	參考IEC 62321-8:2017, 以氣相層析 /質譜儀檢測。 / With reference to IEC 62321-8:2017. Analysis was performed by GC/MS.	50	---	n. d.	1000
鄰苯二甲酸二異癸酯 / DIDP (Di- isodecyl phthalate) (CAS No.: 26761-40-0; 68515-49-1)	mg/kg	參考IEC 62321-8:2017, 以氣相層析 /質譜儀檢測。 / With reference to IEC 62321-8:2017. Analysis was performed by GC/MS.	50	---	n. d.	-
鄰苯二甲酸二異壬酯 / DINP (Di- isononyl phthalate) (CAS No.: 28553-12-0; 68515-48-0)	mg/kg	參考IEC 62321-8:2017, 以氣相層析 /質譜儀檢測。 / With reference to IEC 62321-8:2017. Analysis was performed by GC/MS.	50	---	n. d.	-
鄰苯二甲酸二正辛酯 / DNOP (Di-n- octyl phthalate) (CAS No.: 117-84- 0)	mg/kg	參考IEC 62321-8:2017, 以氣相層析 /質譜儀檢測。 / With reference to IEC 62321-8:2017. Analysis was performed by GC/MS.	50	---	n. d.	-
鄰苯二甲酸二異戊酯 / DIPP (Diisopentyl Phthalate) (CAS No.: 605-50-5)	mg/kg	參考IEC 62321-8:2017, 以氣相層析 /質譜儀檢測。 / With reference to IEC 62321-8:2017. Analysis was performed by GC/MS.	50	---	n. d.	-
鄰苯二甲酸二(2-甲氧基乙基)酯 / DMEP (Bis (2-methoxyethyl) phthalate) (CAS No.: 117-82-8)	mg/kg	參考IEC 62321-8:2017, 以氣相層析 /質譜儀檢測。 / With reference to IEC 62321-8:2017. Analysis was performed by GC/MS.	50	---	n. d.	-
鄰苯二甲酸二己酯 / DNHP (Di-n- hexyl phthalate) (CAS No.: 84-75- 3)	mg/kg	參考IEC 62321-8:2017, 以氣相層析 /質譜儀檢測。 / With reference to IEC 62321-8:2017. Analysis was performed by GC/MS.	50	---	n. d.	-

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測試項目 (Test Items)	單位 (Unit)	測試方法 (Method)	MDL	結果 (Result)		法規 限值 (Limit)
				NO. 1	NO. 2	
鄰苯二甲酸二正戊酯/ DNPP(Di-n-pentyl phthalate) (CAS No.: 131-18-0)	mg/kg	參考IEC 62321-8:2017, 以氣相層析/質譜儀檢測。 / With reference to IEC 62321-8:2017. Analysis was performed by GC/MS.	50	---	n. d.	-
鄰苯二甲酸正戊基異戊基酯 / nPiPP (N-pentyl-isopentylphthalate) (CAS No.: 776297-69-9)	mg/kg	參考IEC 62321-8:2017, 以氣相層析/質譜儀檢測。 / With reference to IEC 62321-8:2017. Analysis was performed by GC/MS.	50	---	n. d.	-
鄰苯二甲酸二(C6-8支鏈與直鏈)烷基酯, 富C7 / DIHP (1,2-Benzenedicarboxylic acid, di-C6-8-branched alkyl esters, C7-rich) (CAS No.: 71888-89-6)	mg/kg	參考IEC 62321-8:2017, 以氣相層析/質譜儀檢測。 / With reference to IEC 62321-8:2017. Analysis was performed by GC/MS.	50	---	n. d.	-
鄰苯二甲酸二(C7-11支鏈與直鏈)烷基酯 / DHNUP (1,2-Benzenedicarboxylic acid, di-C7-11-branched and linear alkyl esters) (CAS No.: 68515-42-4)	mg/kg	參考IEC 62321-8:2017, 以氣相層析/質譜儀檢測。 / With reference to IEC 62321-8:2017. Analysis was performed by GC/MS.	50	---	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, 以氣相層析/質譜儀檢測。 / With reference to IEC 62321: 2008. Analysis was performed by GC/MS.	5	---	n. d.	-
聚氯乙烯 / PVC	**	以紅外光譜分析及焰色法檢測。 / Analysis was performed by FTIR and FLAME Test.	-	---	Negative	-
砷 / Arsenic (As)	mg/kg	參考US EPA 3052: 1996, 以感應耦合電漿發射光譜儀檢測。 / With reference to US EPA 3052: 1996. Analysis was performed by ICP-OES.	2	---	n. d.	-

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測試項目 (Test Items)	單位 (Unit)	測試方法 (Method)	MDL	結果 (Result)		法規 限值 (Limit)
				NO. 1	NO. 2	
中鏈氯化石蠟 / Medium-Chain Chlorinated Paraffins (C14-C17) (MCCP) (CAS No.: 85535-85-9)	%	參考US EPA 3550C: 2007, 以氣相層析儀/電子捕獲偵測器檢測。 / With reference to US EPA 3550C: 2007. Analysis was performed by GC/ECD.	0.01	---	n. d.	-

備註(Note) :

1. mg/kg = ppm ; 0.1wt% = 1000ppm
2. MDL = Method Detection Limit (方法偵測極限值)
3. n. d. = Not Detected (未檢出)
4. "-" = Not Regulated (無規格值)
5. (#2) =
 - a. 當六價鉻結果大於0.13 $\mu\text{g}/\text{cm}^2$, 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 $\mu\text{g}/\text{cm}^2$. 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 $\mu\text{g}/\text{cm}^2$), 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 $\mu\text{g}/\text{cm}^2$). The coating is considered a non-Cr(VI) based coating
 - c. 當六價鉻結果介於 0.10 及 0.13 $\mu\text{g}/\text{cm}^2$ 時, 無法確定塗層是否含有六價鉻。 / The result between 0.10 $\mu\text{g}/\text{cm}^2$ and 0.13 $\mu\text{g}/\text{cm}^2$ is considered to be inconclusive - unavoidable coating variations may influence the determination.
6. "---" = Not Conducted (未測項目)
7. **= Qualitative analysis (No Unit) 定性分析(無單位)
8. Negative = Undetectable 陰性(未偵測到); Positive = Detectable 陽性(已偵測到)
9. (▲) : MDL是針對元素/測試化合物之評估。 / The MDL was evaluated for element / tested substance.
10. 參數換算表 / Parameter Conversion Table:https://twap.sgs.com/sgsrsts/chn/download-REACH_tw.asp
換算公式 (Conversion Formula) : $AX = A \times F$

AX	A	F
三氧化二銻 / Antimony trioxide (Sb ₂ O ₃)	銻 / Antimony	1.1971
氧化雙三丁基錫 / Bis(tributyltin)oxide (TBTO)	三丁基錫 / Tributyl Tin (TBT)	1.024

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11. 全氟辛烷磺酸及其鹽類包含 / PFOS and its salts including :
CAS No. : 29081-56-9, 2795-39-3, 29457-72-5, 70225-14-8, 56773-42-3, 251099-16-8, 307-35-7.
12. 全氟辛酸及其鹽類包含 / PFOA and its salts including :
CAS No. : 3825-26-1, 335-95-5, 2395-00-8, 335-93-3, 335-66-0.
13. 符合性結果之判定係以測試結果與限值做比較。 / The statement of compliance conformity is based on comparison of testing results and limits.

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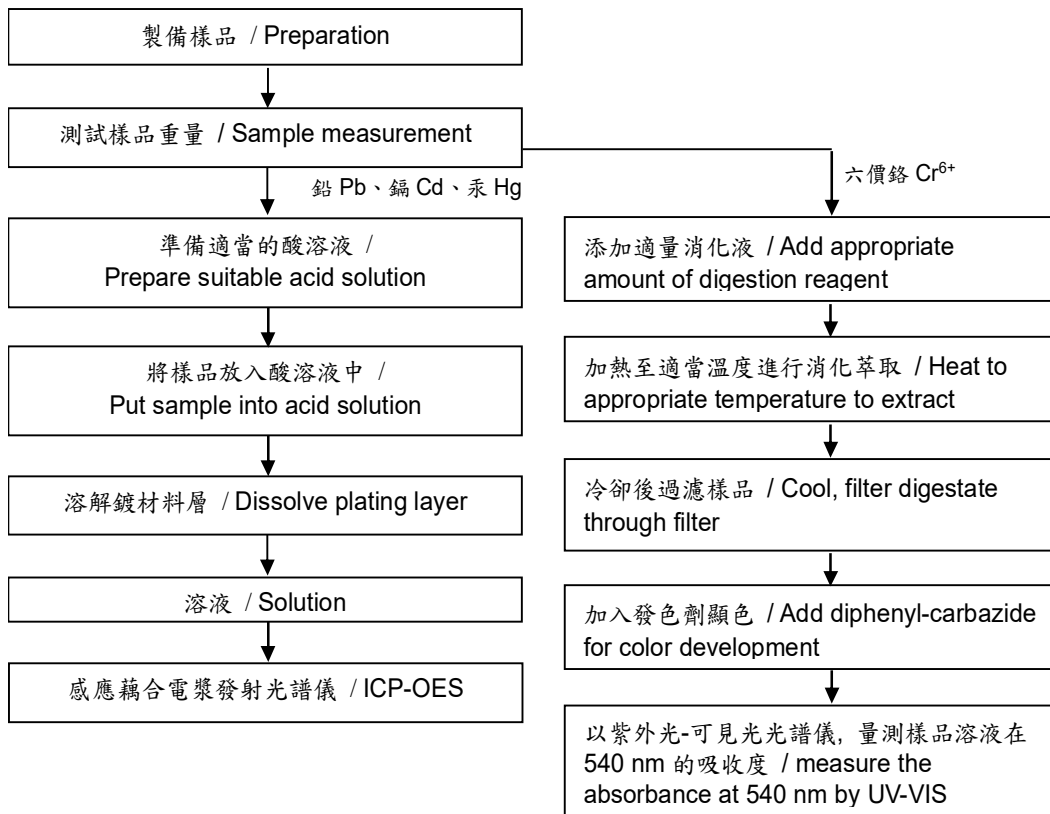
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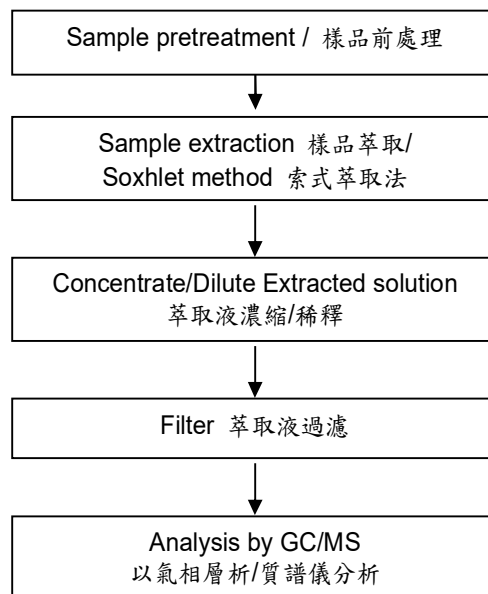
BLOCK 10-17, FUQIAO INDUSTRIAL ESTATE, FUYONG, BAOAN, SHENZHEN, CHINA

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

根據以下的流程圖之條件，樣品之外部鍍層已完全溶解。(六價鉻測試方法除外) / The plating layer of samples were dissolved totally by pre-conditioning method according to below flow chart. (Cr6+ test method excluded)



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



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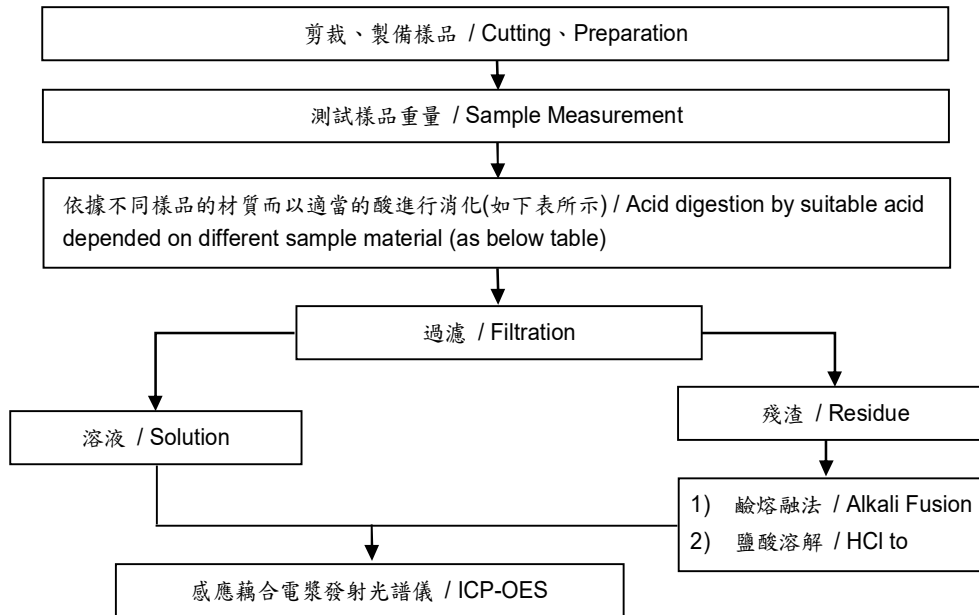
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元素以 ICP-OES 分析的消化流程圖 (Flow Chart of digestion for the elements analysis performed by ICP-OES)

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.

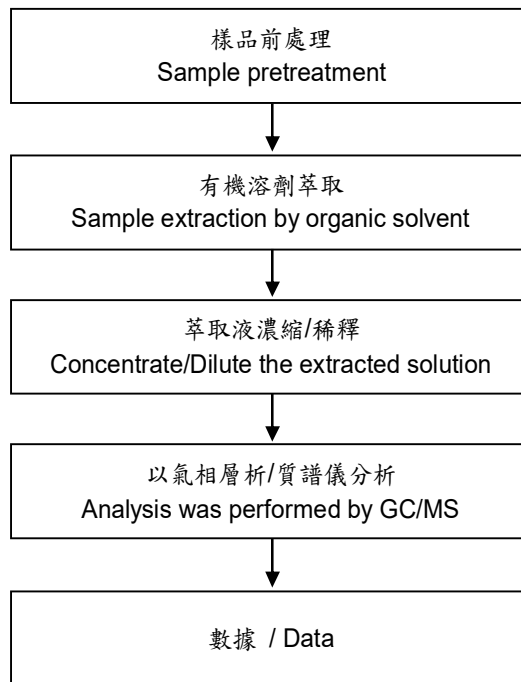


鋼,銅,鋁,焊錫 / Steel, copper, aluminum, solder	王水,硝酸,鹽酸,氫氟酸,雙氧水 / Aqua regia, HNO ₃ , HCl, HF, H ₂ O ₂
玻璃 / Glass	硝酸,氫氟酸 / HNO ₃ /HF
金,鉑,鈀,陶瓷 / Gold, platinum, palladium, ceramic	王水 / Aqua regia
銀 / Silver	硝酸 / HNO ₃
塑膠 / Plastic	硫酸,雙氧水,硝酸,鹽酸 / H ₂ SO ₄ , H ₂ O ₂ , HNO ₃ , HCl
其他 / Others	加入任何酸至完全溶解 / Any acid to total digestion

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】

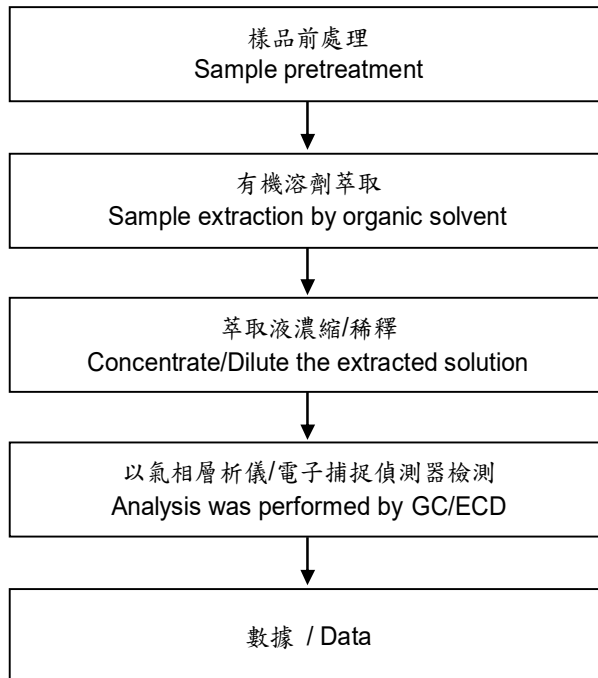
*Apply to: PCBs, PCNs, PCTs, Mirex



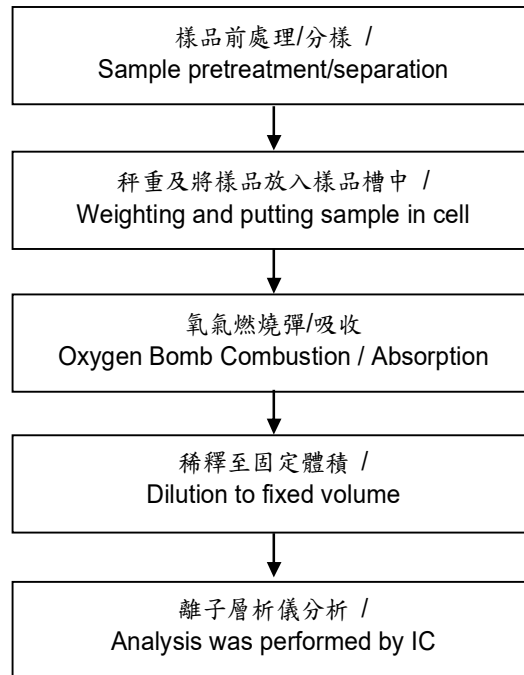
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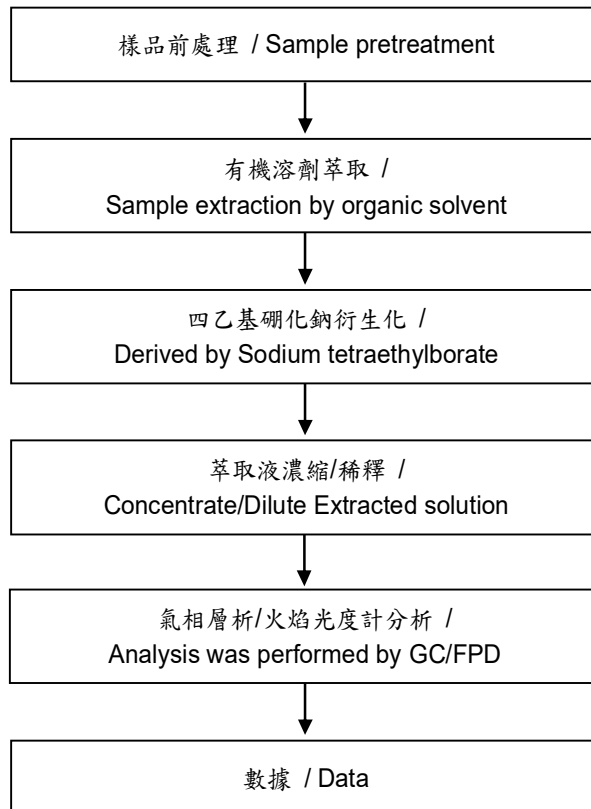
氯化石蠟分析流程圖 / Analytical flow chart - Chlorinated Paraffins



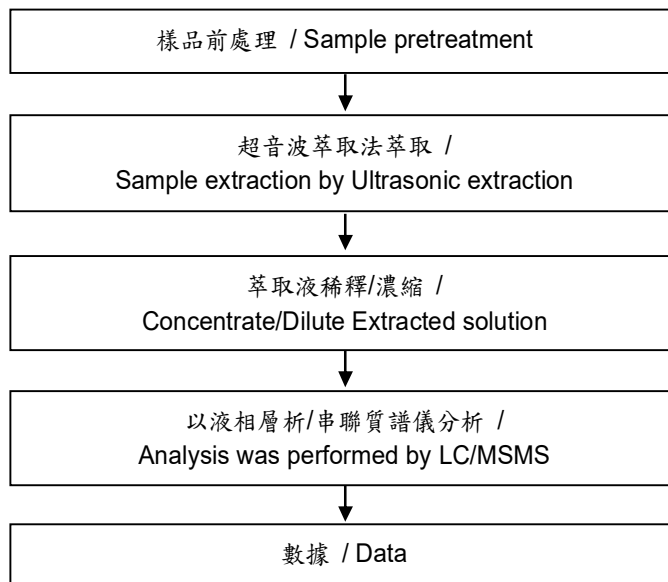
鹵素分析流程圖 / Analytical flow chart of Halogen



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

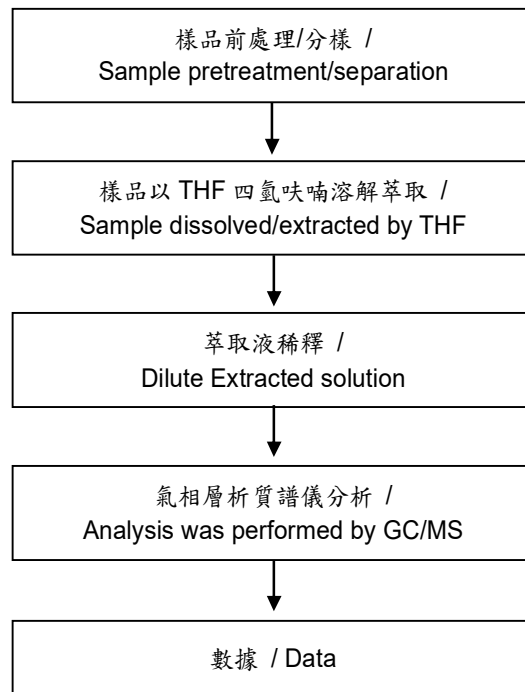


全氟辛酸/全氟辛烷磺酸分析流程圖 / Analytical flow chart - PFOA/PFOS

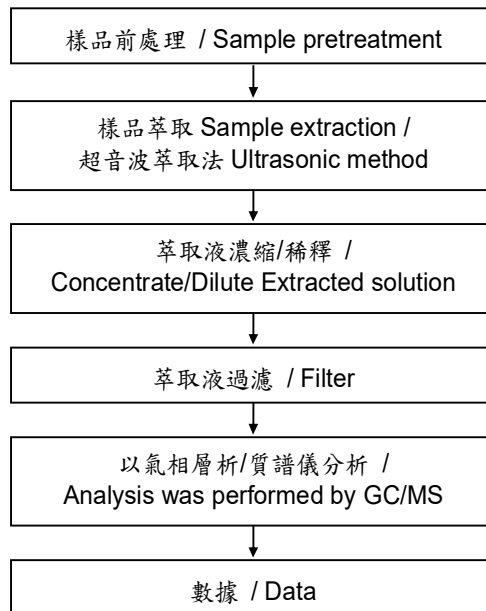


可塑劑分析流程圖 / Analytical flow chart of phthalate content

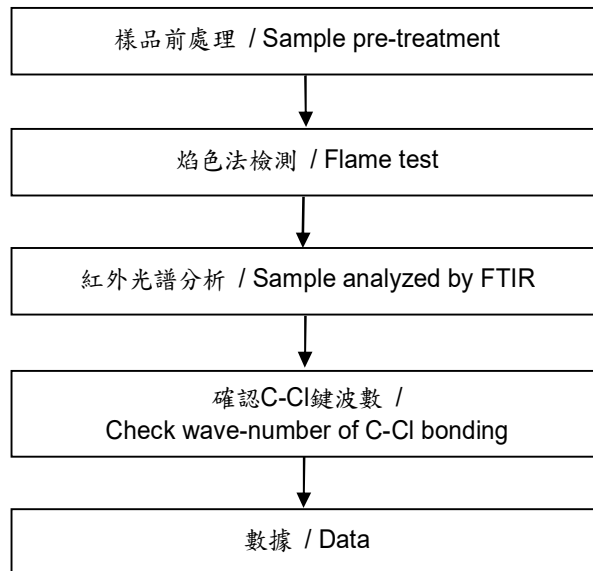
【測試方法/Test method: IEC 62321-8】



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



聚氯乙稀物質判定分析流程圖 /
Analysis flow chart for determination of PVC in material



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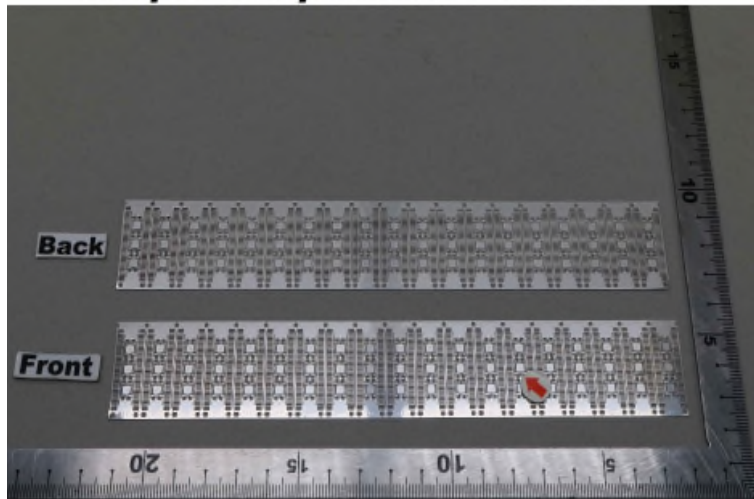
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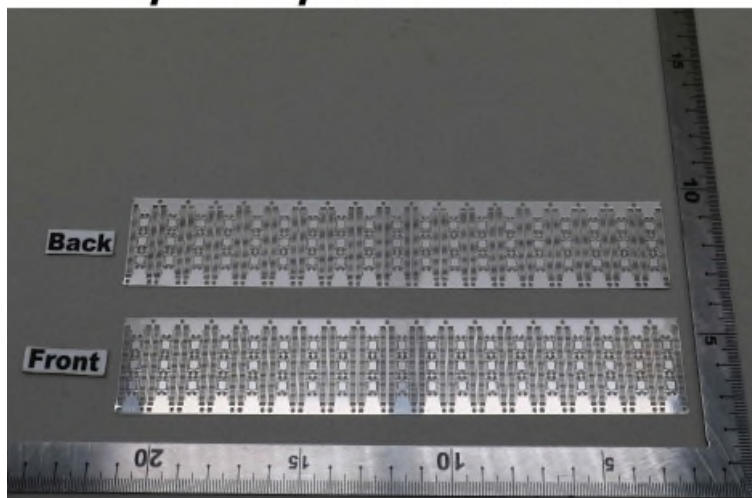
BLOCK 10-17, FUQIAO INDUSTRIAL ESTATE, FUYONG, BAOAN, SHENZHEN, CHINA

* 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/2020/91603 NO.1



KA/2020/91603 NO.2



** 報告結尾(End of Report) **

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