測試報告

Test Report

台灣化學纖維股份有限公司
FORMOSA CHEMICALS & FIBRE CORPORATION
台北市敦化北路201號
201, TUNG HWA N. ROAD, TAIPEI, 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/on behalf of the applicant as):

送樣廠商(Sample Submitted By) : 台灣化學纖維股份有限公司 (FORMOSA CHEMICALS & FIBRE CORPORATION)
樣品名稱(Sample Description) : PC/ABS ALLOYS (聚碳/丙烯-丁烯-苯二烯 合膠)
樣品型號(Style/Item No) : TAIRILOY AC3250
收件日期(Sample Receiving Date) : 2019/06/06
測試期間(Testing Period) : 2019/06/06 to 2019/06/13

測試需求(Test Requested) : 依據客戶指定，參考RoHS 2011/65/EU Annex II及其修訂指令(EU) 2015/863測試錫、鉛、汞、六價錫、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)).

測試方法(Test Method) : 請參閱下一頁 (Please refer to following pages).
測試結果(Test Results) : 請參閱下一頁 (Please refer to following pages).
結論(Conclusion) : 根據客戶所提出的樣品，其錫、鉛、汞、六價錫、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及其修訂指令(EU) 2015/863之限值要求，(Based on the performed tests on 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.)
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測試結果(Test Results)

測試部位(PART NAME)No.1：灰白色塑膠粒（OFF-WHITE PLASTIC PELLETS）

<table>
<thead>
<tr>
<th>測試項目 (Test Items)</th>
<th>單位 (Unit)</th>
<th>測試方法 (Method)</th>
<th>方法檢測極限值 (MDL)</th>
<th>結果 (Result)</th>
<th>限值 (Limit)</th>
</tr>
</thead>
<tbody>
<tr>
<td>鉻 / Cadmium (Cd)</td>
<td>mg/kg</td>
<td>參考 IEC 62321-5 (2013)，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.</td>
<td>2</td>
<td>n.d.</td>
<td>100</td>
</tr>
<tr>
<td>鉛 / Lead (Pb)</td>
<td>mg/kg</td>
<td>參考 IEC 62321-5 (2013)，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.</td>
<td>2</td>
<td>n.d.</td>
<td>1000</td>
</tr>
<tr>
<td>汞 / Mercury (Hg)</td>
<td>mg/kg</td>
<td>參考 IEC 62321-4:2013+ AMD1:2017，以感應耦合電漿原子發射光譜儀檢測。 / With reference to IEC 62321-4:2013+ AMD1:2017 and performed by ICP-AES.</td>
<td>2</td>
<td>n.d.</td>
<td>1000</td>
</tr>
<tr>
<td>六價銅 / Hexavalent Chromium (Cr(VI))</td>
<td>mg/kg</td>
<td>參考 IEC 62321-7-2 (2017)，以UV-VIS檢測。 / With reference to IEC 62321-7-2 (2017) and performed by UV-VIS.</td>
<td>8</td>
<td>n.d.</td>
<td>1000</td>
</tr>
<tr>
<td>多溴聯苯總和 / Sum of PBBs</td>
<td>mg/kg</td>
<td>參考 IEC 62321-6 (2015)，以氣相層析儀 / 質譜儀檢測。 / With reference to IEC 62321-6 (2015) and performed by GC/MS.</td>
<td>-</td>
<td>n.d.</td>
<td>1000</td>
</tr>
<tr>
<td>一溴聯苯 / Monobromobiphenyl</td>
<td>mg/kg</td>
<td>參考 IEC 62321-6 (2015)，以氣相層析儀 / 質譜儀檢測。 / With reference to IEC 62321-6 (2015) and performed by GC/MS.</td>
<td>5</td>
<td>n.d.</td>
<td>-</td>
</tr>
<tr>
<td>二溴聯苯 / Dibromobiphenyl</td>
<td>mg/kg</td>
<td>參考 IEC 62321-6 (2015)，以氣相層析儀 / 質譜儀檢測。 / With reference to IEC 62321-6 (2015) and performed by GC/MS.</td>
<td>5</td>
<td>n.d.</td>
<td>-</td>
</tr>
<tr>
<td>三溴聯苯 / Tribromobiphenyl</td>
<td>mg/kg</td>
<td>參考 IEC 62321-6 (2015)，以氣相層析儀 / 質譜儀檢測。 / With reference to IEC 62321-6 (2015) and performed by GC/MS.</td>
<td>5</td>
<td>n.d.</td>
<td>-</td>
</tr>
<tr>
<td>四溴聯苯 / Tetrabromobiphenyl</td>
<td>mg/kg</td>
<td>參考 IEC 62321-6 (2015)，以氣相層析儀 / 質譜儀檢測。 / With reference to IEC 62321-6 (2015) and performed by GC/MS.</td>
<td>5</td>
<td>n.d.</td>
<td>-</td>
</tr>
<tr>
<td>五溴聯苯 / Pentabromobiphenyl</td>
<td>mg/kg</td>
<td>參考 IEC 62321-6 (2015)，以氣相層析儀 / 質譜儀檢測。 / With reference to IEC 62321-6 (2015) and performed by GC/MS.</td>
<td>5</td>
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<td>六溴聯苯 / Hexabromobiphenyl</td>
<td>mg/kg</td>
<td>參考 IEC 62321-6 (2015)，以氣相層析儀 / 質譜儀檢測。 / With reference to IEC 62321-6 (2015) and performed by GC/MS.</td>
<td>5</td>
<td>n.d.</td>
<td>-</td>
</tr>
<tr>
<td>七溴聯苯 / Heptabromobiphenyl</td>
<td>mg/kg</td>
<td>參考 IEC 62321-6 (2015)，以氣相層析儀 / 質譜儀檢測。 / With reference to IEC 62321-6 (2015) and performed by GC/MS.</td>
<td>5</td>
<td>n.d.</td>
<td>-</td>
</tr>
<tr>
<td>八溴聯苯 / Octabromobiphenyl</td>
<td>mg/kg</td>
<td>參考 IEC 62321-6 (2015)，以氣相層析儀 / 質譜儀檢測。 / With reference to IEC 62321-6 (2015) and performed by GC/MS.</td>
<td>5</td>
<td>n.d.</td>
<td>-</td>
</tr>
<tr>
<td>九溴聯苯 / Nonabromobiphenyl</td>
<td>mg/kg</td>
<td>參考 IEC 62321-6 (2015)，以氣相層析儀 / 質譜儀檢測。 / With reference to IEC 62321-6 (2015) and performed by GC/MS.</td>
<td>5</td>
<td>n.d.</td>
<td>-</td>
</tr>
<tr>
<td>十溴聯苯 / Decabromobiphenyl</td>
<td>mg/kg</td>
<td>參考 IEC 62321-6 (2015)，以氣相層析儀 / 質譜儀檢測。 / With reference to IEC 62321-6 (2015) and performed by GC/MS.</td>
<td>5</td>
<td>n.d.</td>
<td>-</td>
</tr>
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</tr>
</thead>
<tbody>
<tr>
<td>多溴聯苯醚總和 / Sum of PBDEs</td>
<td>mg/kg</td>
<td>參考 IEC 62321-6 (2015)，以氣相層析儀 / 質譜儀檢測。With reference to IEC 62321-6 (2015) and performed by GC/MS.</td>
<td>-</td>
<td>n.d.</td>
<td>1000</td>
</tr>
<tr>
<td>一溴聯苯醚 / Monobromodiphenyl ether</td>
<td>mg/kg</td>
<td>5</td>
<td>n.d.</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>二溴聯苯醚 / Dibromodiphenyl ether</td>
<td>mg/kg</td>
<td>5</td>
<td>n.d.</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>三溴聯苯醚 / Tribromodiphenyl ether</td>
<td>mg/kg</td>
<td>5</td>
<td>n.d.</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>四溴聯苯醚 / Tetrabromodiphenyl ether</td>
<td>mg/kg</td>
<td>5</td>
<td>n.d.</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>五溴聯苯醚 / Pentabromodiphenyl ether</td>
<td>mg/kg</td>
<td>5</td>
<td>n.d.</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>六溴聯苯醚 / Hexabromodiphenyl ether</td>
<td>mg/kg</td>
<td>5</td>
<td>n.d.</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>七溴聯苯醚 / Heptabromodiphenyl ether</td>
<td>mg/kg</td>
<td>5</td>
<td>n.d.</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>八溴聯苯醚 / Octabromodiphenyl ether</td>
<td>mg/kg</td>
<td>5</td>
<td>n.d.</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>九溴聯苯醚 / Nonabromodiphenyl ether</td>
<td>mg/kg</td>
<td>5</td>
<td>n.d.</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>十溴聯苯醚 / Decabromodiphenyl ether</td>
<td>mg/kg</td>
<td>5</td>
<td>n.d.</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>邻苯二甲酸二(2-乙基己基)酯 / DEHP (Di-(2-ethylhexyl) phthalate) (CAS No.: 117-81-7)</td>
<td>mg/kg</td>
<td>參考 IEC 62321-8 (2017)，以氣相層析儀 / 質譜儀檢測。With reference to IEC 62321-8 (2017). Analysis was performed by GC/MS.</td>
<td>50</td>
<td>n.d.</td>
<td>1000</td>
</tr>
<tr>
<td>邻苯二甲酸丁苯酯 / BBP (Butyl Benzyl phthalate) (CAS No.: 85-68-7)</td>
<td>mg/kg</td>
<td>50</td>
<td>n.d.</td>
<td>1000</td>
<td></td>
</tr>
<tr>
<td>邻苯二甲酸二丁酯 / DBP (Dibutyl phthalate) (CAS No.: 84-74-2)</td>
<td>mg/kg</td>
<td>50</td>
<td>n.d.</td>
<td>1000</td>
<td></td>
</tr>
<tr>
<td>邻苯二甲酸二異丁酯 / DIBP (Diisobutyl phthalate) (CAS No.: 84-69-5)</td>
<td>mg/kg</td>
<td>50</td>
<td>n.d.</td>
<td>1000</td>
<td></td>
</tr>
</tbody>
</table>

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)
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重金屬流程圖 / Analytical flow chart of Heavy Metal

These samples were dissolved totally by pre-conditioning method according to below flow chart. (Cr(VI) test method excluded)

- 剪裁、製備樣品 / Cutting, Preparation
- 銅/鉛/錳/汞 / Pb/Cd/Hg
- 用微波/電熱板進行酸消解
  - Acid digestion with microwave / hotplate
- 過濾 / Filtration
- 溶液 / Solution
- 殘渣 / Residue
  1) 鹽酸除主體 / Alkali fusion
  2) 沸水萃取 / HCl to dissolve
- 感應耦合等離子體原子發射光譜儀 / ICP-AES
- 沸水萃取 / Boiling water extraction
- 超音波溶解
  - Dissolving by ultrasonication
- 在60℃條件下超音波
  - Digesting at 60℃ by ultrasonication
- 过濾後取水層
  - Separating to get aqueous phase
- 加入發色劑顏色
  - Add diphenyl-carbazide for color development
- 以UV-VIS，量測樣品溶液在540 nm的
  - Measure the absorbance at 540 nm by UV-VIS
  - 以UV-VIS，量測樣品溶液在540 nm的吸收度
  - Measure the absorbance at 540 nm by UV-VIS

金屬 / Metal

- 非金屬 / Non-metal
- ABS / PC / PVC
- 其他材料 / Others

試電話 : 02-2299 3939   传真: 02-2299 3237

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多溴聯苯/多溴聯苯醚分析流程圖 / Analytical flow chart - PBB/PBDE

- 測試人員：涂雅苓 / Technician: Yaling Tu
- 測試負責人：張啟興 / Supervisor: Troy Chang

1. 初次測試程序 / First testing process
2. 選擇性篩檢程序 / Optional screen process
3. 確認程序 / Confirmation process

Sample / 樣品

Sample pretreatment / 樣品前處理

Screen analysis / 初篩分析

Sample extraction 樣品萃取 / Soxhlet method 索式萃取法

Concentrate/Dilute Extracted solution 萃取液濃縮/稀釋

Filter / 萃取液過濾

GC/MS / 氣相層析質譜儀
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可塑劑分析流程圖 / Analytical flow chart - Phthalate

- 测試人員：涂雅苓 / Technician: Yaling Tu
- 测試负责人：张啟兴 / Supervisor: Troy Chang

【测试方法/Test method: IEC 62321-8】

1. 樣品前處理/分樣 / Sample pretreatment/separation
2. 樣品以 THF 四氯呋喃溶解萃取 / Sample dissolved/extracted by THF
3. 萃取液稀釋 / Dilute Extracted solution
4. 氣相層析質譜儀分析 / Analysis was performed by GC/MS

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Tel: +886 (02)2299 3939  Fax: +886 (02)2299 3237  www.sgs.com.tw
Member of the SGS Group
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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.)

CE/2019/60910

** 報告結尾 (End of Report) **