

測試報告 Test Report

號碼(No.) : CE/2011/A1952 日期(Date) : 2011/10/24 頁數(Page) : 1 of 14

台灣銅箔股份有限公司
TAIWAN COPPER FOIL CO., LTD.

南投縣南投市成功三路150號
NO. 150 CHENG KUNG 3 ROAD, NANTOU CITY, NANTOU HSIEN, TAIWAN.



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) : COPPER FOIL (銅箔)
樣品型號(Style/Item No.) : MW-G (OG), MW-F
收件日期(Sample Receiving Date) : 2011/10/12
測試期間(Testing Period) : 2011/10/12 TO 2011/10/24

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



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

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測試報告 Test Report

號碼(No.) : CE/2011/A1952 日期(Date) : 2011/10/24 頁數(Page) : 2 of 14

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測試結果(Test Results)

測試部位(PARTNAME)No.1 : 棕色/銅色片狀 (BROWN/COPPER COLORED SHEET)

測試項目 (Test Items)	單位 (Unit)	測試方法 (Method)	方法偵測 極限值 (MDL)	結果 (Result)
				No.1
鎘 / Cadmium (Cd)	mg/kg	參考IEC 62321: 2008方法, 以感應耦合電漿原子發射光譜儀檢測. / With reference to IEC 62321: 2008 and performed by ICP-AES.	2	n.d.
鉛 / Lead (Pb)	mg/kg	參考IEC 62321: 2008方法, 以感應耦合電漿原子發射光譜儀檢測. / With reference to IEC 62321: 2008 and performed by ICP-AES.	2	n.d.
汞 / Mercury (Hg)	mg/kg	參考IEC 62321: 2008方法, 以感應耦合電漿原子發射光譜儀檢測. / With reference to IEC 62321: 2008 and performed by ICP-AES.	2	n.d.
六價鉻 / Hexavalent Chromium Cr(VI)	mg/kg	參考IEC 62321: 2008方法, 以UV-VIS檢測. / With reference to IEC 62321: 2008 and performed by UV-VIS.	2	n.d.
鈹 / Beryllium (Be)	mg/kg	參考US EPA 3050B方法, 以感應耦合電漿原子發射光譜儀檢測鈹含量. / With reference to US EPA Method 3050B for Beryllium Content. Analysis was performed by ICP-AES.	2	n.d.
銻 / Antimony (Sb)	mg/kg	參考US EPA 3050B方法, 以感應耦合電漿原子發射光譜儀檢測銻含量. / With reference to US EPA Method 3050B for Antimony Content. Analysis was performed by ICP-AES.	2	n.d.

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測試報告 Test Report

號碼(No.) : CE/2011/A1952 日期(Date) : 2011/10/24 頁數(Page) : 3 of 14

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南投縣南投市成功三路150號

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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
砷 / Arsenic (As)	mg/kg	參考US EPA 3052方法, 以感應耦合電漿原子發射光譜儀檢測砷含量. / With reference to US EPA Method 3052 for Arsenic Content. Analysis was performed by ICP-AES.	2	n.d.
全氟辛烷磺酸 / Perfluorooctane sulfonates (PFOS-Acid, Metal Salt, Amide)	mg/kg	參考US EPA 3540C: 1996方法, 以液相層析/質譜儀檢測全氟辛烷磺酸含量. / With reference to US EPA 3540C: 1996 method for PFOS Content.	10	n.d.
全氟辛酸(銨) / PFOA (CAS No.: 335-67-1)	mg/kg	參考US EPA 3540C: 1996方法, 以液相層析/質譜儀檢測全氟辛酸(銨)含量. / With reference to US EPA 3540C: 1996 method for PFOA Content.	10	n.d.
短鏈氯化石蠟 / Alkanes, C10-13, chloro (Short Chain Chlorinated Paraffins) (CAS No.: 85535-84-8)	%	參考US EPA 3540C方法, 以氣相層析/質譜儀檢測. / With reference to US EPA 3540C method. Analysis was performed by GC/MS.	0.01	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
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.) : CE/2011/A1952 日期(Date) : 2011/10/24 頁數(Page) : 4 of 14

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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.		
多溴聯苯醚總和 / Sum of PBDEs					-	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.

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測試報告 Test Report

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釋出鎳 / Nickel Release Test

測試方法(Method) :

參考BS EN 1811:1998+A1:2008方法處理, 以感應耦合電漿原子發射光譜儀分析. / With reference to BS EN 1811:1998+A1:2008. Analysis was performed by ICP-AES.

樣品 (Sample)	樣品表面積 (Sample Area) (cm ²)	測試溶液體積 (Volume of Test Solution) (ml)	釋出鎳 (Nickel Release) (µg/cm ² /week)	已調整的釋出鎳結果 (Adjusted Nickel Release) (µg/cm ² /week)	法規限值 (Specified Limit) (µg/cm ² /week)	結論 (Conclusion)
No.1	8.00	10	<0.1	<0.01	0.5	通過(PASS)
	8.00	10	<0.1	<0.01	0.5	通過(PASS)

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. Negative = Undetectable 陰性(未偵測到); Positive = Detectable 陽性(已偵測到)

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號碼(No.) : CE/2011/A1952 日期(Date) : 2011/10/24 頁數(Page) : 6 of 14

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PFOS參考資訊(Reference Information) : 指令 2006/122/EC (Directive 2006/122/EC)

- (1) 該物質不可置於市場上或使用於特殊物質或配置成分重量濃度等於或大於0.005%。
(May not be placed on the market or used as a substance or constituent of preparations in a concentration equal to or higher than 0.005% by mass.)
- (2) 該物質不可置於市場上的半成品或商品或其物件；假若零件上明顯地具有PFOS並參照結構上及微細構造上計算PFOS重量濃度等於或大於0.1%，而紡織品或其他覆蓋物質，如果PFOS在覆蓋物質中含量等於或大於 $1\mu\text{g}/\text{m}^2$ 。
(May not be placed on the market in semi-finished products or articles, or parts thereof, if the concentration of PFOS is equal to or higher than 0.1% by mass calculated with reference to the mass of structurally or microstructurally distinct parts that contain PFOS or, for textiles or other coated materials, if the amount of PFOS is equal to or higher than $1\mu\text{g}/\text{m}^2$ of the coated material.)

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台灣檢驗科技股份有限公司 | Chemical-Taipei 33 WuChyuan Road, Wuku Industrial Zone, New Taipei City, Taiwan / 新北市五股工業區五權路33號 + 886 (02)2299 3279 f + 886 (02)2299 3237 www.sgs.com

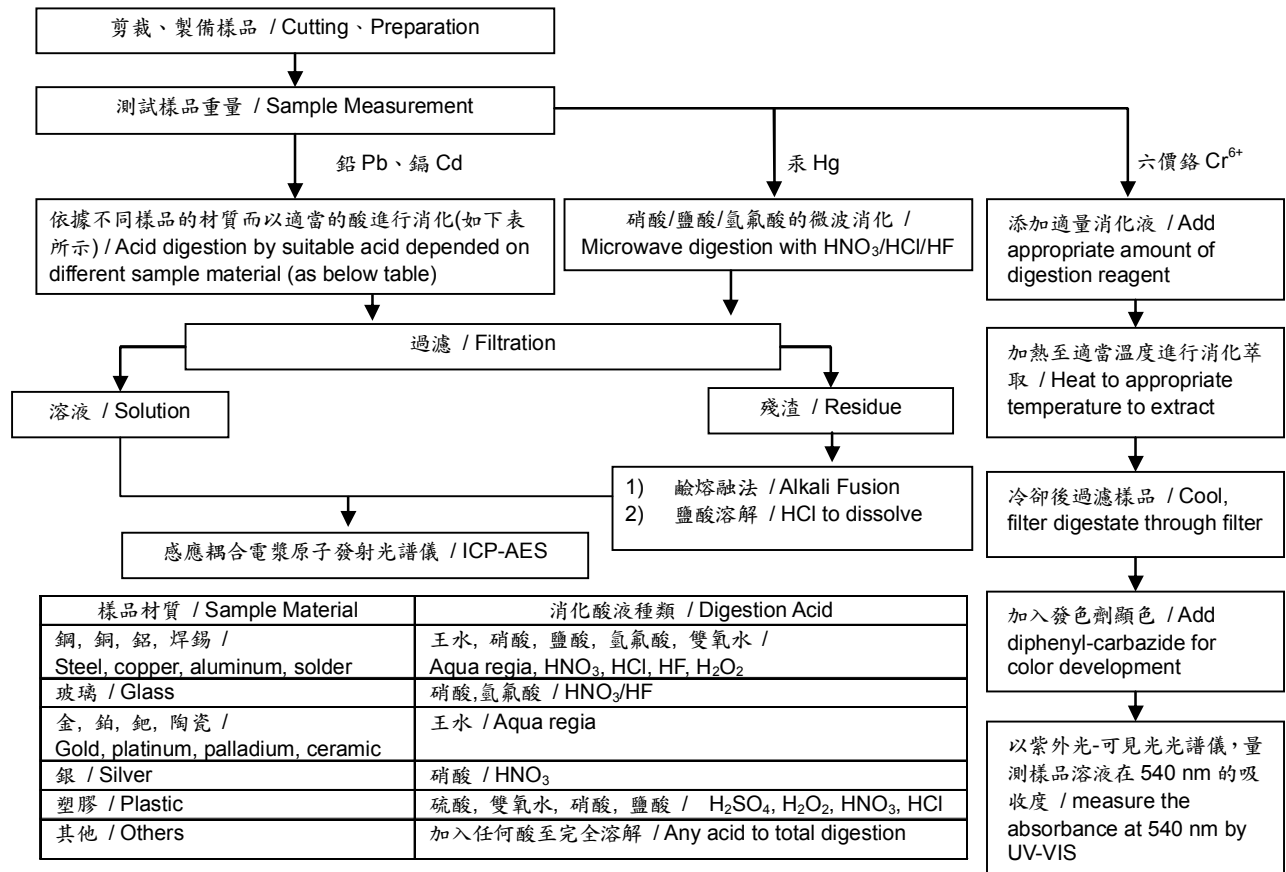
測試報告 Test Report

號碼(No.) : CE/2011/A1952 日期(Date) : 2011/10/24 頁數(Page) : 7 of 14

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NO. 150 CHENG KUNG 3 ROAD, NANTOU CITY, NANTOU HSIEN, TAIWAN.



- 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：楊登偉 / Name of the person who made measurement: Climbgreat Yang
- 3) 測試負責人：張啓興 / Name of the person in charge of measurement: Troy Chang



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測試報告 Test Report

號碼(No.) : CE/2011/A1952 日期(Date) : 2011/10/24 頁數(Page) : 8 of 14

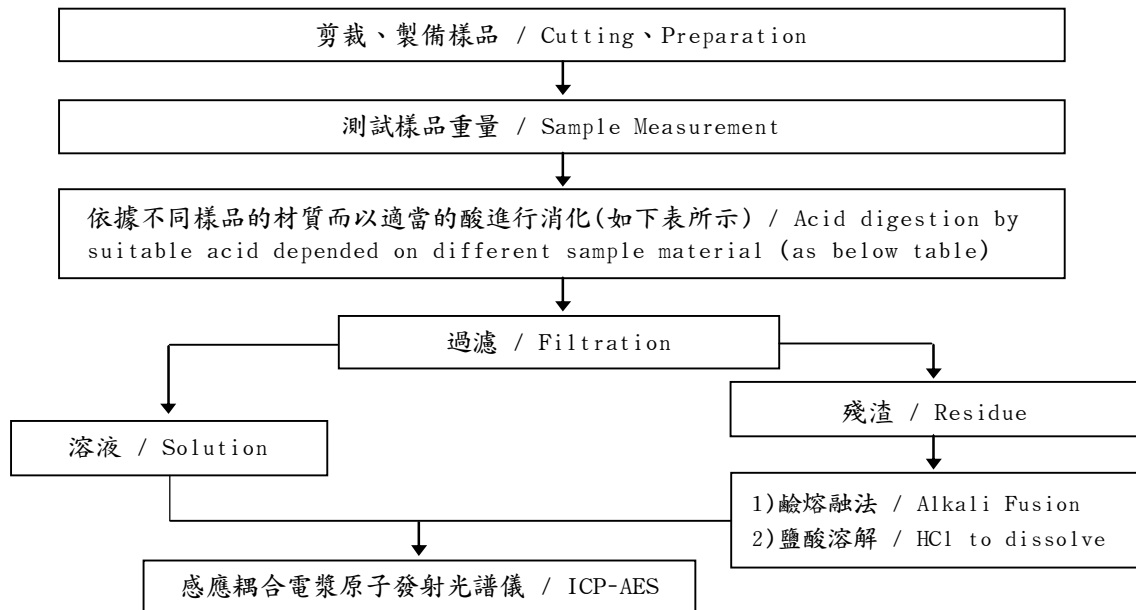
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- 1) 根據以下的流程圖之條件，樣品已完全溶解。 / These samples were dissolved totally by pre-conditioning method according to below flow chart.
- 2) 測試人員：楊登偉 / Name of the person who made measurement: Climbgreat Yang
- 3) 測試負責人：張啓興 / Name of the person in charge of measurement: Troy 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, 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

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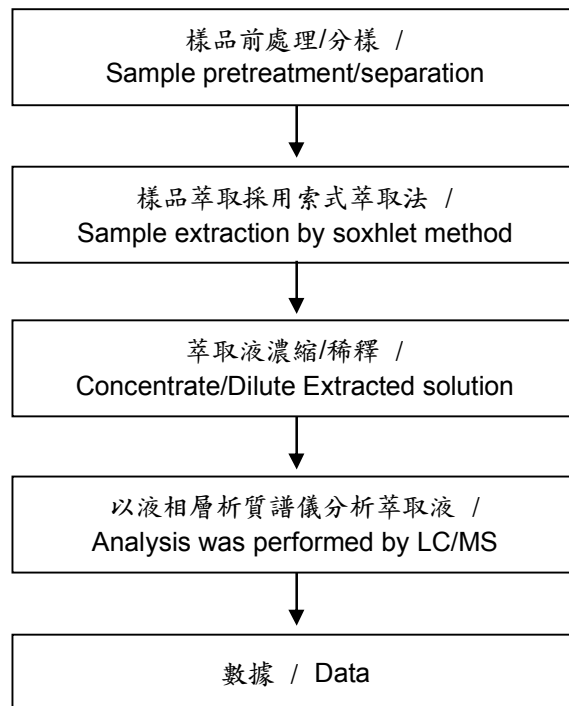
號碼(No.) : CE/2011/A1952 日期(Date) : 2011/10/24 頁數(Page) : 9 of 14

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索式萃取分析流程圖 / Analytical flow chart of Soxhlet extraction (LC/MS) procedure

- 測試人員：翁賜彬 / Name of the person who made measurement: Roman Wong
 - 測試負責人：張啓興 / Name of the person in charge of measurement: Troy Chang
- 【測試項目：全氟辛烷磺酸/全氟辛酸(銨)、苯並三唑類化合物 /
Test Items: PFOS/PFOA、Benzotriazole】**



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測試報告 Test Report

號碼(No.) : CE/2011/A1952 日期(Date) : 2011/10/24 頁數(Page) : 10 of 14

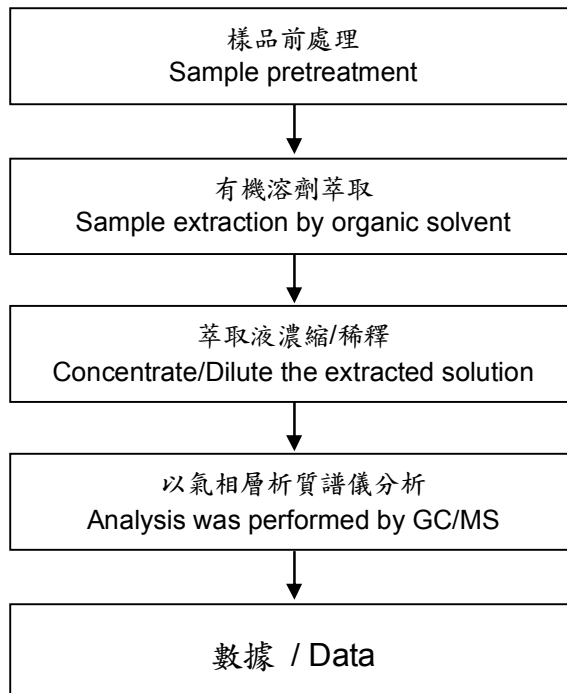
台灣銅箔股份有限公司
TAIWAN COPPER FOIL CO., LTD.

南投縣南投市成功三路150號
NO. 150 CHENG KUNG 3 ROAD, NANTOU CITY, NANTOU HSIEN, TAIWAN.



含氯阻燃劑分析流程 / Chlorinated Flame retardant analytical flow chart

- 1) 測試人員：曾勃鈞 / Name of the person who made measurement: Barry Tseng
 - 2) 測試負責人：張啓興 / Name of the person in charge of measurement: Troy Chang
- 參考方法(Reference method): US EPA 8270D, US EPA 3540
 - 測試項目(Test Items): PCBs, PCNs, PCTs, Mirex, CP, MCCP / 多氯聯苯, 多氯奈, 多氯三聯苯, 滅蟻靈, 氯化石蠟, 中鏈氯化石蠟



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測試報告 Test Report

號碼(No.) : CE/2011/A1952 日期(Date) : 2011/10/24 頁數(Page) : 11 of 14

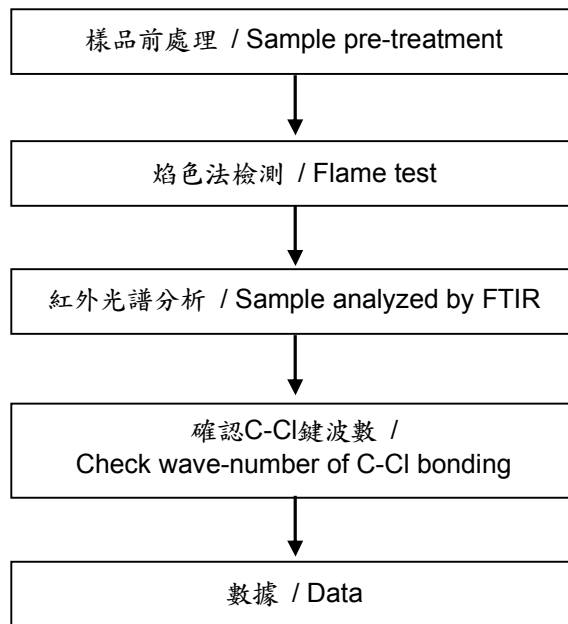
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聚氯乙稀物質判定分析流程圖 /

Analysis flow chart for determination of PVC in material

- 測試人員：陳君涵 / Name of the person who made measurement: Ginny Chen
- 測試負責人：張啓興 / Name of the person in charge of measurement: Troy Chang



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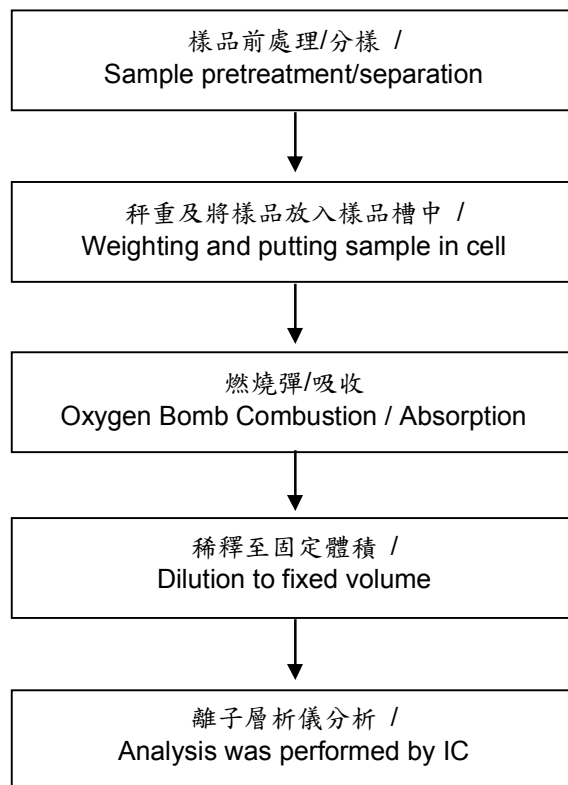
號碼(No.) : CE/2011/A1952 日期(Date) : 2011/10/24 頁數(Page) : 12 of 14

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

- 1) 測試人員：陳恩臻 / Name of the person who made measurement: Rita Chen
- 2) 測試負責人：張啓興 / Name of the person in charge of measurement: Troy Chang



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測試報告 Test Report

號碼(No.) : CE/2011/A1952 日期(Date) : 2011/10/24 頁數(Page) : 13 of 14

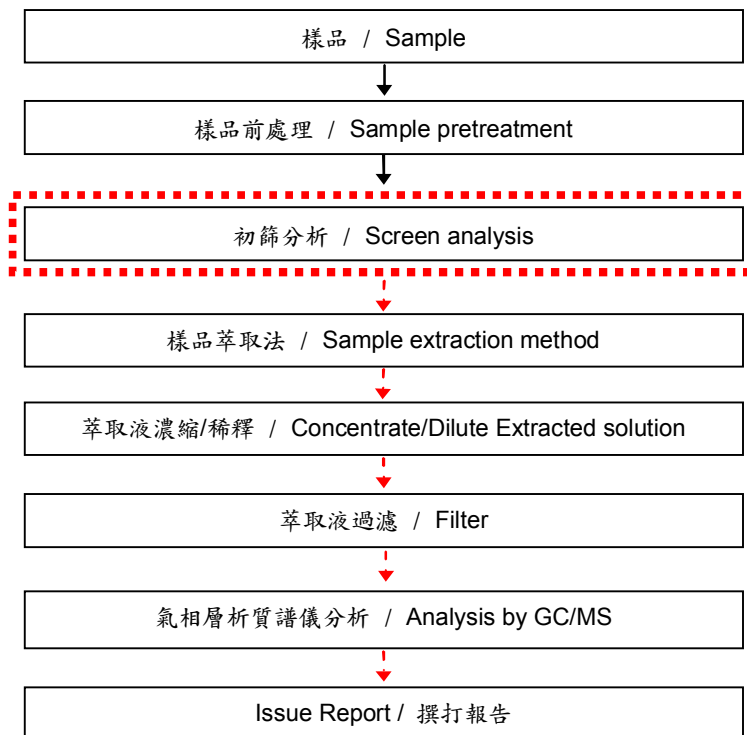
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分析流程圖 / Analytical flow chart

- 測試人員：翁賜彬 / Name of the person who made measurement: Roman Wong
 - 測試負責人：張啓興 / Name of the person in charge of measurement: Troy Chang
- 【測試項目(Test Items): 多溴聯苯/多溴聯苯醚、四溴雙酚-A-雙 / PBB/PBDE, TBBP-A-bis】**

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



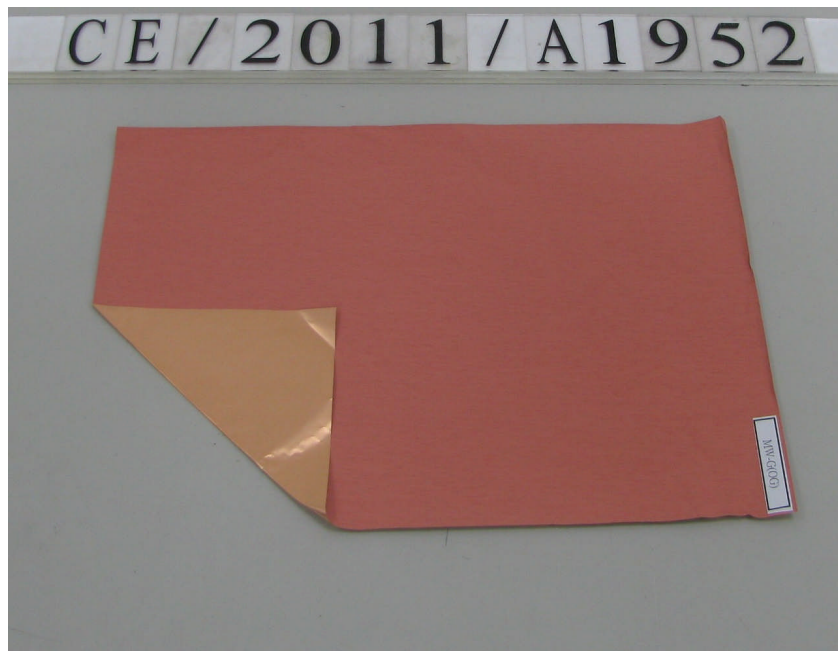
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測試報告 Test Report

號碼(No.) : CE/2011/A1952 日期(Date) : 2011/10/24 頁數(Page) : 14 of 14

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** 報告結尾 (End of Report) **

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