



數: 1 OF 報告日期: 109年09月14日

凡展綠能科技有限公司 嘉義市西區高鐵大道 235 號

稱: HDPE 太陽綠能光電用管材(管件)組合水密測試(等級 IP68) 產

產 ㅁ 色: 黑色

供 應 廠 商:凡展綠能科技有限公司

送 驗 商:凡展綠能科技有限公司 收 件 期: 109年 08月 28日

試 期: 109年 08月 28日~109年 09月 14日

備 註: 1.以上資料由顧客提供(收件及試驗日期除外)

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3.下述報告內容標示#處由顧客提供

------本實驗室依據顧客所提供之試驗需求與樣品進行試驗,結果說明如下:

試驗要求:

- 1. 密度
- 2. 水密性
- 3. IP68 防水防塵試驗

試驗方法:

- 1.密度 ASTM D792-13 Density and Specific Gravity (Relative Density) of Plastics by Displacement
- 2.#水密性 將樣品以適當方式置於水面下深度 1M處,檢視試樣有無洩漏狀況
- 3. IP68 防水防塵試驗 IEC 60529 Edition 2.2: 2013

試驗結果:

請參見附頁

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本報告若有提供規範值時,該規範值僅供參考,合格之判定以委託單位實際要求為準

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TWD 0310526

SGS Taiwan Ltd. No. 9, 14th Rd. Taichung Industrial Park, Taichung 40755, Taiwan /40755 台中市台中工業區14路9號 台灣檢驗科技股份有限公司 t (886-4) 2359-1515 f (886-4) 2359-2557 www.sgs.com.tw





報告編號: TV-20-03241 數: 2 OF 報告日期:109年09月14日

1.試驗項目:

密度/水密性

試驗設備:

儀器名稱	廠牌	型號
精密天平	METTLER TOLEDO	XS 204

試驗結果:

試驗項目	結果
密度(g/cm³)	0.949
水密性	置於水面下深度1M處,無洩漏狀況

2.試驗項目:

IP68 防水防塵試驗

委託測試要求: 外殼保護程度試驗 (IEC 60529 Edition 2.2: 2013)

IP碼	IP68	
第一數字碼	防止觸及危險部位及外來固體異物之保護等級	
第二數字碼	防水保護等級	

結論

送測樣品經過測試符合 IEC 60529 Edition 2.2: 2013 外殼保護程度試驗--IP68 試驗要求及 合格判定準則。測試結果之詳細說明如附頁所示。

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報告編號:TV-20-03241 數: 3 OF 7 報告日期: 109年09月14日

外殼保護程度試驗:

試驗設備:

	廠牌	型號	序號
1.0 mm 測試探棒	ED&D	TRP-02	L12470907
電子式拉壓力計	ALGOL	HF-50	HF-106764
耐塵試驗機	T-MACHINE	TMJ-9723S	T-23-110708
IPX7/IPX8 防水試驗水槽	Self-made	SGS-ETR-030201	ETR000001

實驗室環境條件:

環境溫度:

 $(15 \sim 35)^{\circ}$ C

環境濕度:

 $(25 \sim 75)$ % RH

IP 試驗場址:

新北市五股區(新北產業園區)五權路 33 號

試驗方法/規格:

試驗規範:

IEC 60529 Edition 2.2: 2013 -- IP68

1. 防止觸及危險部位之保護試驗:

試驗方法:

將直徑 1.0 mm、長 100 mm 之金屬測試棒施加一指定力量向樣品外殼開口部

壓住或插入。檢查試驗棒尖端與待測物之外殼內危險帶電/危險機械轉動部位

之間是否有接觸。

測試施加力量:

1 N±10%

2. 防止外來固體異物之保護試驗:

試驗方法:

防塵試驗

樣品狀態:

非操作狀態

外殼種類:

類型 1

防塵種類:

滑石粉

防塵置放量:

每立方公尺之試驗箱容積,使用2kg之滑石粉

最大抽取負壓:

<20 mbar

測試時間:

8小時

試驗後檢查待測物外殼之內部是否有進塵之情形。

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報告編號: TV-20-03241 頁 數: 4 OF 報告日期: 109年09月14日

試驗方法/規格--續:

3. 防水保護試驗:

非操作狀態

樣品狀態: 試驗方法:

樣品依客戶所指定之正常使用狀態,完全浸沒於水中,樣品之最低端在水面

下 1200 mm 之位置

試驗時間:

30 分鐘

試驗裝置:

如照片 4 所示

試驗後檢查待測物外殼之內部是否有進水之情形。

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數: 5 OF 報告日期:109年09月14日

代測樣品:

型號/編號:

2"epec HDPE 管/No.1

數量:

共1件

測試結果:

A. 防止觸及危險部位及外來固體異物之保護等級(IP6X)

A-1 防止觸及危險部位之保護試驗(IP6X)

檢查項目 測試棒是否可進入外殼開口部?	樣品型號/編號
測試棒是否可進入外殼開口部?	
	2"epec HDPE 管/No.1
(4x 1) + all b t - T 14 x (4 all d) x 4l + 11 11 - 20 - 20 - 20 E/ 14 1/2 14 1/2	否
(續 1) 若測試棒可進入待測物之外殼開口部,試驗棒尖端與 外殼內危險帶電部位或危險機械轉動部位之間是否有接觸?	N/A
(續 2) 試驗棒尖端與外殼內危險帶電部位或危險機械轉動 部位之間是否保持適當之空間距離?	N/A
1: N/A 表示不適用 2: 上	

A-2 防止外來固體異物之保護試驗(IP6X)

試驗結果	
N * Æ P	樣品型號/編號
檢查項目	2"epec HDPE 管/ No.1
1 待測物外殼內部是否有粉塵進入?	否

- - -5- - -

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報告編號: TV-20-03241 數: 6 OF 頁 報告日期: 109年09月14日

測試結果--續:

B 防水保護 等級(IPX8)

	試驗結果		
	W # 45 F	樣品型號/編號	
檢查項目		2"epec HDPE 管/ No.1	
1	待测物外殼之內部是否有進水情形?	否	
2	(續1) 電線或電氣元件附近是否有水滯留?	N/A	
2.1	(續 2) 外殼內部浸水時,是否足以阻礙內部器具正常動作及安全之虞?	N/A	
2.2	(續 2.1) 是否於沿面距離之絕緣物表面附著有產生電弧軌跡之虞 的水分?	N/A	
2.3	(續 2.2) 導致未被設計為在潮濕情形下可運轉之帶電部或繞組受潮?	N/A	
±1:	N/A 表示不適用		

- 註 2:上述檢查項目係參考 IEC 60529 Edition 2.2: 2013 試驗要求並依照客戶提供之判定準則實施。
- 1.本試驗報告密度及 IP 試驗為 TAF 認證範圍,其餘則非
 - 2.本試驗報告 IP 試驗係委由 SGS 可靠度實驗室執行(TAF 認證編號:1511); 其餘項目試驗地點同實驗室地址

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TWD0310521





數: 7 OF 7

報告日期: 109年09月14日

試驗照片:(IP 試驗)





1. 樣品外觀



2. 樣品外觀



防止外來固體異物之保護試驗

(防塵試驗)

防水保護試驗

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TWIND 0.21 0.52.0. TWD0310520





報告編號: TV-21-01709 數: 1 OF 頁

報告日期: 110年06月16日

稱: 109NV01 碩力光能 工 程 名

辨 韋能能源 主 機 關:

監 單 中興工程顧問股份有限公司 造 位:

金陽機電工程有限公司/旭邦科技股份有限公司 承

委 位: 凡展綠能科技有限公司 託

址: 嘉義市西區高鐵大道 235 號 地 供 料 廠 商:凡展綠能科技有限公司

樣 名 稱: 2"HDPE 光電專用管 밆

部 位: HDPE 管 結 構

中興工程顧問股份有限公司-鄭子洧/金陽機電工程有限公司-陳世霖/ 取 樣 人 員:

旭邦科技股份有限公司-高崇燦

中興工程顧問股份有限公司-鄭子洧 員: 送 驗

收 件 H 期: 110年 05月 14日

期: 110年 05月 14日~110年 06月 15日 試 驗 H

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試驗結果:

試驗項目	試驗方法	試驗結果	#顧客要求值
密度(g/cm³)	CNS 13333-1(2015)A 法	0.949	≥0.941
抗拉降伏強度(kgf/cm²)	ASTM D638-14	273	230 以上
伸長率(%)	ASTM D638-14	967	350 以上
熔點(°C)	DSC(熱示差掃描分析儀)	130.04	120 以上
材質分析	FTIR+DSC	高密度聚乙烯(HDPE)	HDPE
灰分(%)	CNS 2456(1999)	0.04	1以下
剛性(kPa)-內徑 5%變形	ASTM D2412-11(2018)	1350	1000 以上

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報告編號: TV-21-02231 數: 1 OF 1

報告日期: 110年07月14日

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I 程 名 稱: 109NV01 碩力光能

機 主 辨 關: 韋能能源

監 留 中興工程顧問股份有限公司 造 位:

承 商: 金陽機電工程有限公司/旭邦科技股份有限公司

委 託 位: 凡展綠能科技有限公司

地 址: 嘉義市西區高鐵大道 235 號

供 料 廠 商:凡展綠能科技有限公司

樣 稱: 2"HDPE 光電專用管 PP 名 結 構 部 位: HDPE 管

第二次取樣 加 註 項 目:

中興工程顧問股份有限公司機工部-黃裕盛/金陽機電工程有限公司-陳世霖/ 取

旭邦科技股份有限公司-葛政宜 員:凡展綠能科技有限公司-於青松

送 驗 人 件 收 H 期: 110年 07月 02日

試 驗 H 期: 110年 07月 02日~110年 07月 14日

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3.下述報告內容標示#處由顧客提供

北瓜4里.

試驗項目	試驗方法	試驗結果	#顧客要求值
密度(kgf/cm³)	CNS 13333-1(2015)A 法	0.947	≥0.941
抗拉降伏強度(kgf/cm²)	ACTM D(20.14	266	230 以上
伸長率(%)	ASTM D638-14	1138	350 以上
剛性(kPa)	ASTM D2412-11(2018)	1633	1000 以上
灰分(%)	CNS 2456(1999)	0.1	1以下

註:本試驗報告之試驗地點同實驗室地址

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報告編號: TV-21-02232 數: 1 OF 1

報告日期: 110年07月14日

稱: 109NV01 碩力光能 T 程 名

主 辨 機 闞: 韋能能源

監 單 中興工程顧問股份有限公司 诰 位:

承 商: 金陽機電工程有限公司/旭邦科技股份有限公司

委 託 位: 凡展綠能科技有限公司

地 嘉義市西區高鐵大道 235 號 址: 供 料 廠 商: 凡展綠能科技有限公司

樣 品 名 稱: 8"HDPE 光電專用管

結 構 部 位: HDPE 管 月: 第二次取樣 項 力口 註

中興工程顧問股份有限公司機工部-黃裕盛/金陽機電工程有限公司-陳世霖/ 取 樣 人

旭邦科技股份有限公司-葛政宜

送 驗 人 員:凡展綠能科技有限公司-於青松 期: 110年 07月 02日 收 件 日

期: 110年 07月 02日~110年 07月 14日 試 驗 日

註: 1.以上資料由顧客提供(收件及試驗日期除外) 備

2.除非另有說明,此報告結果僅對測試之樣品負責 未經本公司事先書面同意,此報告不可部分複製

3.下述報告內容標示#處由顧客提供

試驗針里.

試驗項目	試驗方法	試驗結果	#顧客要求值
密度(kgf/cm³)	CNS 13333-1(2015)A 法	0.952	≥0.941
抗拉降伏強度(kgf/cm²)	A CTM D (20.14	272	230 以上
伸長率(%)	ASTM D638-14	1074	350 以上
剛性(kPa)	ASTM D2412-11(2018)	1571	1000 以上
灰分(%)	CNS 2456(1999)	0.1	1以下

註:本試驗報告之試驗地點同實驗室地址

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TWD3022510

SGS Teiwen Ltd.
6 灣檢驗科技股份有限公司 t (886-4) 2359-1515 f (886-4) 2359-2557 www.sgs.com.tw





報告編號: TV-20-04541 數: 1 OF 2 頁

報告日期: 110年01月18日

名 稱: 嘉義縣義竹鄉新庄農場滯洪池水面浮力式太陽光電發電廠 工 程

主 辨 機 關: 進金生能源服務股份有限公司

承 商: 詠光工程有限公司

委 託 位: 凡展綠能科技有限公司

地 址: 嘉義市西區高鐵大道 235 號

供 料 廠 商:凡展綠能科技有限公司

製 诰 商: 冠威工業有限公司

品 稱: 2"HDPE 太陽能光電用管 樣 名

取 樣 員: 進金生能源服務股份有限公司-陳冠樺/詠光工程有限公司-阮皇凱/ 人

凡展綠能科技有限公司-戴銘緯

送 驗 人 凡展綠能科技有限公司-戴銘緯 取 109年11月18日 樣 H 期:

109年11月19日 件 收 日 期:

試 驗 日 期: 109年11月19日~110年01月18日

備

註: 1.以上資料由顧客提供(收件及試驗日期除外)

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3.下述報告內容標示#處由顧客提供

試驗紅里.

試驗項目	試驗方法	試驗結果	#顧客要求值
密度(g/cm³)	CNS 13333-1(2015)A 法	0.949	≥0.941
抗拉降伏強度(kgf/cm²)	ASTM D638-14	273	230 以上
伸長率(%)	ASTM D638-14	913	350 以上
氧化誘導時間(min)	參考 ISO 11357-6(2018) (試驗溫度:200℃)	>100	≧100
熔點(°C)	DSC(熱示差掃描分析儀)	133.43	120 以上
灰分(%)	CNS 2456(1999)	0.2	1以下
熱傳導率(W/m·K)	CNS 7332(2014)	0.2987	
剛性(kPa)-內徑 5%變形	ASTM D2412-11(2018)	1832	1000 以上

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TWD 0889734

 SGS Teiwen Ltd.
 No. 9, 14th Rd. Taichung Industrial Park, Taichung 40755, Taiwan / 40755 台中市台中工業區 14路9號台灣檢驗科技股份有限公司
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報告編號: TV-20-04541 數: 2 OF 2 報告日期: 110年01月18日

試		

試驗方法	試驗結果	#顧客要求值
CNS 12152(2008)	無龜裂或裂痕	不得產生龜裂或裂痕,且復原
	外徑減少平.2.03%	後之外徑減少率應在10%以下
	無龜裂或裂痕:12 支	無產生龜裂或裂痕之試驗
		應在9支以上
	可耐 2000V 電壓	可耐受 2000V 商頻交流電壓
	15 分鐘	15 分鐘而無異狀
	>50000	100 以上
	量規可通過試樣	量規應能容易通過試樣內
多考 CNS 12152(2008)	量規可通過試樣	量規應能容易通過試樣內
	無龜裂或裂痕,且	不得產生龜裂或裂痕,
	量規可通過試樣	且量規應能容易通過試樣內
	CNS 12152(2008)	無

- 註:1.本試驗報告密度、抗拉隆伏強度、伸長率、灰分及剛性試驗為 TAF 認證範圍,其餘則非
 - 2.本試驗報告壓縮復原性、耐衝擊性、耐電壓、絕緣阻抗、耐熱變形性、耐彎曲變形性、 可撓性、熱傳導率、熔點及氧化誘導時間試驗委託 SGS 材料暨工程實驗室-高雄執行
 - 3.本試驗報告之之試驗地點同實驗室地址
 - 4. 熱傳導率試驗條件:
 - a.測試時厚度:1.041cm
 - b.平均温度=29.99℃

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0202

試驗報告

報告編號: TV-22-00203 數: 1 OF 2

報告日期: 111年 02月11日

鳥山頭水庫水面型太陽能光電發電系統設置工程 星能股份有限公司 T 程 名 主:

进 位: 星能股份有限公司

業監承委供樣 舜德機電股份有限公司 商: 託 凡展綠能科技有限公司 位: 料品 廠 商: 凡展綠能科技有限公司 名

21/2"獨立環狀光電用管 星能股份有限公司(王韋翔);舜德機電股份有限公司(吳晉瑋); 凡展綠能科技有限公司(於青松) 取 樣

星能股份有限公司(王韋翔);舜德機電股份有限公司(吳晉瑋); 送 驗

凡展綠能科技有限公司(於青松) 取 樣 111年 01月 13日 日 期:

111年 01月 18日 收 件 日 期:

期: 111年 01月 18日~111年 02月 11日 試 驗 H

1.以上資料由顧客提供(收件及試驗日期除外)

2.除非另有說明,此報告結果僅對測試之樣品負責 未經本公司事先書面同意,此報告不可部分複製

3.下述報告內容標示#處由顧客提供 4.本樣品由 SGS 材料暨工程實驗室-斗六(申請書號碼: DV-22-00025,

收件日期:111年01月13日)轉送至本實驗室執行本報告所示之試驗項目

試 驗 結 果:		
試驗項目	試驗方法	試驗結果
密度(g/cm³)(23±1℃)	CNS 13333-1:2015,A 法	0.943

試驗項目	單位	試驗方法	試驗結果	偵測極限 (MDL)	
鄰苯二甲酸二(2-乙基己基)酯(DEHP) (CAS No.: 117-81-7)	mg/kg		未檢出 (n.d.)	30	
鄰苯二甲酸二丁酯 (DBP) (CAS No.: 84-74-2)			未檢出 (n.d.)	30	
鄰苯二甲酸丁苯甲酯 (BBP) (CAS No.: 85-68-7)			未檢出 (n.d.)	30	
鄰苯二甲酸二異癸酯 (DIDP) (CAS No.: 26761-40-0; 68515-49-1)		ma/ka	参考 EN 14372:2004 以氣相層析儀/質譜儀	未檢出 (n.d.)	100
鄰苯二甲酸二異壬酯 (DINP) (CAS No.: 28553-12-0; 68515-48-0)		分析	未檢出 (n.d.)	100	
鄰苯二甲酸二正辛酯 (DNOP) (CAS No.: 117-84-0)			未檢出 (n.d.)	30	
鄰苯二甲酸二甲酯 (DMP) (CAS No.: 131-11-3)			未檢出 (n.d.)	30	
鄰苯二甲酸二乙酯 (DEP) (CAS No.: 84-66-2)			未檢出 (n.d.)	30	

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TWD 4512488





報告編號: TV-22-00203 數: 2 OF 2 報告日期: 111 年 02 月 11 日

試驗項目	試驗方法	試驗結果	偵測極限
鉛(mg/kg)(CAS No.7439-92-1)	參考 USEPA 3052:1996, 以感應耦合電漿原子發射光譜儀 (ICP-AES)做分析	未檢出(n.d.)	2
鎬(mg/kg)(CAS No.7440-43-9)		未檢出(n.d.)	2
汞(mg/kg)(CAS No.7439-97-6)		未檢出(n.d.)	2
氣(mg/kg)(CAS No.:22537-15-1)		未檢出(n.d.)	50
錫(mg/kg)(CAS No.:7440-31-5)		未檢出(n.d.)	2

- 註:1.本試驗報告密度試驗為 TAF 認證範圍,其餘則非
 - 2.本試驗報告塑化劑及鉛鎘汞氣錫含量試驗委託 SGS 綜合化學實驗室-台北執行 試驗條件說明如下:
 - (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
 - 3.本試驗報告之試驗地點同實驗室地址 4.樣品相片:



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