JJ-LAPPCABLE

25 SEPT 2017

CRITICAL CONNECTIVITY SOLUTIONS FOR PHOTOVOLTAIC INDUSTRY

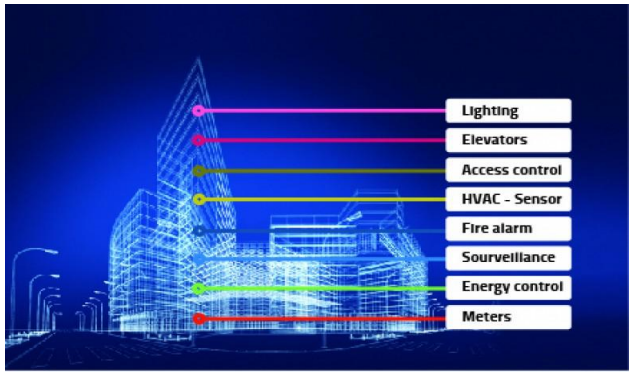
PREPARED BY : JOHN HNG

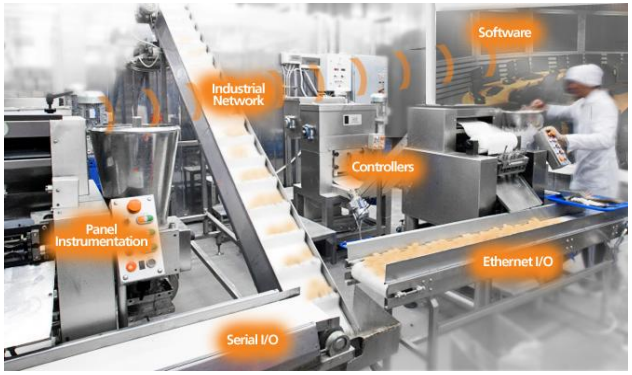
JJ-LAPP CABLE

About us :

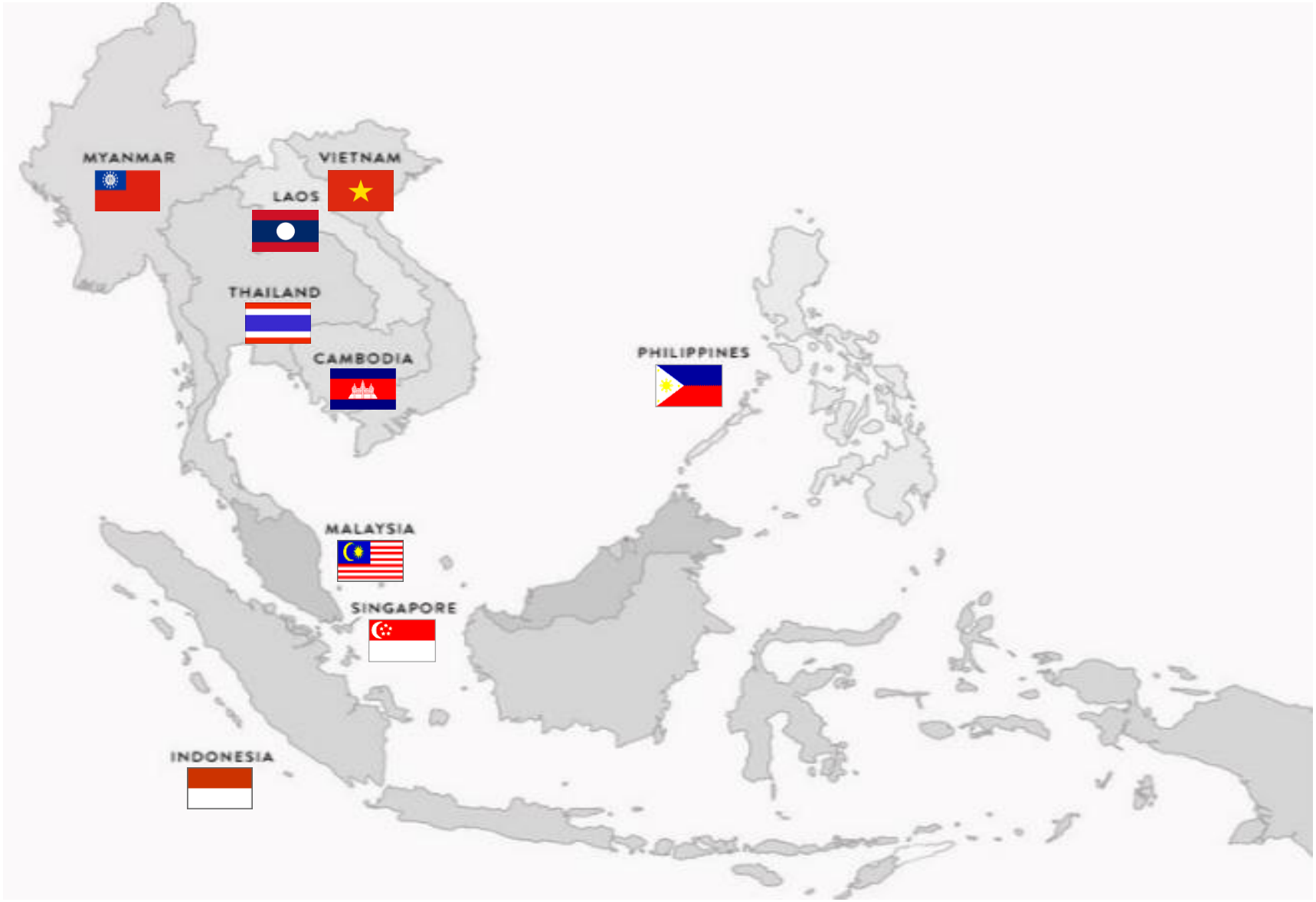
Borne of Jebsen & Jessen (SEA) and Lapp Holding Asia, a subsidiary of Lapp Group in Germany, we represent the finest German cable technology developed for and delivered to ASEAN.

With the strengths of both founding companies consolidated under one brand, our connectivity solutions are fully supported by the manufacturing capabilities of a global industry leader and the regional reach of a distribution giant.

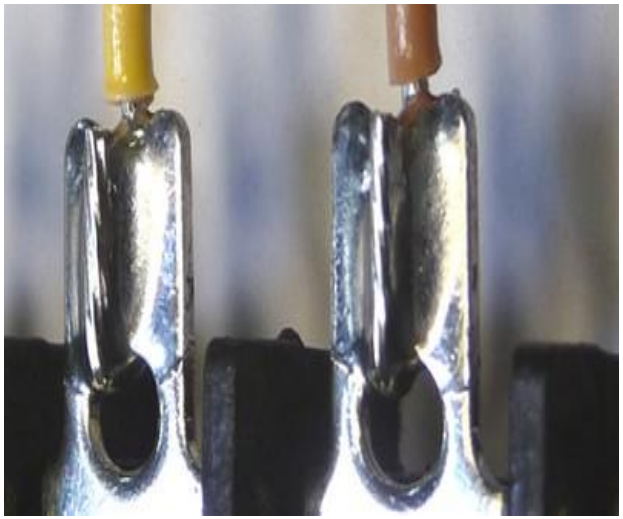


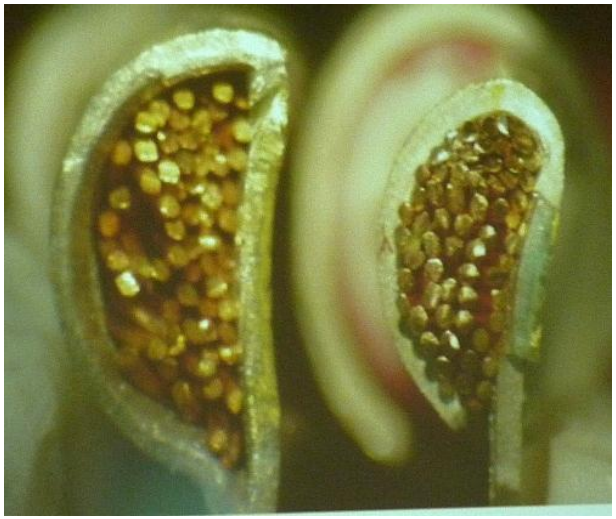


Our Presence in SEA



Connectivity – Crimping Threats & Solution



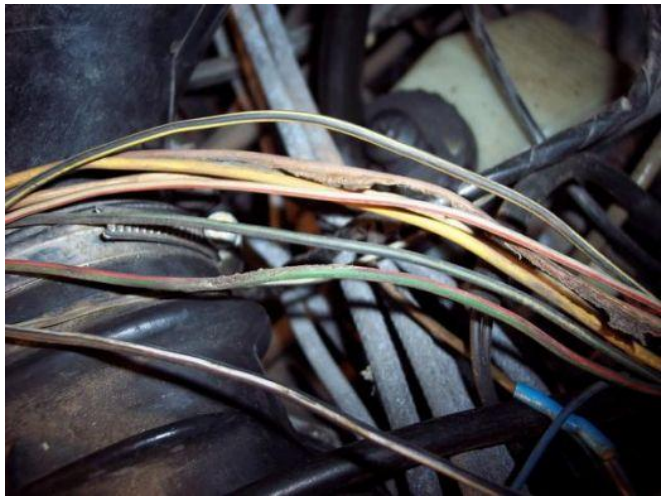


Non Solar Grade Cable – Threats

According to **DIN VDE 0298 part 4**, de-rating of current carrying capacity applies to any cable at ambient and/or conductor temperatures above 30C.

A little exception for solar cables: because of their special insulation materials, solar cables are allowed a maximum conductor temperature of 120C.

As such, there is no de-rating required until temperatures > 60C.



Why We Need Solar Grade Cable – structures and benefits

Certified acc. to EN 50618, Type designation H1Z2Z2-K

Electron beam cross-linked solar cables with optimized performance in water

Product Make-up

- Fine-wire, tinned-copper conductor
- Core insulation made of electron beam cross-linked copolymer
- Colour of core insulation: white
- Outer sheath made of electron beam cross-linked copolymer
- Outer sheath colour: black respectively black with red stripe

Current rating
In compliance with TÜV 2 PfG 1169/08.2007 table 1

Temperature range
-40°C to +120°C max. conductor temperature based on EN 60216-1
Ambient temperature according to TÜV 2 PfG 1169/08.07: -40°C to +90°C

Test voltage
AC 6500 V

Product features

- Weather/UV-resistant acc. to HD 605/A1 Ozone-resistant according to EN 50396
- Halogen-free and flame-retardant
- Good notch and abrasion resistance

Benefits

- Robust against mechanical impacts
- For outdoor applications
- Extruded colour stripe serves as reverse polarity protection during installation.
- Exact quantity control during installation by meter marking on the cable sheath
- Reduction of flame propagation and of toxic combustion gases in the event of fire
- The alternative for long-term storage in water, e.g. as it can occur in case after flooding or in buried conduits

Solar Cable withstanding HIGH TEMPERATURE

Electrical factors

Temperature Rating (Conversion Factor for deviating temperatures)

Rated temperature of the conductor of wire or cable. (See product page of the catalogue, Technical Data, Temperature range: upper value for static and/or flexing)						2 Pfg 1169/09.2007
	60 °C	70 °C	80 °C	85 °C	90 °C	120 °C
Ambient temperature in °C	Correction factor, applicable to current value of T12-1					
10	1.29	1.22	1.18	1.17	1.15	1.00
15	1.22	1.17	1.14	1.13	1.12	1.00
20	1.15	1.12	1.10	1.09	1.08	1.00
25	1.08	1.06	1.05	1.04	1.04	1.00
30	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	1.00
35	0.91	0.94	0.95	0.95	0.96	1.00
40	0.82	0.87	0.89	0.90	0.91	1.00
45	0.71	0.79	0.84	0.85	0.87	1.00
50	0.58	0.71	0.77	-	0.82	1.00
55	0.41	0.61	0.71	-	0.76	1.00
60	-	0.50	0.63	-	0.71	1.00
65	-	0.35	0.55	-	0.65	0.91
70	-	-	0.45	-	0.58	0.91
75	-	-	0.32	-	0.50	0.82
80	-	-	-	-	0.41	0.82
85	-	-	-	-	0.29	0.82
90						0.71
100						0.58
110						0.41

Simple Calculation On Why We need SOLAR CABLE

Temp C	Performance
at 30 C	100%
at 40 C	90%
at 50 C	80%
at 60 C	70%
at 70 C	60%
at 80 C	50%
at 90 C	40%

Temp C	Performance
at 60 C	100%
at 70 C	90%
at 80 C	80%
at 90 C	70%

Projected Scenario :
4mm2 Cable
Ideally = 55A DC
Designed = 40A
But @ 70 C (55A x 0.60%) = 33A DC

Electrical components

If an incorrect, undersized cable is used for a circuit or an appliance this can have detrimental consequences:

- Cable can go brown
- Cable can go brittle and damage the insulation
- Cable can overheat and burn
- A fire can start.

Generally, the insulation is the first item that gets damaged – the very thing keeping people safe.

Special Connection Solution for Harsh Environment

Armoured with stainless steel wire braid

Efficient protection against martens, rodents and termites

Connector system for weatherproof cabling of photovoltaic systems

Field-mountable solar connector

Tested according EN 50521: 2008+A1

For cable sizes 4-6 mm²

Technical data

Classification
ETIM 5.0 Class-ID: EC002635
ETIM 5.0 Class-Description: Circular connector (industrial connector)

Rated voltage (V)
1.5 kV

Rated impulse voltage
16 kV

Degree of soiling
3

Contact resistance
< 0.5 mOhm

Protection rating
IP68 (10h/1m)

Cycle of mechanical operation
100

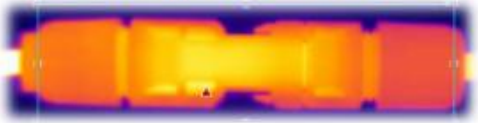
Protection class
II

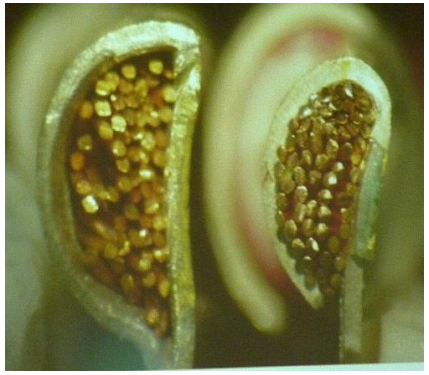
Temperature range
-40°C ... +105°C

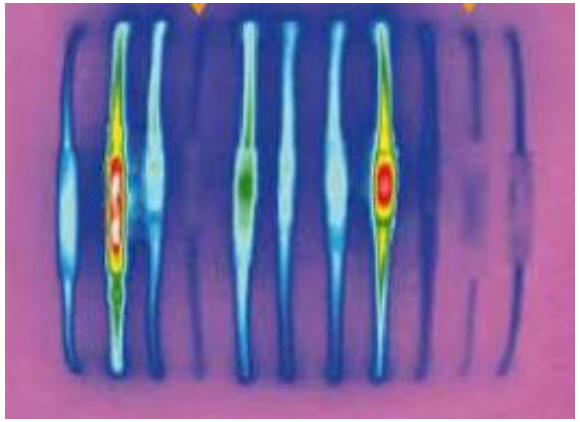
Disaster caused by POOR CONNECTION / Low Quality Components

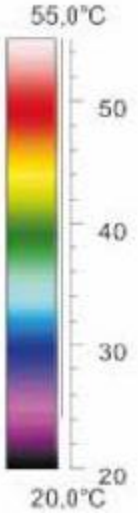
Potential sources of failures

Low quality connectors









Risk of Fire

Insulation Fault

Service Hours

Increased Electrical Resistance

Danger of Electric Shock

Danger For Life

Power Loss

Maintenance Expenses

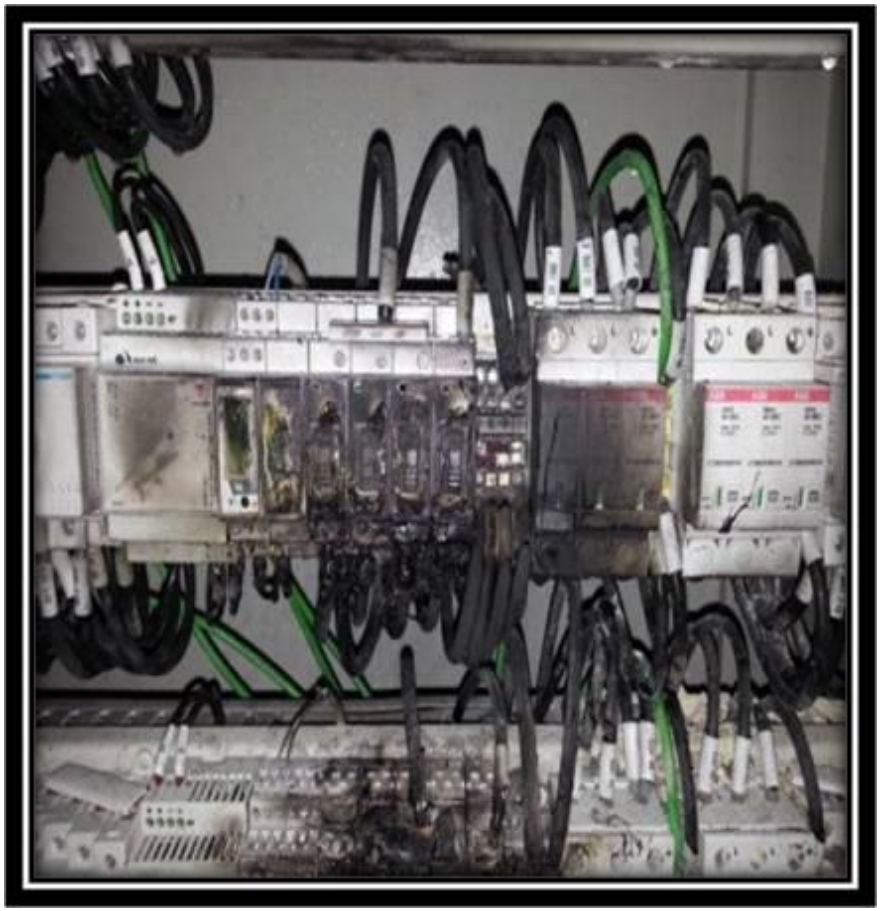
Reduction of PV plants efficiency

Less Income and ROI

Disaster caused by POOR CONNECTION / Low Quality Components

Poor Connection caused *Fire*

Combiner Box Burnt Down – Poor Connection



AS/NZS 5033:2012 Installation and safety requirements for photovoltaic (PV) arrays

4.3.7 Plugs, sockets and connectors

Plugs, sockets and connectors shall—

(a) comply with EN 50521 (see Appendix H);

(b) be protected from contact with live parts in connected and disconnected states (e.g. shrouded);

(c) have a current rating equal to or greater than the current carrying capacity for the circuit to which they are fitted (refer to Table 4.2);

(d) be capable of accepting the cable used for the circuit to which they are fitted;

(e) require a deliberate force to separate;

(f) have a temperature rating suitable for their installation location;

(g) if multi-polar, be polarized;

(h) comply with Class II for systems operating above ELV;

(i) if exposed to the environment, be rated for outdoor use, be of a UV-resistant type and be of an IP rating suitable for the location;

(j) be installed in such a way as to minimize strain on the connectors (e.g. supporting the cable on either side of the connector); and

Importance of the components for a Module and PV System

- In a PV system, the components which have been and continue to be the most prone to failure are the cables, connectors and the junction box on the rear of the PV module.

- It is interesting to note that these components comprise only 1%-2% of the overall cost of a PV module system and price savings among component choices are rarely more than 20%. Therefore, it is appropriate to ask if a savings of .002 percent gained by using cheaper components is justified when considering the additional safety risks and decreased efficiency such a choice might entail.

- The European experience has shown that for a system to last the warranted lifetime of 25 years, PVC and rubber cables, in addition to connectors which are not moisture proof, will ultimately prove to be the weakest links.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