Walsin Lihwa Wire & Cable

太陽能光伏電纜
PhotoVoltaic (PV) Cables

2021年09月

華新麗華
WALSIN LIHWA

WALSIN LIHWA

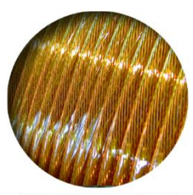
躍升・自堅實基礎

華新麗華 在基礎材料領域
深耕累積 成就卓越
在堅實的基礎上
探索新領域
將我們對新世紀的願景 逐步實現

華新麗華一覽

創立時間：1966
股票上市：1972（臺灣證券交易所代號1605）
資本額：約 台幣343億；員工人數：約 4,800人
營運總部：台北市
營運據點：台北、新莊、楊梅、台中、鹽水、
上海、江陰、南京、常熟、無錫、
東莞、煙臺、西安

深耕基礎材料 實現美好生活



WALSIN LIHWA

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WALSIN LIHWA

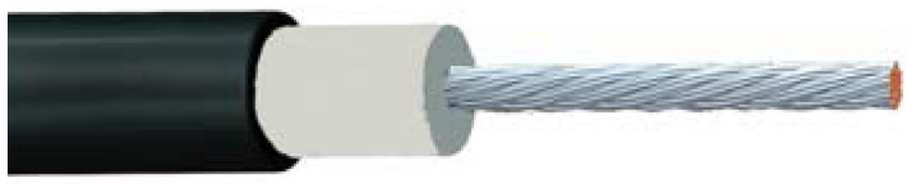
PV Cables

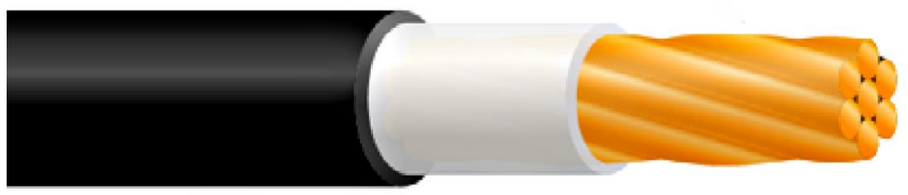
華新麗華 PV Cable

電纜通過TUV、UL、EN、S-JET等認證

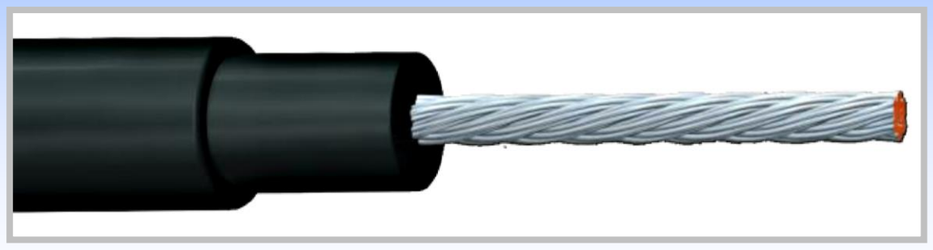
因為太陽能模組需長期在高溫下操作，連接模組的電線電纜必須具備抗日照和抗溼熱等特性，以UL為例，就要求PV電線必須通過攝氏90度或以上的高溫潮濕環境測試。且因裝設於外露環境，更需另外通過720小時耐紫外線試驗和攝氏零下40度的低溫測試。

PV電纜屬於結構相對簡單的電纜，太陽能廠商如果對電纜選擇不慎，使用到未經認證或不符合規範的電纜，可能會造成系統的失效。最大的差別就在使用年限上。不符合認證的電纜無法達到預期壽命，未來更換的工程和工資都是很驚人的。因此選用通過認證的太陽能電纜可以大幅降低後續維修費用，使太陽能發電更具經濟效益。





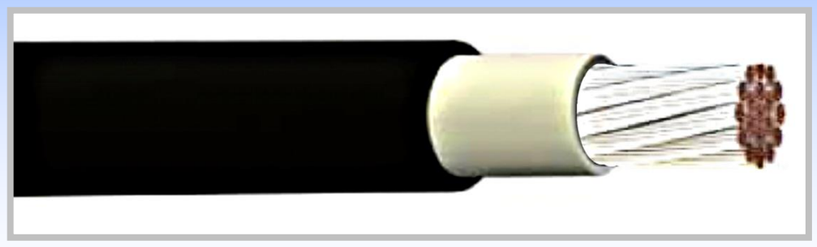
TUV PV Cables



- TUV approvals：R 50190118 0003.
- Standard：TUV 2pfg 1169/08.2007.
- Application：The PV cables for use at the DC-side of photovoltaic-systems.
- Rating voltage：AC U 0 /U 0.6/1 kV.
  DC 1.8kV (conductor-conductor, non earthed system, circuit not under load).
  DC 900V (single-phase earthed systems).
- Temperature range：Ambient temperature：-40℃ to +90℃, Max. temperature at conductor：120℃
- Conductor：Flexible tinned copper conductor, Class 5 of IEC 60228.
  Insulation：Black XLPO.
  Jacket：Black XLPO.
- Character：Flexibility , -40℃, UV resistance, Halogen free.
- Flame retardant：Comply with IEC 60332-1-2.

Conductor			Overall diameter (Approx.)	Maximum conductor resistance (20℃)	AC test voltage	Insulation resistivity (20℃)	Insulation resistivity (90℃)
Size	Construction	Outerside diameter (Approx.)					
mm^2	**no./ mm**	**mm**	**mm**	**Ω/km**	**kV/min**	**Ω-cm**	**Ω-cm**
1.5	28/0.25	1.57	5.37	13.7	6.5/5	10^{14}	10^{11}
2.5	48/0.25	2.02	5.82	8.21	6.5/5	10^{14}	10^{11}
4	80/0.25	2.59	6.39	5.09	6.5/5	10^{14}	10^{11}
6	119 /0.25	3.57	7.39	3.39	6.5/5	10^{14}	10^{11}
10	126/0.32	4.71	8.91	1.95	6.5/5	10^{14}	10^{11}
16	203/0.32	5.97	10.17	1.24	6.5/5	10^{14}	10^{11}

UL 1000 and 2000V PV Wires

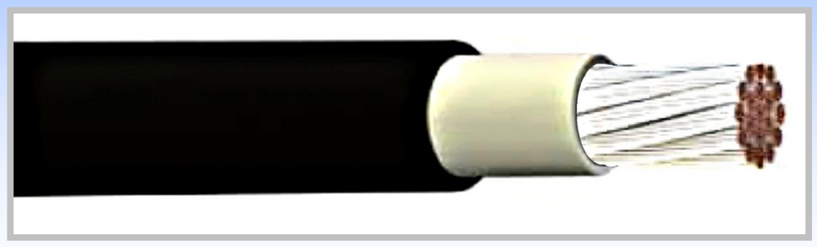


- UL approvals：File E339319.
- Standard：UL 4703.
- Application：The PV wires for interconnection wiring of grounded and ungrounded photovoltaic power systems as described in Wiring Systems, Article 690, and other applicable parts of the National Electrical Code (NEC), NFPA 70.
- Rating voltage：1000V and 2000V, 90°C wet or dry.
- Conductor：Flexible tinned copper conductor, Class 5 or non-tinned compacted Class 2 of IEC 60228.
  Binder tape：PET film or other suitable tape over conductor.
  Insulation：White (natural) XLPO.
  Jacket：Black XLPO.
- Character：Flexibility , -40℃, Sunlight resistance.
- Flame retardant：Comply with FV-1/Vertical, FV-2/VW-1 and Horizontal Specimen / FT2 flame test.

Conductor			Overall diameter (Approx.)	Maximum conductor resistance (20℃)	AC test voltage	Insulation resistance (15℃)
Size	Construction	Outerside diameter (Approx.)				
mm²	**no./ mm**	**mm**	**mm**	**Ω/km**	**kV/min**	**MΩ·km**
1.5	28/0.25	1.57	6.52	13.7	6.0/1	1470
2.5	48/0.25	2.02	6.97	8.21	6.0/1	1260
4	80/0.25	2.59	7.54	5.09	6.0/1	1070
6	119 /0.25	3.57	8.7	3.39	7.5/1	930
10	126/0.32	4.71	10.16	1.95	7.5/1	770
16	203/0.32	5.97	11.42	1.24	7.5/1	640
25	315/0.32	7.44	12.89	0.795	7.5/1	530
35	437/0.32	8.9	15.35	0.565	9.0/1	560
50	608/0.32	10.45	16.9	0.393	9.0/1	490
70	437/0.45	12.5	18.95	0.277	9.0/1	420
95	608/0.45	14.7	21.15	0.210	9.0/1	370
120	777/0.45	16.66	24.96	0.164	10.0/1	420
240	1517/0.45	23.31	31.61	0.0817	10.0/1	310

Note: Flexible tinned, Class 5 copper Conductor

UL 1000 and 2000V PV Wires



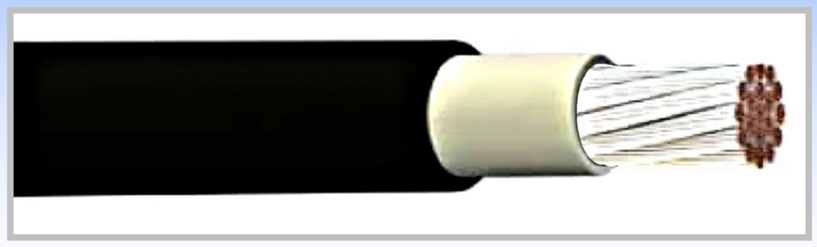
UL LISTED

- UL approvals：File E339319.
- Standard：UL 4703.
- Application：The PV wires for interconnection wiring of grounded and ungrounded photovoltaic power systems as described in Wiring Systems, Article 690, and other applicable parts of the National Electrical Code (NEC), NFPA 70.
- Rating voltage：1000V and 2000V, 90°C wet or dry.
- Conductor：Flexible tinned, Class K, I or non-tinned compressed Class B copper conductor of ASTM.
  Binder tape：PET film or other suitable tape over conductor.
  Insulation：White (natural) XLPO.
  Jacket：Black XLPO.
- Character：Flexibility , -40℃, Sunlight resistance.
- Flame retardant：Comply with FV-1/Vertical, FV-2/VW-1 and Horizontal Specimen / FT2 flame test.

Conductor			Overall diameter (Approx.)	Maximum conductor resistance (20℃)	AC test voltage	Insulation resistance (15℃)
Size	Construction	Outerside diameter (Approx.)				
AWG	**no./ mm**	**mm**	**mm**	**Ω/km**	**kV/min**	**MΩ·km**
18	16/0.254	1.18	6.13	23.4	6.0/1	1740
16	26/0.254	1.50	6.45	14.7	6.0/1	1510
14	41/0.254	1.88	6.83	9.25	6.0/1	1310
12	65/0.254	2.37	7.32	5.82	6.0/1	1130
10	104/0.254	3.38	8.33	3.66	6.0/1	950
9	133/0.254	3.81	9.26	2.96	7.5/1	1010
8	168/0.254	4.32	9.77	2.35	7.5/1	910
6	63/0.511	5.31	10.76	1.43	7.5/1	770
4	105/0.511	6.87	12.32	0.900	7.5/1	640
3	133/0.511	7.68	13.13	0.713	7.5/1	590
2	161/0.511	8.49	13.94	0.566	7.5/1	530
1	210/0.511	9.69	16.19	0.449	9.0/1	590
1/0	266/0.511	11.05	17.5	0.359	9.0/1	530
2/0	342/0.511	12.55	19.05	0.285	9.0/1	490
3/0	418/0.511	13.85	20.3	0.225	9.0/1	440
4/0	532/0.511	15.65	23.05	0.180	9.0/1	400

Note: Flexible tinned, Class K, I copper Conductor

UL 1000 and 2000V PV Wires



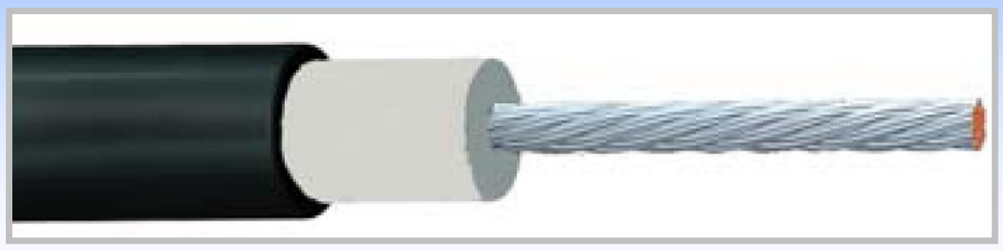
UL LISTED

- UL approvals：File E339319.
- Standard：UL 4703.
- Application：The PV wires for interconnection wiring of grounded and ungrounded photovoltaic power systems as described in Wiring Systems, Article 690, and other applicable parts of the National Electrical Code (NEC), NFPA 70.
- Rating voltage：1000V and 2000V, 90°C wet or dry.
- Conductor：Flexible tinned, Class K, I or non-tinned compressed Class B copper conductor of ASTM.
  Binder tape：PET film or other suitable tape over conductor.
  Insulation：White (natural) XLPO.
  Jacket：Black XLPO.
- Character：Flexibility , -40℃, Sunlight resistance.
- Flame retardant：Comply with FV-1/Vertical, FV-2/VW-1 and Horizontal Specimen / FT2 flame test.

Conductor			Overall Diameter (Approx.)	Maximum conductor resistance (20℃)	AC test voltage	Insulation resistance (15℃)
Size	Construction	Outerside diameter (Approx.)				
MCM	**no./ mm**	**mm**	**mm**	**Ω/km**	**kV/min**	**MΩ·km**
250	37/2.09	14.2	22.5	0.142	10.0/1	420
300	37/2.29	15.5	23.8	0.118	10.0/1	390
400	37/2.64	17.9	26.2	0.0885	10.0/1	350
500	37/2.95	20.0	28.3	0.0709	10.0/1	310
600	61/2.52	22.0	30.9	0.059	11.0/1	320

Note: Non- tinned compressed Class B copper conductor

EN PV Cables



Type Approved
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Surveillance
TÜVRheinland
CERTIFIED
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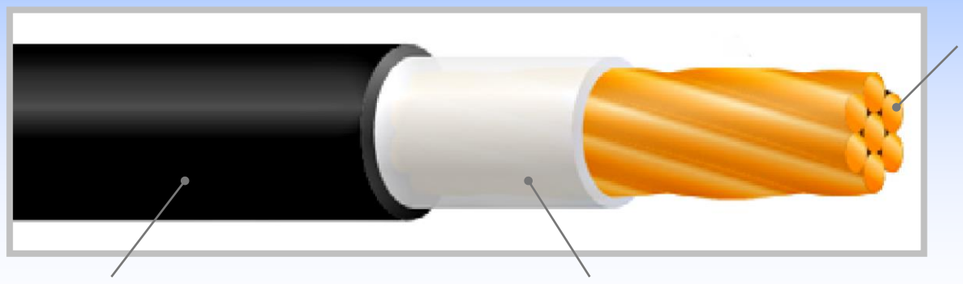
ID 1419055675

- Certificate no. : R 50401138
- Standard：EN 50618:2014
- Application：The PV cables for use at the DC-side of photovoltaic systems.
- Rating voltage： AC U_0 /U 1.0/1.0 kV.
  DC 1.5 kV (between conductors as well as between conductor and earth).
- Temperature range：The cables are designed to operate at a normal maximum conductor temperature of 90 ˚C, but for a maximum of 20 000 hours a max. conductor temperature of 120 ˚C at a max. ambient temperature of 90 ˚C is permitted.
- Conductor：Flexible tinned copper conductor Class 5 of EN 60228.
  Insulation： White (natural) - Halogen-free cross-linked material.
  Sheath：Black - Low smoke halogen free cross-linked material.
- Color ：Black
- Character：Flexibility , -40℃ , UV resistance , Low smoke Halogen-free.
- Flame retardant：Comply with EN 60332-1-2.

Conductor			Overall diameter (Approx.)	Maximum conductor resistance (20℃)	AC test voltage	Minimum insulation resistance (20℃)	Minimum insulation resistance (90℃)
Size	Construction	Outerside diameter (Approx.)					
mm^2	no./ mm	mm	mm	Ω/km	kV/min	MΩ-km	MΩ-km
4	80/0.25	2.59	6.0	5.09	6.5/5	580	0.58
6	119/0.25	3.57	6.77	3.39	6.5/5	500	0.5
10	126/0.32	4.71	7.91	1.95	6.5/5	420	0.42
16	203/0.32	5.97	9.37	1.24	6.5/5	340	0.34
25	315/0.32	7.44	11.44	0.795	6.5/5	340	0.34
35	437/0.32	8.9	13.1	0.565	6.5/5	290	0.29
50	608/0.32	10.45	15.05	0.393	6.5/5	270	0.27
70	437/0.45	12.5	17.3	0.277	6.5/5	250	0.25
95	608/0.45	14.7	19.7	0.210	6.5/5	220	0.22
120	777/0.45	16.66	21.86	0.164	6.5/5	210	0.21
150	925/0.45	18.2	24	0.132	6.5/5	210	0.21
185	1184/0.45	20.58	27.18	0.108	6.5/5	200	0.20
240	1517/0.45	23.31	30.31	0.0817	6.5/5	200	0.20

S-JET PV Cables



太陽光発電システム用ソーラーケーブル

国内向け太陽光発電システム用の給電ケーブルです。
PV モジュールからパワコンまでの区間に適応可能です。
S-JET 認証基準に対応しております。
PV 配線用架橋ポリオレフィン絶縁架橋ポリオレフィンシースケーブル 。

- S-JET 認証書番号(Approvals) ：1638-12024-001
- 準拠規格(Standard) ：JETST - CABL - 001 – 1
  電気設備の技術基準の解釈第 46 条第 1 項に適合
- 定格電圧(Rating voltage)：DC 1500V
- 使用温度(Temperature range) ：-40℃～90℃
- 難燃性(Flame retardant) ：JIS C 3665-1-2 の一条垂直燃焼試験に適合

導体			絶縁体厚さ	シース厚さ	仕上り外径（約）	最大導体抵抗（20℃）	試験電圧（AC）	最小絶縁抵抗（20℃）
公称断面積	構成素線数/素線径	外径（約）						
mm^2	mm	mm	mm	mm	mm	Ω/km	kV/min	MΩ-km
2	7/0.6	1.8	0.7	1.1	5.6	9.24	6.5/5	1000
3.5	7/0.8	2.4	0.7	1.1	6.2	5.20	6.5/5	1000
5.5	7/1.0	3	0.7	1.2	7.0	3.33	6.5/5	1000
8	7/1.2	3.6	0.7	1.2	7.6	2.31	6.5/5	1000
14	7/円形圧縮 Compacted	4.4	0.7	1.2	8.4	1.31	6.5/5	1000
22	7/円形圧縮 Compacted	5.5	0.9	1.3	10.1	0.832	6.5/5	1000
38	7/円形圧縮 Compacted	7.3	0.9	1.3	11.9	0.481	6.5/5	1000

技術資料

TUV 載流容量

Current carrying capacity of TUV PV-cables

$$I = I_n \times f_1 \times f_2 \times f_3$$

Where,

I ： Current carrying capacity for operation under service conditions (A)

I_n ： Current carrying capacity for operation under standard conditions (A) (see Table 1)

f_1 ： Conversion factor for ambient temperature (see Table 2)

f_2 ： Conversion factor for conductor temperature (see Table 3)

f_3 ： Conversion factor for multi-cable (see Table 4)

Table 1：Current carrying capacity for operation under standard conditions, I_n

Nominal cross sectional area	Kind of installation		
	Single cable free in air	Single cable on surfaces	Two cables adjacent on surfaces (Single cable)
mm^2	A	A	A
1.5	30	29	24
2.5	41	39	33
4	55	52	44
6	70	67	57
10	98	93	79
16	132	125	107

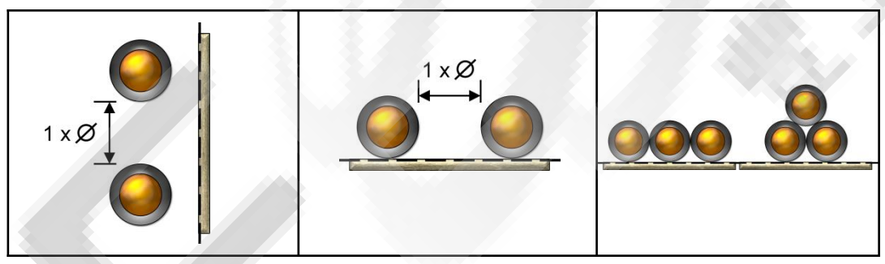


Table 2：Conversion factor for ambient temperature, f_1

Ambient temperature ℃	≦60	70	80	90
Conversion factor	1.00	0.91	0.82	0.71

Note：The maximum ambient temperature shall be not more than 90℃ according to TUV-2pfg-1169-08-2007.

Table 3：Conversion factor for conductor temperature, f_2

Temperature of the cable conductor ℃	120	110	100	90	80	70
Conversion factor	1.00	0.92	0.84	0.73	0.61	0.44

Note：The maximum conductor temperature shall be not more than 120℃.
For this temperature index of 120℃ applies to the insulation and the sheath, based on EN 60216-1 (20,000h, 50% residual elongation)

Table 4：Conversion factor for multi-cable, f_3

The number of cable side by side	1	2	3	4	5	6	7	8	9
Conversion factor	1.00	0.80	0.70	0.65	0.60	0.57	0.54	0.52	0.50

■ TUV依據EN 60216-1國際標準計算範例：

公式：載流容量 $I = I_n \times f_1 \times f_2 \times f_3$ (A)

Table 1：以 4 mm^2為例，電纜併排置放於表面上(Two cables adjacent on surface) 之 I_n值 = 44。

Table 2：環境溫度40℃以上，可以查Table 2 表溫度係數，去乘上溫度系數進行修正。

Ambient temperature(環境溫度)：60℃時溫度係數值 f_1 ＝1.00

Table 3：導體溫度一般以90℃，可以查Table 3 表轉換係數值 f_2 ＝0.73

Table 4：Adjustment factors 相鄰電纜調整係數，如一層佈設共8條，調整係數值 f_3 = 0.52

安全電流 I ＝ 44 x 1.00 x 0.73 x 0.52＝**16.7 (A)**

技術資料

UL 容許電流容量

Allowable ampacities of UL PV wires

$$I = I_n \times f_1 \times f_2 \times f_3$$

Where,

I ： Allowable ampacities for operation under service conditions (A)

I_n ： Allowable ampacities for operation under standard conditions (A) (see Table 1)

f_1 ： Correction factors for ambient temperatures (see Table 2)

f_2 ： Correction factors for conductor temperature (see Table 3)

f_3 ： Adjustment factors for more than one wire (see Table 4)

Table 1：Allowable ampacities for operation under standard conditions, I_n

Size	AWG	18	16	14**	12**	10**	8	6	4
Metric size used instead of AWG size	mm^2	1.5	1.5	2.5	4	6	10	16	25
Single wire in free air at 30℃	A	18	24	35	40	55	80	105	140

Size	AWG	3	2	1	1/0	2/0	3/0	4/0
Metric size used instead of AWG size	mm^2	35	35	50	70	70	95	120
Single wire in free air at 30℃	A	165	190	220	260	300	350	405

** Refer to NEC's 240.4(D) for conductor overcurrent protection limitations. Unless specifically permitted in 240.4(E) or (G), the overcurrent protection shall not exceed that required by NEC's (D)(3) through (D)(7) after any correction factors for ambient temperature and number of conductors have been applied.

Table 2：Correction factors for ambient temperatures, f_1

Ambient temperature ℃	10 or less	11~15	16~20	21~25	26~30	31~35	36~40	41~45
Conversion factors	1.15	1.12	1.08	1.04	1.00	0.96	0.91	0.87

Ambient temperature ℃	46~50	51~55	56~60	61~65	66~70	71~75	76~80	81~85
Conversion factors	0.82	0.76	0.71	0.65	0.58	0.50	0.41	0.29

Table 3：Correction factors for conductor temperature, f_2

Temperature of the cable conductor ℃	90	80	70	60	50	40
Conversion factor	1	0.93	0.84	0.74	0.62	0.44

Table 4：Adjustment factors for more than one wire, f_3

Number of wires	2~3	4~6	7~9	10~20	21~30	31~40	41 and above
Adjustment factors	0.7	0.56	0.49	0.35	0.32	0.28	0.25

EN 載流容量

Current carrying capacity of EN PV-cables

$$I = I_n \times f_1 \times f_2 \times f_3$$

Where,

I ： Current carrying capacity for operation under service conditions (A)

I_n ： Current carrying capacity for operation under standard conditions (A) (see Table 1)

f_1 ： Conversion factor for different ambient temperature (see Table 2)

f_2 ： Conversion factor for conductor temperature (see Table 3)

f_3 ： Conversion factor for multi-cable (see Table 4)

Table 1：Current carrying capacity for operation under standard conditions, I_n

Nominal cross sectional area	Kind of installation		
	Single cable free in air	Single cable on surfaces	Two loaded cables touching, on surfaces
mm^2	A	A	A
1.5	30	29	24
2.5	41	39	33
4	55	52	44
6	70	67	57
10	98	93	79
16	132	125	107
25	176	167	142
35	218	207	176
50	276	262	221
70	347	330	278
95	416	395	333
120	488	464	390
150	566	538	453
185	644	612	515
240	775	736	620
Ambient temperature: 60 ˚C (see Table 2 for other ambient temperatures) max. conductor temperature: 120 ˚C.			

Note：The expected period of use at a max. conductor temperature of 120 ˚C and at a max. ambient temperature of 90 ˚C is limited to 20 000 h..

Table 2：Conversion factor for different ambient temperature, f_1

Ambient temperature ℃	≦ 60	70	80	90
Conversion factor	1.00	0.91	0.82	0.71

Note：The maximum ambient temperature shall be not more than 90℃ according to EN 50618:2014.

Table 3：Conversion factor for conductor temperature, f_2

Temperature of the cable conductor ℃	120	110	100	90	80	70
Conversion factor	1.00	0.92	0.84	0.73	0.61	0.44

Note：The expected period of use at a max. conductor temperature of 120 ˚C and at a max. ambient temperature of 90 ˚C is limited to 20 000 h.

Table 4：Conversion factor for multi-cable, f_3

The number of cable side by side	1	2	3	4	5	6	7	8	9
Conversion factor	1.00	0.80	0.70	0.65	0.60	0.57	0.54	0.52	0.50

Note：For installation in groups the reduction factors for current rating according to HD 60364-5-52:2011, Table B.52.17 shall apply.

ケーブルの許容電流

Allowable ampacities of S-JET PV cables

$$I = I_n \times f_1 \times f_2 \times f_3$$

其中,

I ： 通常運転時の許容電流 (A)

I_n ： 一般条件における許容電流(表一) (A)

f_1 ： 周囲温度補正係数(表二)

f_2 ： 導体温度補正係数(表三)

f_3 ： 多条敷設時の電流減少係数(表四)

表一： 一般条件における許容電流, I_n

導体公称断面積, mm^2	2	3.5	5.5	8	14	22	38
許容電流, A	38	52	69	86	124	162	228

表二： 周囲温度補正係数, f_1

周囲温度,℃	30 及以下	31~35	36~40	41~45	46~50	51~55
補正係数	1	0.96	0.91	0.87	0.82	0.76

周囲温度,℃	56~60	61~65	66~70	71~75	76~80	81~85
補正係数	0.71	0.65	0.58	0.5	0.41	0.29

表三： 導体温度補正係数, f_2

導体温度, ℃	90	80	70	60	50	40
電流補正係数	1	0.93	0.84	0.74	0.62	0.44

表四： 多条敷設時の電流減少係数, f_3

敷設条数	3 以下	4	5 又は 6	7 以上 15 以下	16 以上 40 以下	41 以上 60 以下	61 以上
電流減少係数	0.7	0.63	0.56	0.49	0.43	0.39	0.34

WALSIN LIHWA

技術資料

電纜材料特性比較

The material properties of cable

市面上常見電纜種類及使用材料

電纜種類	絕緣/ 外被
PV Cables	XLPO/XLPO
CV Cables	XLPE/PVC
IV Cables	PVC
VV Cables	PVC/PVC

材料及性能差異比較表

材料別	交連	熱固性材料	熱塑性材料	耐溫性能	柔軟性	耐候性
XLPO	V	V	--	優	優	優
XLPE	V	V	--	優	佳	劣
PVC	--	--	V	佳	佳	佳

為何要使用PV Cable而非傳統CV Cable

CV Cables：CV cable之XLPE絕緣料多是採用溫水交連製程，交連度低且外被為PVC材質。整體而言耐候性差。

PV Cables：絕緣和外被材料採用交連聚烯烴，交連聚烯烴，也被稱為XLPO，是將聚烯烴透過高溫或是輻照的方式來做交連，形成網狀或體形結構的高分子。整體而言耐熱性、 耐磨性、抗日光(抗UV)等性能較CV Cable來得好。

高溫，1 小時後

CV Cable

高溫，1 小時後

PV Cable

認證測試項目

TUV 認證通過

■ 結構

導體: 符合 IEC 60228 Class 5的絞合鍍錫銅導線
絕緣: 交連聚烯烴，低煙無鹵阻燃複合物
護套: 交連聚烯烴，低煙無鹵阻燃複合物, 黑色

■ 電氣性能

交流耐電壓試驗: 6.5 kV/5 min

■ 依據標準：2pfg 1169/08.2007 (PV1-F)
通過下列測試項目

電性能試驗
結構和尺寸檢驗
老化性能試驗
成品高溫壓力試驗
濕熱試驗
耐酸鹼試驗
相容性試驗
低溫衝擊試驗
低溫捲繞試驗
冷延伸試驗
耐臭氧試驗
耐候試驗(耐UV)
動態穿透試驗
耐凹痕試驗
被覆熱收縮試驗
阻燃試驗：EN 60332-1-2 垂直燃燒

UL 認證通過

■ 結構

導體: 符合 IEC 60228 Class 5的絞合鍍錫銅導線
或ASTM相關規定之導體
絕緣: 交連聚烯烴，阻燃複合物
護套: 交連聚烯烴，阻燃複合物, 黑色

■ 電氣性能

交流耐電壓試驗:
3.0、3.5或4.0 kV/1 min (600V)、
6.0、7.5或9.0 kV/1 min (1000V and 2000V)
(視導體尺寸大小)

■ 依據標準：UL 4703 通過下列試驗項目

變形試驗
耐候(抗日光)試驗(耐UV)
冷彎曲試驗
冷衝擊試驗
長時間絕緣電阻試驗
墨水印字耐久性試驗
可繞性試驗
耐油試驗
耐老化性能試驗

■ 阻燃性能

FV-2/VW-1垂直耐燃試驗
FV-1/垂直耐燃試驗

EN 認證通過

■ 結構

導體: 符合 EN 60228 Class 5 可撓性鍍錫銅導線
絕緣: 交連聚烯烴，低煙無鹵阻燃複合物
護套: 交連聚烯烴，低煙無鹵阻燃複合物, 黑色

■ 電氣性能

交流耐電壓試驗: 6.5 kV/5 min

■ 依據標準：EN 50618 通過下列測試項目

電性能試驗
結構和尺寸檢驗
絕緣及被覆老化性能試驗
成品相容性試驗
絕緣及被覆熱固性試驗
絕緣及被覆耐熱性試驗
絕緣及被覆冷伸長試驗
絕緣及被覆鹵素評價試驗
絕緣長期直流絕緣電阻試驗
成品濕熱試驗
被覆耐酸鹼試驗
成品冷衝擊試驗
成品冷彎試驗
成品耐臭氧試驗
被覆耐候試驗(耐UV)
成品動態穿透試驗
被覆退縮試驗
成品垂直耐延燃試驗：EN 60332-1-2 垂直燃燒
成品發煙量試驗