WEBINAR

# RISE OF SOLAR:
## TAPPING BRIGHT SPOTS IN ASIA PACIFIC

# THE SPEAKERS

**Santhosh Kumar**
**LAPP ASIA PACIFIC**
Regional Manager,
Renewable Energy APAC

**Patrick Tan**
**Bizlink Technology**
Country Manager,
Australia & India

# LAPP: THE STORY

## Family-based. Innovative. LAPP.

Founded by Oskar Lapp in 1957, LAPP has established itself a trusted brand with a heritage of quality and a reputation for excellence. As a global business with a family-oriented corporate culture, the company has engaged customers with a relentless focus on customer, innovation and quality.

## Today, LAPP is synonymous with competence, assured quality and innovation all over the world.

Partnering with us ensures not only quality cables and connectors, but also quick delivery times worldwide and advanced system solutions, thanks to state-of-the-art technological innovations. All of these factors combined provide our customers with an unparalleled peace-of-mind and enhanced value over our competitors.

# Lapp Brand

From standard to custom-made products

**8 strong brands**, which are international industry standards



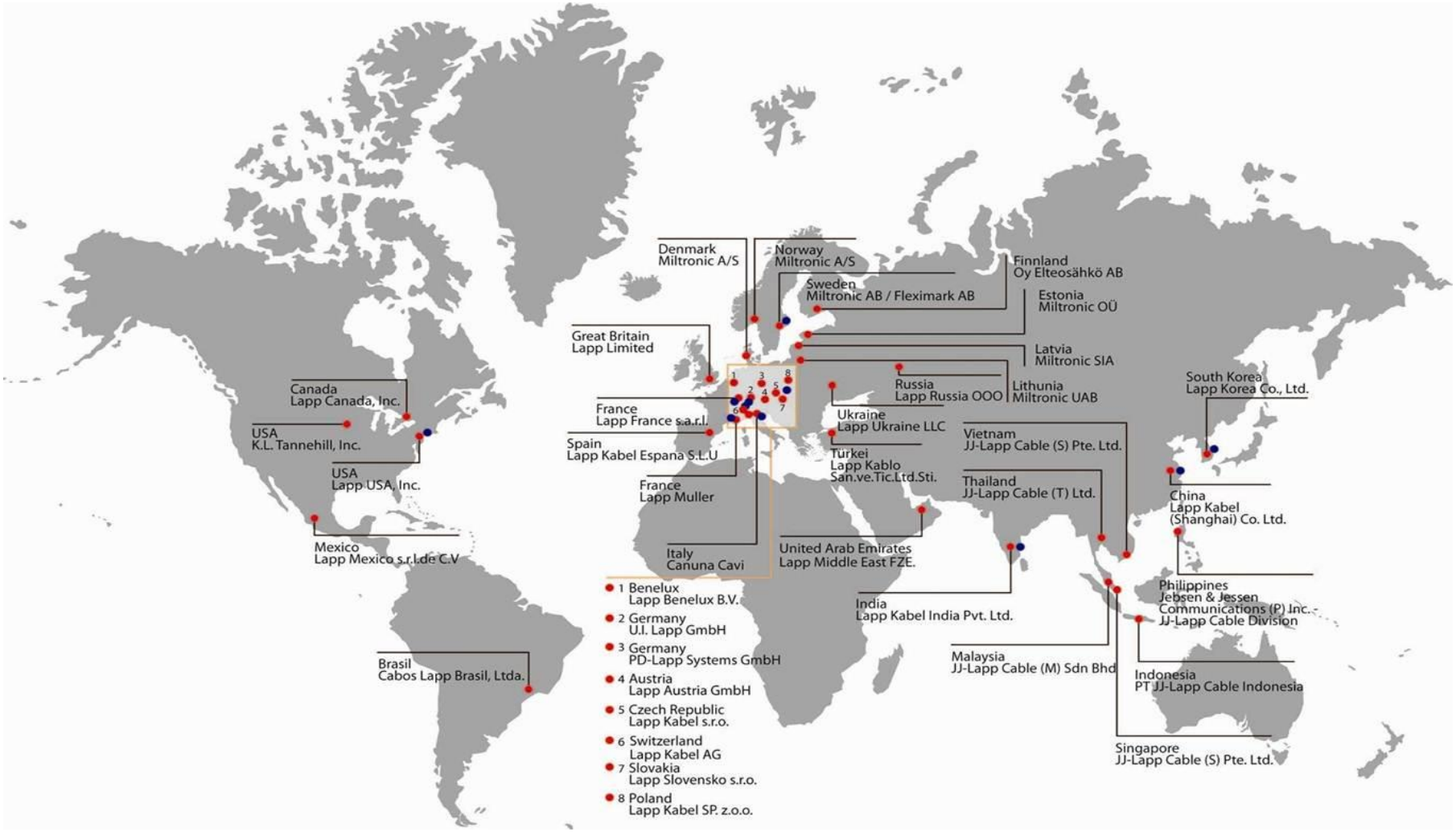




More than **40,000 standard products** for practically every international requirement

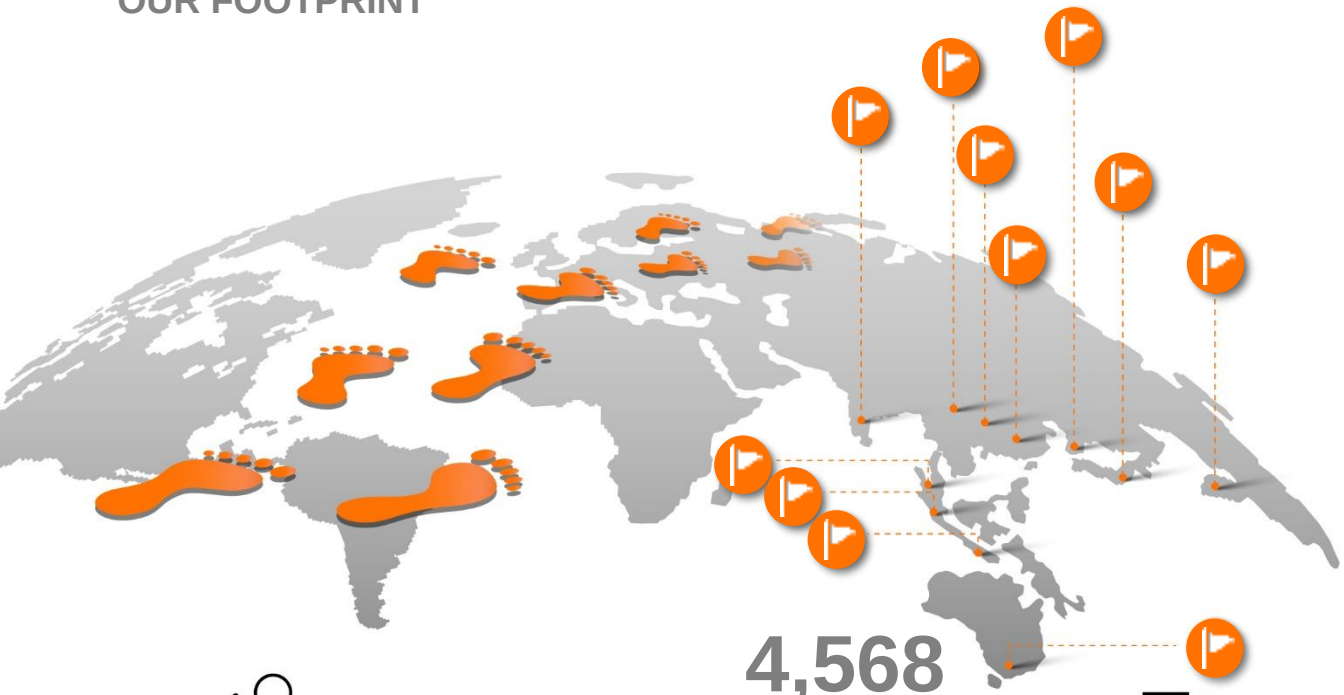

**Tailored solutions** for customer-specific applications


# WHAT PROXIMITY MEANS TO US



# LAPP IN ASIA PACIFIC

## OUR FOOTPRINT



### Asia Pacific

| | |
|---|---|
| China | Lapp Kabel Shanghai Co., Ltd. |
| India | LAPP India Pvt. Ltd. |
| Japan | LAPP Japan K.K. |
| South Korea | LAPP Korea LLC |
| Singapore | LAPP Asia Pacific Pte Ltd |
| | JJ-LAPP (S) Pte Ltd |
| Malaysia | JJ-LAPP (M) SDN BHD |
| Indonesia | PT. JJ-LAPP Cable SMI |
| Philippines | JJ-LAPP (P) INC |
| Vietnam | JJ-LAPP Vietnam Co. Ltd. |
| Thailand | JJ-LAPP (T) Ltd. |
| Taiwan | DKSH Taiwan Ltd. |
| Australia | LAPP Australia Pty Ltd |
| New Zealand | ECS New Zealand Ltd. |

**1,000+**

Employees Across Asia

**4,568**

Engineering hours spent each day for individual customer projects

**90**

Over Offices

Serving more than

**27,000**

Customers

More than **330**

People serving our customers

**40,000**

Products

**5**

Factories

# ASIA PACIFIC OFFERS THE BIGGEST POTENTIAL IN THE PV MARKET

PV/SOLAR REMAINS THE **FASTEST GROWING** SEGMENT IN ALL ENERGY INSTALLATIONS

**APAC** HAS **55%** MARKET SHARE IN INSTALLED CAPACITY

**CHINA** ITSELF OPERATES **1/3** OF GLOBAL PV BASE

Image Source: Unsplash; Data Source: Global Market Outlook for Solar Power 2018-2022, SolarPower Europe

**The economic case for renewable energy (RE) is certain: Here are 6 factors to iterate why**

- **Market potential**: Many governments are ramping up their efforts in RE, setting higher RE targets.
- **Procurement model**: Countries are increasingly moving towards the auction system, a competitive selective process, compared to the traditional Feed-in-Tariff mechanism.

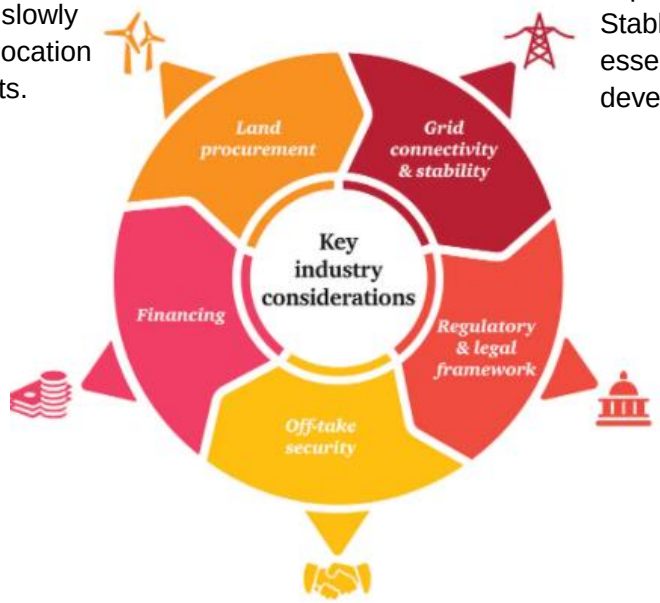

- **Revenue**: Robust Power Purchase Agreements (PPAs) remain a key consideration for developers.
- **Financing**: Besides decreasing financing costs, there is expected to be continued innovation in financing options.
- **Costs**: The global photovoltaics (PV) module pricing trend has shown a downward trend in recent years, making RE more competitive over conventional sources of energy.
- **Policy & regulatory support**: Government initiatives and fiscal incentives have proven to be an accelerator of the RE ecosystem.

Data Source: PWC: The next frontier of infrastructure investment – renewable energy in Asia Pacific

# These are the key considerations for developing renewable energy (RE) in Asia

Currently, **land procurement** is a key concern in most Asia-Pacific countries, however, regional governments are slowly assuming land allocation risk for RE projects.

**Grid connectivity & stability** has a high impact on RE projects in remote areas separated from the main grid. Stable grid networks are essentials for future large-scale developments.




The availability of local debt, long-term loans and falling interest rates in most Asia-Pacific countries provides a solid **financing** platform for RE projects.

Many Asia-Pacific governments have favourable **regulatory & legal frameworks** for RE, with significant RE capacity targets.

It is important for RE developers to ensure **off-take security** for PPAs to reduce risk of payment default since most off-takers in the region are in poor financial health.

Data Source: PWC: The next frontier of infrastructure investment – renewable energy in Asia Pacific

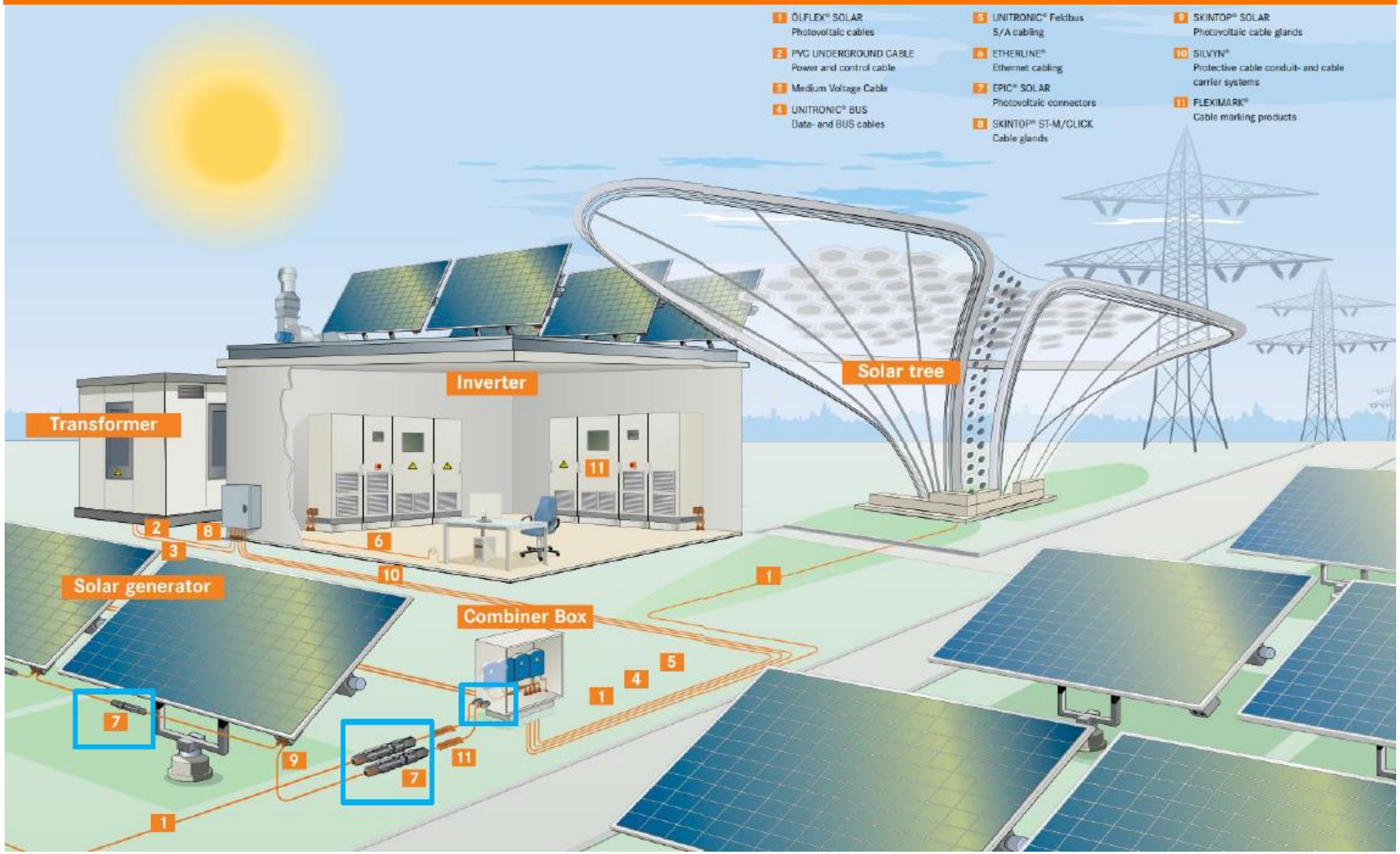
## Expect these to be up and coming in renewable energy (RE)

1. **Mini-grids or hybrids** consist of a set of electricity generators interconnected to a distribution network that supplies electricity to a localized group of customers.
2. **Stand-alone systems** such as rooftop solar systems are being used to power homes increasingly.
3. **Utility scale battery storage** helps enhance grid stability and remove intermittency of RE generation.
4. **Building integration** through adoption of energy efficient equipment as well as inclusion of RE technologies has been a key focus in global environmental sustainability.
5. **Artificial intelligence** will propel increased usage of clean power in the future.

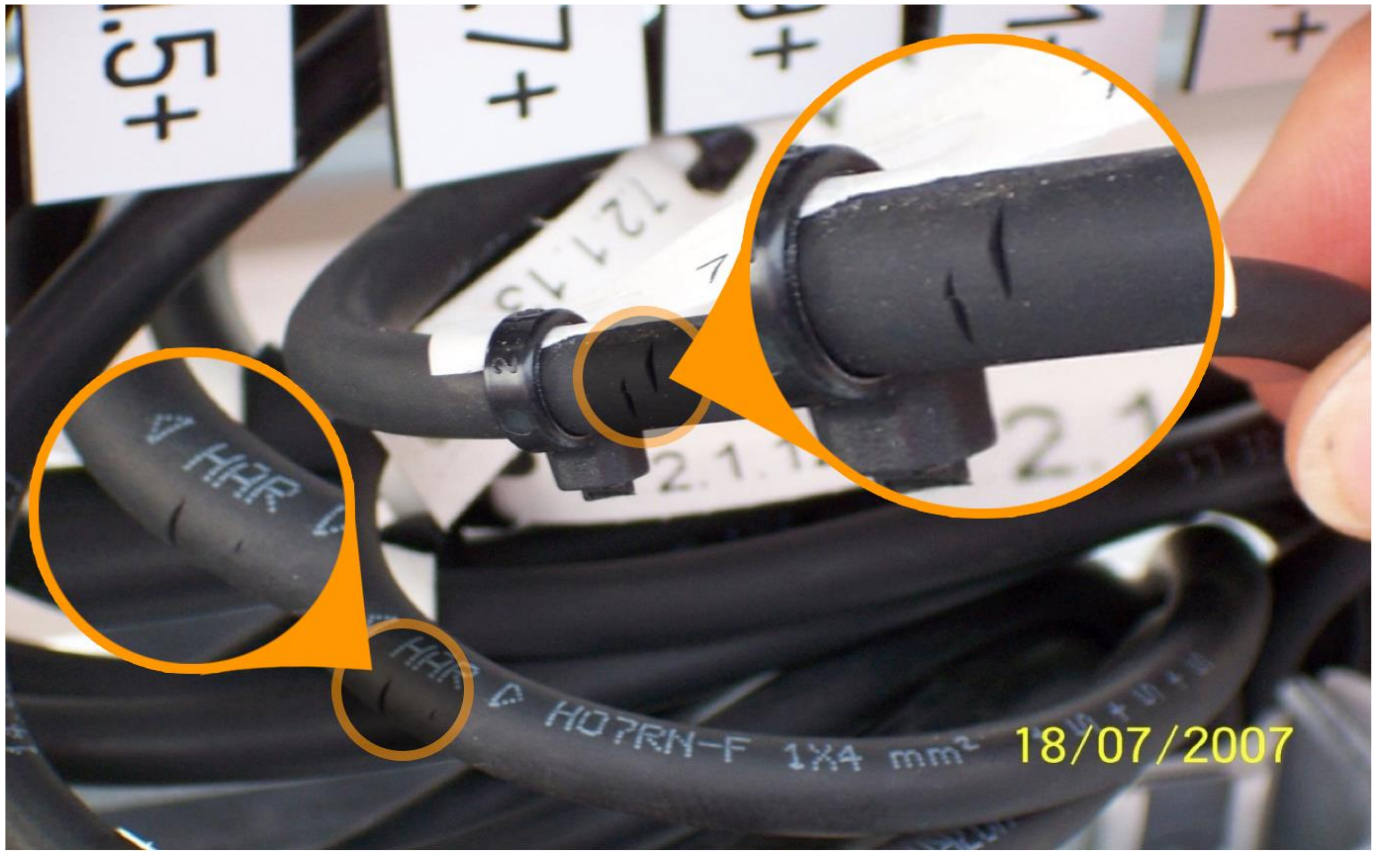
Data Source: PWC: The next frontier of infrastructure investment – renewable energy in Asia Pacific

# LAPP SETS THE QUALITY IN THE SOLAR PRODUCTS RANGE

# Photovoltaic in the Lapp Group



# CRITICAL COMPONENTS




Cables for string wiring as well as connectors are critical components of PV installations.

They account for only 2% of total system cost, however, 6 –10% of claims are caused by those products.

When thinking about PV installations which are supposed to produce energy for decades, long-term durability should be your guide, down to the cable ties you choose...

# Products for photovoltaic

## Linking of PV panels in power plants and on roof tops

### ÖLFLEX® SOLAR XLR-E[I+E]

Certified acc. to IEC 62930 & EN 50618, Type designation 62930 IEC 131 & H1Z2Z2-K


Versions with extruded stripe (red or blue) available for easy differentiation of polarity.

### ÖLFLEX® SOLAR XLS-R


Economic alternative – when TÜV approval is not required.

# Products for photovoltaic

## Linking of PV panels in power plants and on roof tops

### ÖLFLEX® SOLAR XLWP [I+E]

Certified acc. to IEC 62930 & EN 50618, Type designation 62930 IEC 131 & H1Z2Z2-K


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

### ÖLFLEX® SOLAR XLR-E T

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


Twin cable for easy installation on rooftops

## Products for photovoltaic

## Linking of PV panels in power plants and on roof tops

### ÖLFLEX® SOLAR V4A

Armoured with stainless steel wire braid

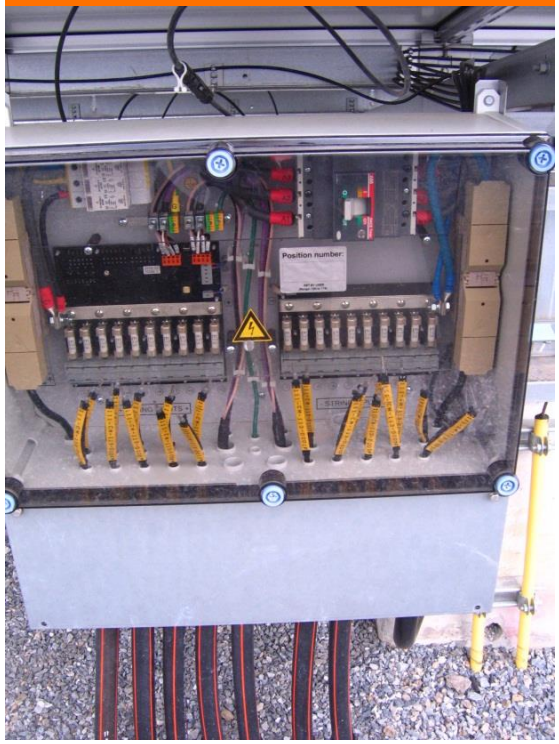
Efficient protection against martens, rodents and termites

### ÖLFLEX® TRAFO XLv 1,8/3 kV


Mechanically robust wiring between inverter and transformer

Suitable for direct burial

**Products for photovoltaic**



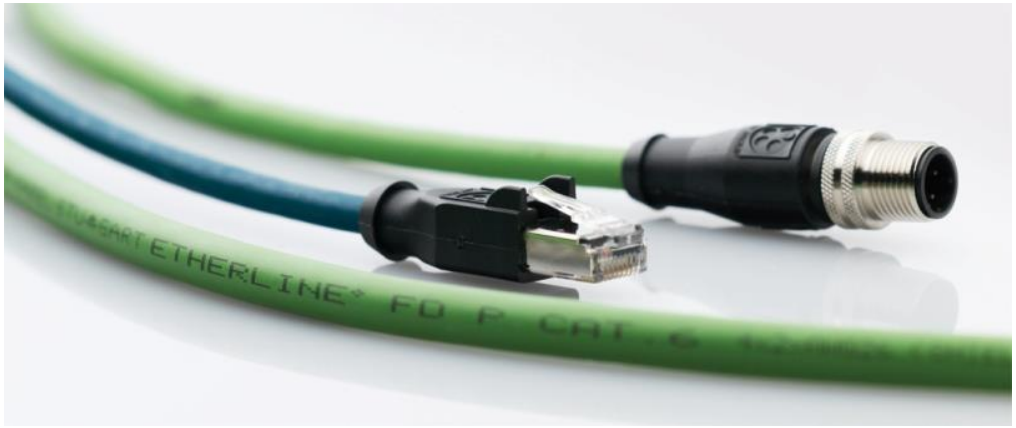
## Monitoring PV installations

### UNITRONIC®

Efficient cabling for data transmission


### ETHERLINE®

For secure industrial networking



# Products for photovoltaic

## Tools and accessories

### SKINTOP®

Cable glands

### FLEXIMARK®

Cable marking systems


### SILVYN®

Protective conduits

### EPIC SOLAR®

Crimp tool

# Customer references world wide

Wirsol
Centrosolar
Hanwha Q Cells
Bull Solar
Waaree Energies
SunEdison
Solpower
Sterling & Wilson
ABB
DHybrid
Schletter
Sol & Solucoes
Axitec
Conergy
Phoenix Solar
AS Solar
Mage Solar
BK Solar
Solar Edge
Tyco
Wagner Solar
Belectric

# REFERENCE PROJECTS IN ASIA PACIFIC ON CABLES SUPPLIED

# Total Solution - XLWP water proof version for 78MWp

# 5MW Floating Solar Systems @ Thailand - XLWP

# 14MW Floating Solar Systems @Laos - XLWP version solar cable

# TOTAL SOLUTION FOR FLOATING SOLAR SYSTEMS

Selected reference projects in Asia Pacific

**FLOATING SOLAR**

## Hwaseong Reservoir – 2.5 MWp


| | |
|---|---|
| **Location:** | Hwaseong-si, Korea |
| **Developer:** | KEPID – Korea Electric Power Industrial Development Co., Ltd |
| **Products supplied**: | ÖLFLEX® SOLAR XLWP 1x6mm² – 80,000 m<br>EPIC® SOLAR 4 Connectors – 3,000 pcs |

# TOTAL SOLUTION FOR FLOATING SOLAR SYSTEMS

Selected reference projects in Asia Pacific

**FLOATING SOLAR**

## Hwaseong Dukwoo Reservoir – 2.1 MWp


| | |
|---|---|
| **Location:** | Hwaseong-si, Korea |
| **Developer:** | KEPID - Korea Electric Power Industrial Development Co., Ltd |
| **Products supplied**: | ÖLFLEX® SOLAR XLWP 1x6mm² – 70,000 m<br>EPIC® SOLAR 4 Connectors – 2,000 pcs |

# INSTALLATION CHALLENGES & SOLUTIONS

## INSTALLATION CHALLENGES

ACTUAL SITE PICTURES

# APPLICATION

- Buried under ground : 630 Centimeter deep / Cable length 7 meter
- Protected by Flexible HDPE Conduits: Without joints
- Sealing with epispastic type protection method

*It seems that there is no open point in conduits

## INSTALLATION

ACTUAL SITE PICTURES

# APPLICATION

- Buried under ground:
  630 Centimeter deep
- Protected by Flexible HDPE Conduits:
  With joints (elbow & “ T ”)
- Insufficient sealing of entry points

**INSTALLATION**

ACTUAL SITE PICTURES

# SEALING

| SITE : A | SITE : B |
| --- | --- |
|  |  |
| Protected with a plastic epispastic type sealing method | Open condition & not sufficient sealing |

**INSTALLATION**

COMPARISON

# ROUTING

| SITE : A | SITE : B |
| --- | --- |
|  |  |
| No joints in the conduits from array to CB (less chance of water entry) | “ T ” or “ + ” type Connection: 90 º joints used & big size conduits (more possibility for water entry) |

INSTALLATION CHALLENGES

# DAMAGES

- DAMAGES on cable surfaces
- It means that the cables have been damaged during installation & the damaged cables could be installed under ground

INSTALLATION CHALLENGES

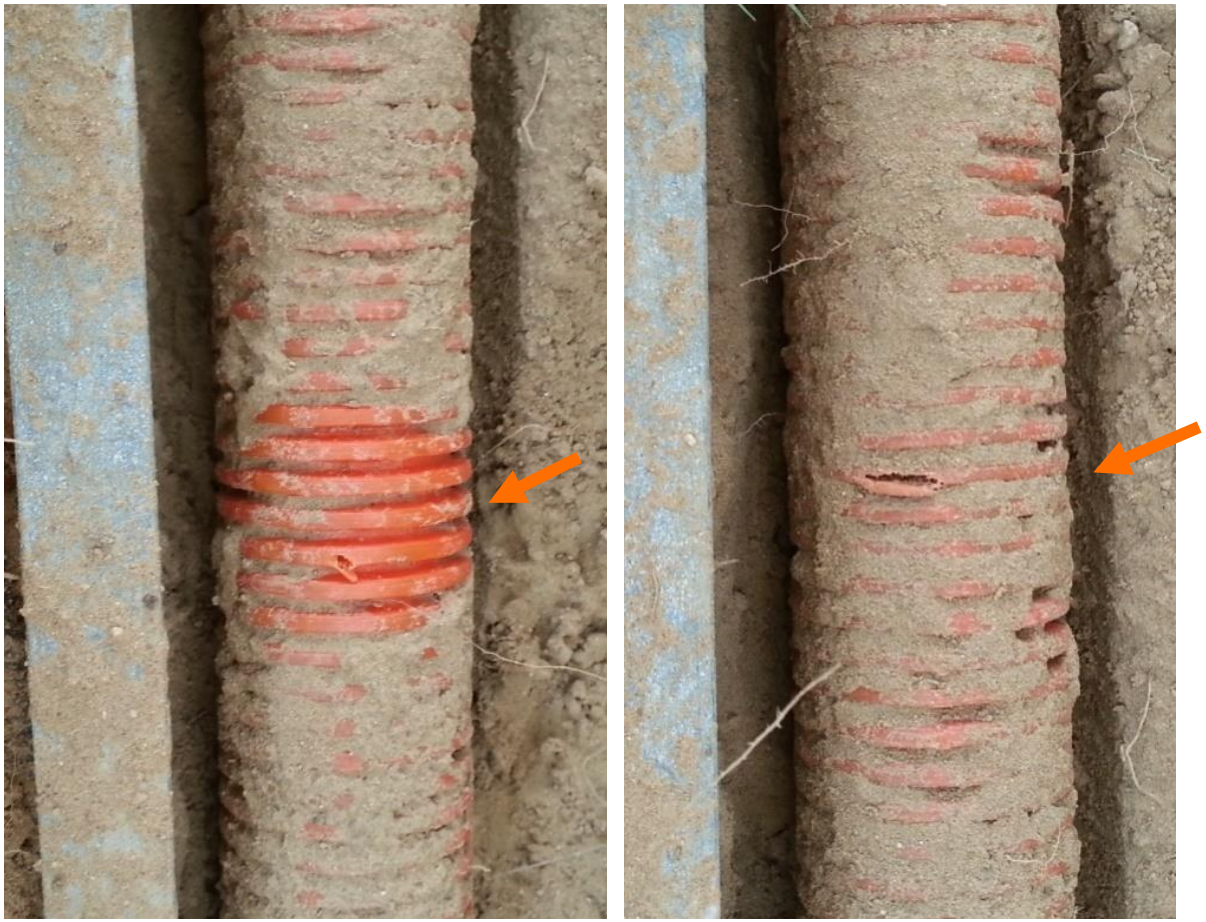
# TWISTING OF CABLES

- Cables are twisted…
- It means that the cables might have been released incorrectly from wooden drum & it could give stress on conductors inside cable


INSTALLATION CHALLENGES

# LOAD ON CONDUIT

It is recommended that burial depth to be atleast 1.2 mtr in areas where additional load because of vehicle movement comes over the soil



INSTALLATION CHALLENGES

# WET SOIL INSIDE CONDUIT

- Wet soil seen inside conduits
- This is a typical scenario and hence cables are in a continuously wet state inside the conduit

INSTALLATION CHALLENGES

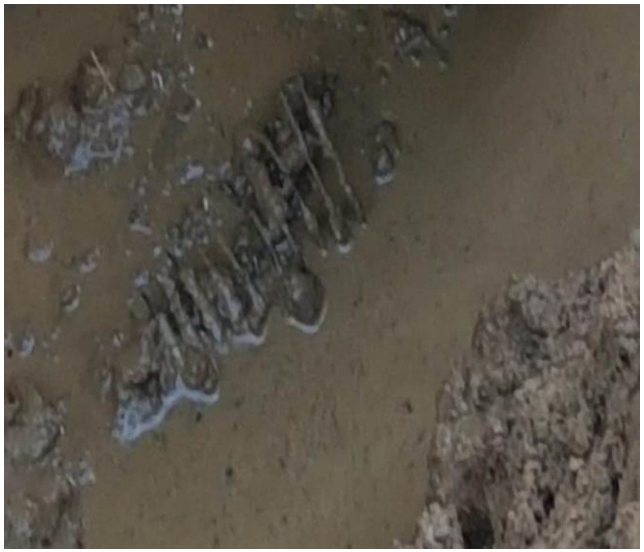
# WATER INSIDE CONDUIT

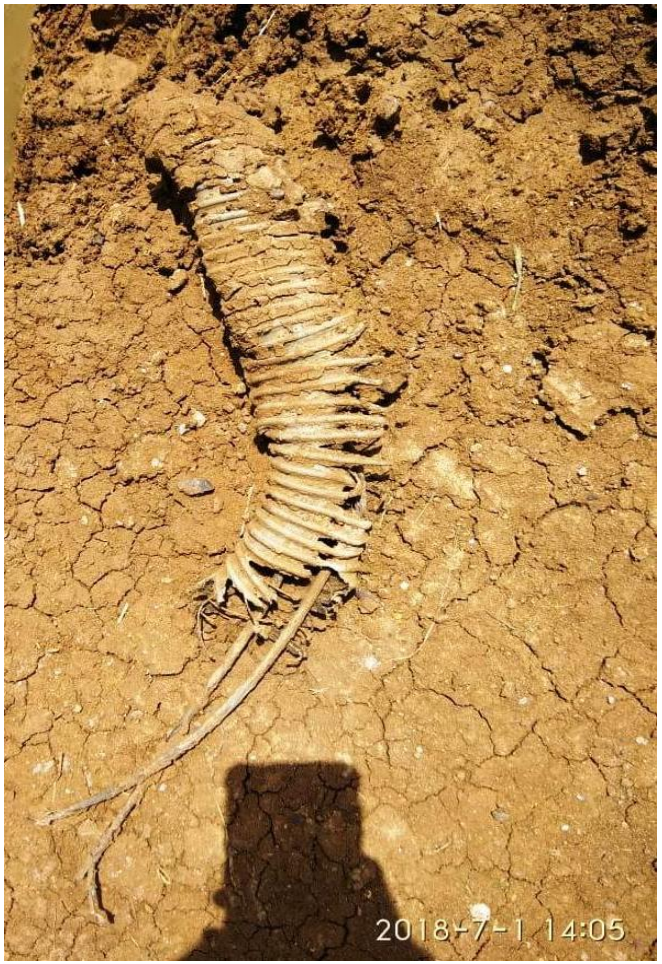
- Water observed inside the conduit while cables were pulled out

## INSTALLATION CHALLENGES

PVC SPIRAL CONDUITS USED NOT PROTECTED AGAINST WATER ENTRY

# CONDUIT DAMAGED / SLUSHY CONDITIONS

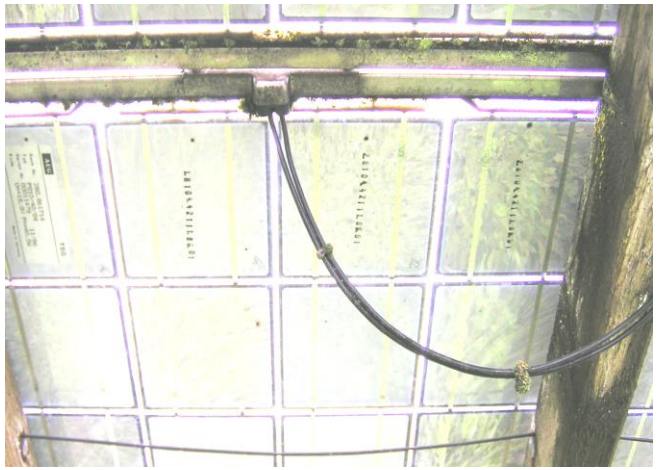




INSTALLATION CHALLENGES

# TERMITE & RODENT ATTACK

- Termite & Rodent attack in various degrees depending on site conditions



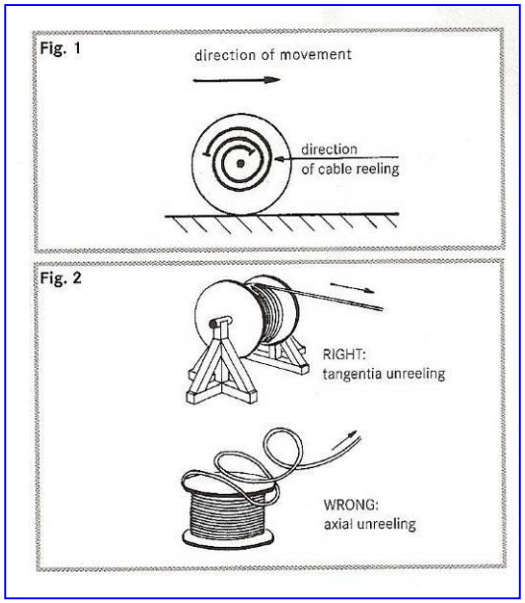
# RECOMMENDATION

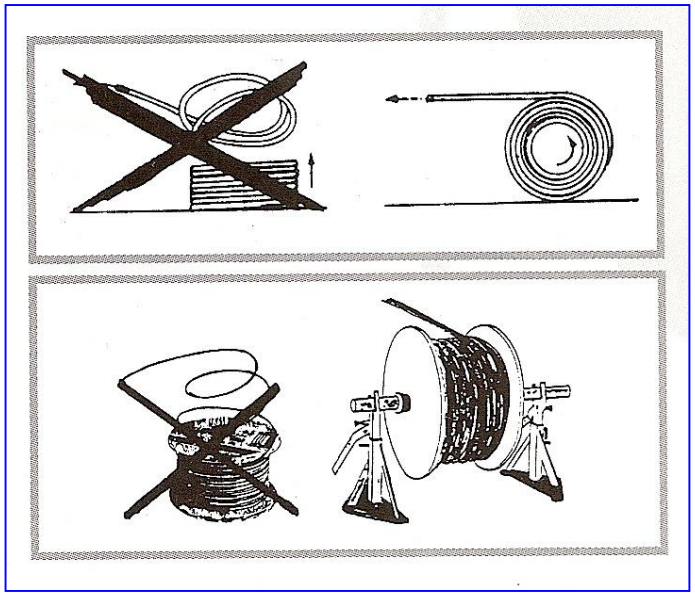
# CONDUIT INSTALLATION.

Make an Inverted “U” / 90 ° bend.

Prevent twisting of cables.

Follow cable pulling / unreeling guidelines



When thinking about PV installations which are supposed to producing energy for decades, long-term durability should be your guide, down to the cable ties you choose...

## OVERALL QUALITY OF THE INSTALLATION

Following relevant codes and standards

## QUALITY OF INSTALLERS

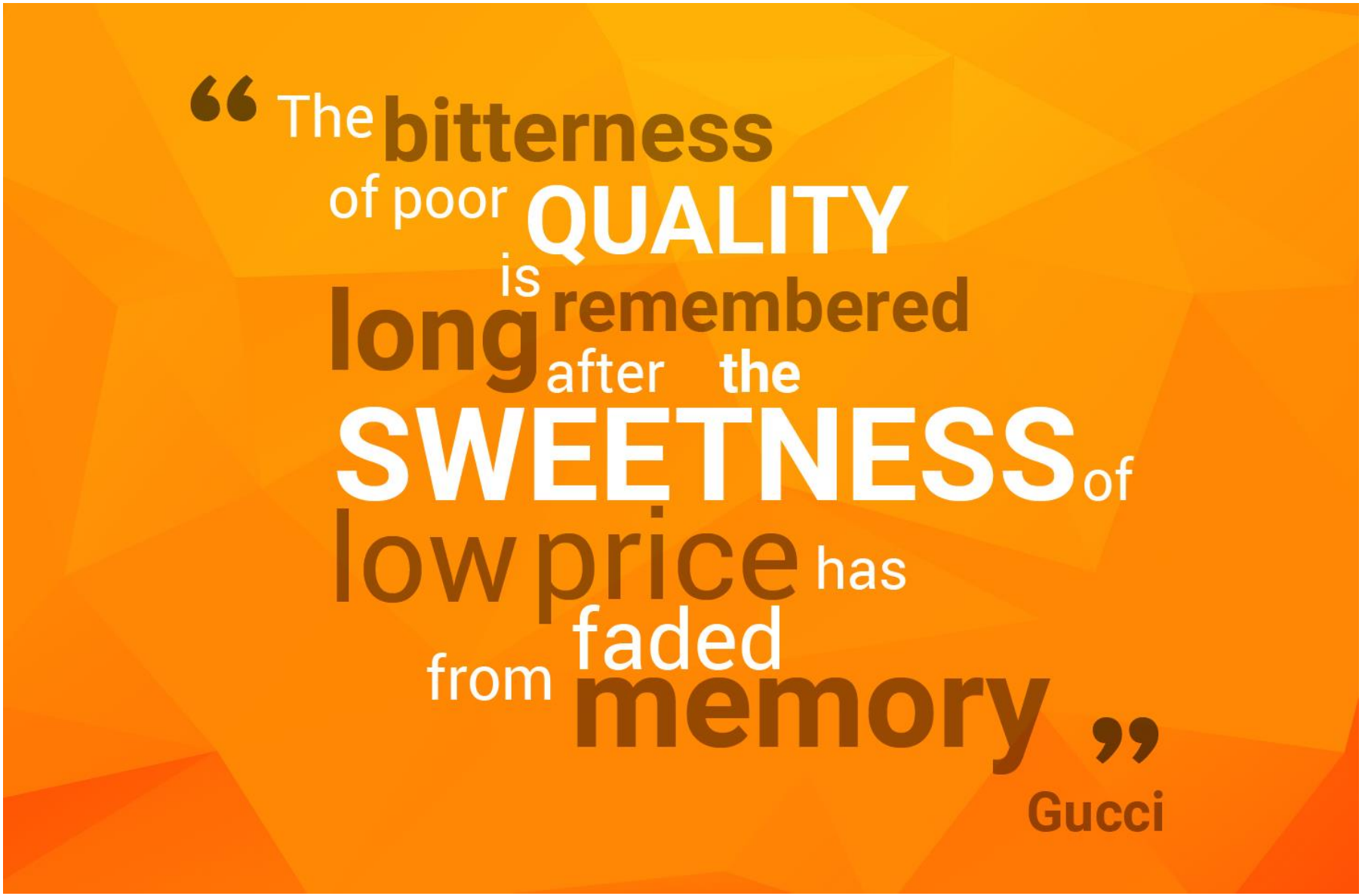
Photovoltaic systems should only be installed by qualified/certified installers

## QUALITY OF COMPONENTS

Long-lasting, secure cable connections with low contact resistances are necessary to avoid defects and losses. This is only possible with carefully selected, high quality components.

## MAINTENANCE AND INSPECTION

Photovoltaic systems should be maintained and inspected annually by qualified professionals.


“ The bitterness of poor QUALITY is remembered long after the SWEETNESS of low price has faded from memory ”
Gucci

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BizLink

# About BizLink

## Who We Are

**BizLink, founded in 1996, is headquartered in Silicon Valley, USA. We have vertically-integrated production lines in 17 locations worldwide.**

**Our mission is to make interconnection easier and to become the reliable interconnect solution provider.**

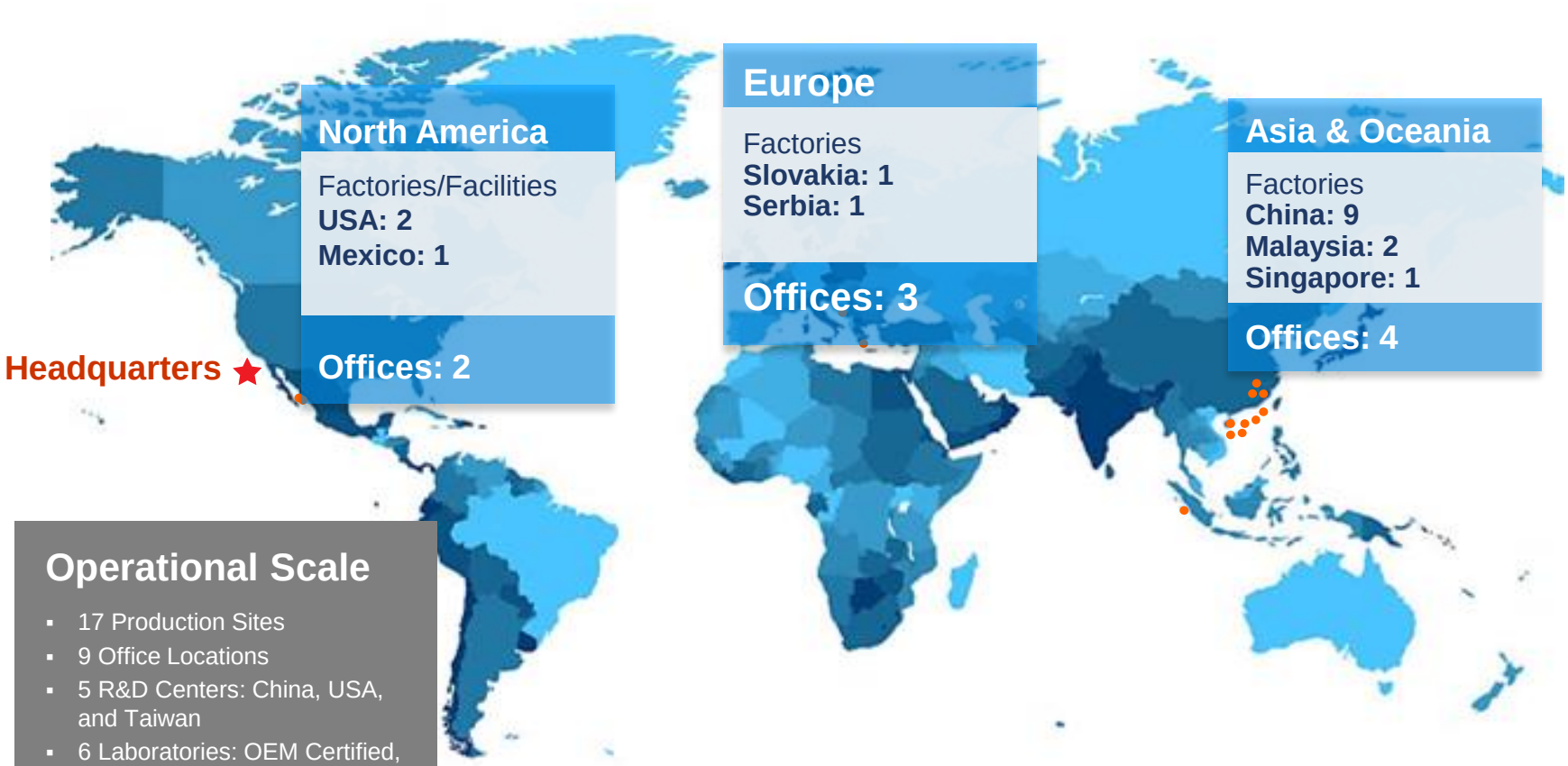
**We support industries that are environmentally conscious and improve quality of life through innovative products and services. As a tier-one interconnect solution company, BizLink has state-of-the-art facilities, advanced manufacturing processes, and professional research and development capabilities.**

**Besides being the PV connectors partner to LAPP, BizLink is also one of the wiring harnesses partner to First Solar.**

Bridging the divide with the Silicon Valley

# OUR GLOBAL FOOTPRINT BRINGS US CLOSER TO YOU

BizLink




## Operational Scale

- 17 Production Sites
- 9 Office Locations
- 5 R&D Centers: China, USA, and Taiwan
- 6 Laboratories: OEM Certified, ISO / IEC 17025
- Around 10,800 Employees as of Apr 2020

BizLink

# BIZLINK PROVIDES SOLAR SOLUTIONS FOR

## Solar

**EPC Projects & Installers**
**Combiner Box Manufacturers**
**Inverter Manufacturers**
**Module Manufacturers**

# PRODUCT OFFERINGS – PV CONNECTORS

BizLink

## S418 F-Type

- 1500V IEC62852 & UL6703
- 2.5-10 mm² / 10-14AWG
- IEC 70A / UL 30A

## S418 D-Type

- 1500V UL6703
- IEC62852 (in progress)
- 10-16 mm²/ 6-8 AWG
- IEC 90A / UL 65A

## S418 R-Type

- 1500V IEC62852 & UL6703
- 2.5-10 mm² / 8-14AWG
- IEC 70A / UL 50A
- **Best in low temperature impact performance**

- Operation Temperature -40 ~ +90℃
- **IP68 (1m, 24hrs) protection to withstand harsh weather like storm, floods or salty condition**

# PRODUCT OFFERINGS – ARRAY SYSTEM SERIES

BizLink

## Branch Connector S415

- 1500V 2PfG 1913 & UL6703
- IEC & UL 50A

## DC Branch Cable

- 1500V 2Pfg 1913 & UL9703
- TUV 70A / UL 65A
- Customized length and branches

- Operation Temperature -40 ~ +90℃
- IP68 (1m, 24hrs) protection to withstand harsh weather like storm, floods or salty condition

# PRODUCTS – ARRAY SYSTEM SERIES

BizLink

## Fuse Connector S417

- 1500V UL 4248
- Assembly-Type
- Fuse Replaceable
- Max 20A Fuse Option

## Fuse Holder S417

## Fuse Cable S417

- 1500V UL4248
- Overmold Type
- 12/10AWG
- Max 32A Fuse Option

- Operation Temperature 40 ~ +75 ℃
- **Protection against surge power to prevent huge property loss**

# CONNECTOR ASSEMBLY PRECAUTIONS

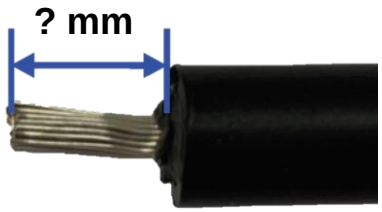
BizLink

**1. Right tool  2. Right parameters**

***Cable Cutting***

X


***Jacket Stripping***




**STAR STRIP stripping tool**


**UNIVERSAL STRIP stripping tool**

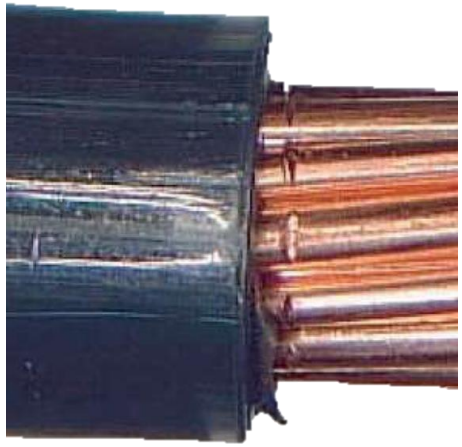
# CONNECTOR ASSEMBLY PRECAUTIONS

BizLink

## 1. Right tool  2. Right parameters

### Jacket Stripping

*Damaged / Broken Strands*



IPC 620 Standard

**3.2 Strand Damage and End Cuts (cont.)**

**Table 3-1 Allowable Strand Damage[1,2,3]**

| Number of Strands | Maximum allowable strands scraped, nicked or severed for Class 1,2 | Maximum allowable strands scraped, nicked or severed for Class 3 for wires that will not be tinned before installation | Maximum allowable strands scraped, nicked or severed for Class 3 for wires that will be tinned prior to installation |
|---|---|---|---|
| 1 (solid conductor) | No damage in excess of 10% of conductor diameter | | |
| 2-6 | 0 | 0 | 0 |
| 7-15 | 1 | 0 | 1 |
| 16-25 | 3 | 0 | 2 |
| 26-40 | 4 | 3 | 3 |
| 41-60 | 5 | 4 | 4 |
| 61-120 | 6 | 5 | 5 |
| 121 or more | 6% | 5% | 5% |

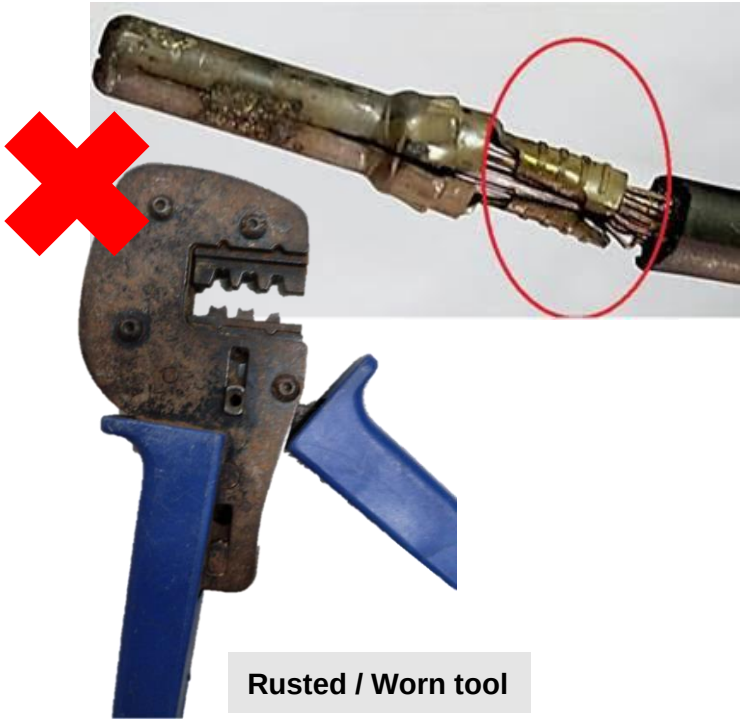
**Note 1:** No damaged strands for wires used at a potential for 6 kV or greater.
**Note 2:** For plated wires, a visual anomaly that does not expose basis metal is not considered to be strand damage.
**Note 3:** Nicks or scrapes less than 10% of conductor diameter are not considered to be strand damage.

# CONNECTOR ASSEMBLY PRECAUTIONS

BizLink

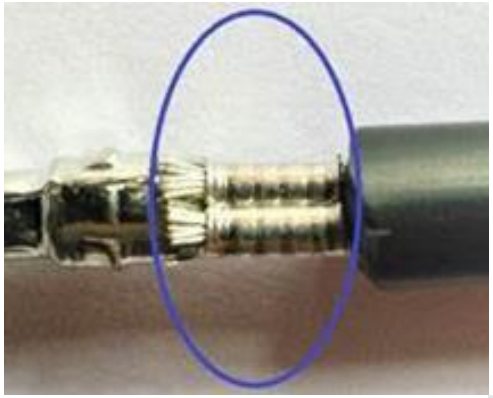
**1. Right tool  2. Right parameters**

***Terminal Crimping***



**Rusted / Worn tool**

## Example of the Good and Bad Crimping



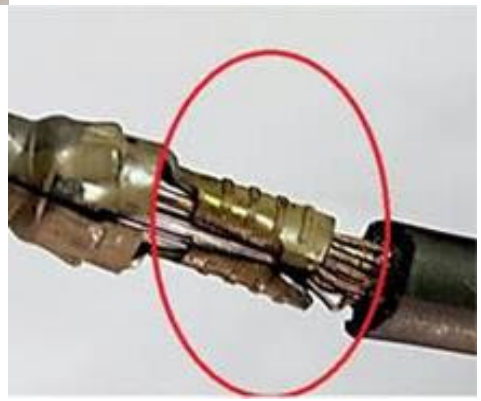
Good crimping starts from cutting and stripping the cable with the right tool with right parameters

**Broken Conductors (over cut)**

**Using wrong crimping tool**

***Melted Connectors***

**INSPECTION PARAMETERS:**
*Crimping Height*
*Crimping Width*
*Pull Force*
*Cross Section Inspection*

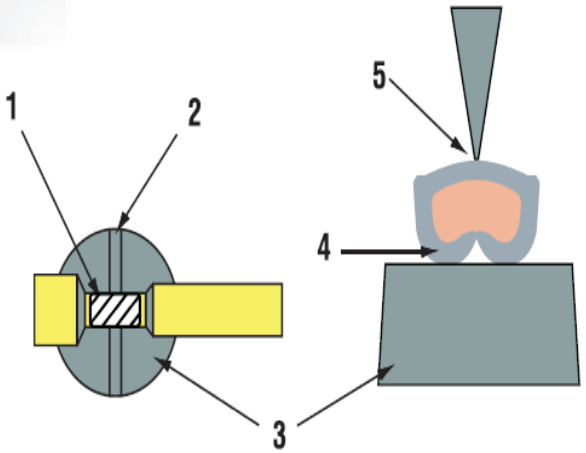


# CONNECTOR ASSEMBLY PRECAUTIONS

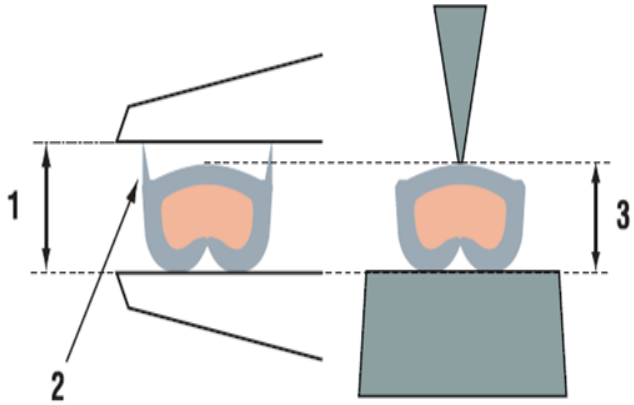
## Verification of crimping

***Inspection Parameters:***

***Crimping Height***
*Crimping Width*
*Pull Force*
*Cross Section*
*Inspection*




1. Crimp area
2. Micrometer anvil blade edge
3. Micrometer anvil
4. Rolled side of crimp laying flat on micrometer anvil
5. Micrometer spindle positioned in the center of the crimp area




1. Incorrect height measurement (using calipers)
2. Flash
3. Correct (true) height measurement (using crimp height micrometer)

# CONNECTOR ASSEMBLY PRECAUTIONS

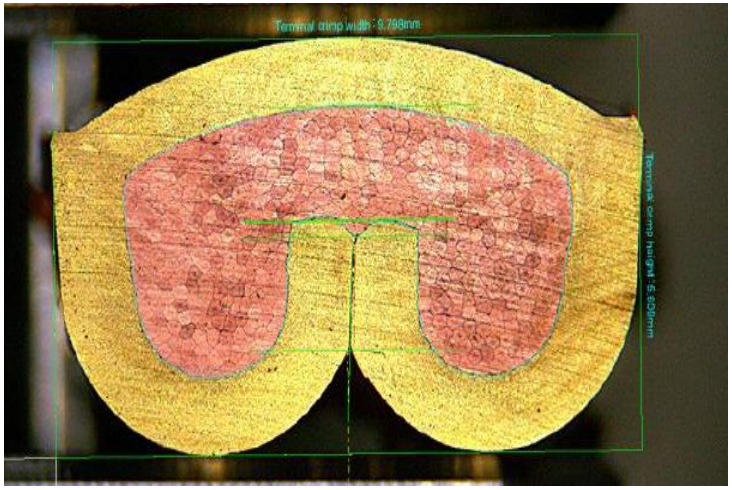
BizLink

## Verification of crimping

***Inspection Parameters:***

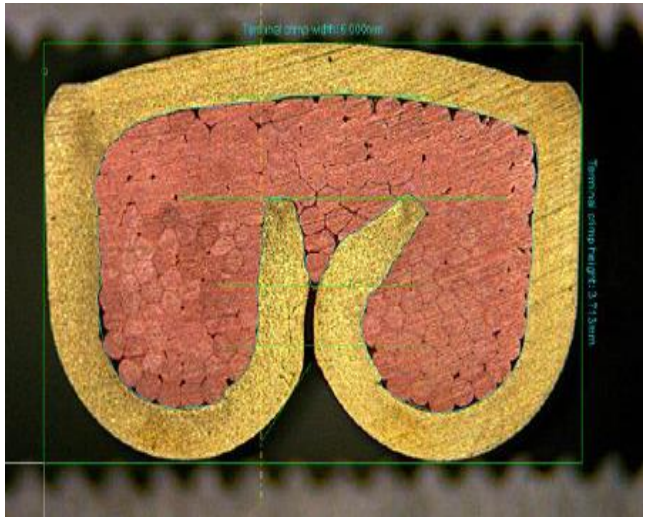
*Crimping Height*
*Crimping Width*
*Pull Force*
***Cross Section Inspection***

***Good Example***



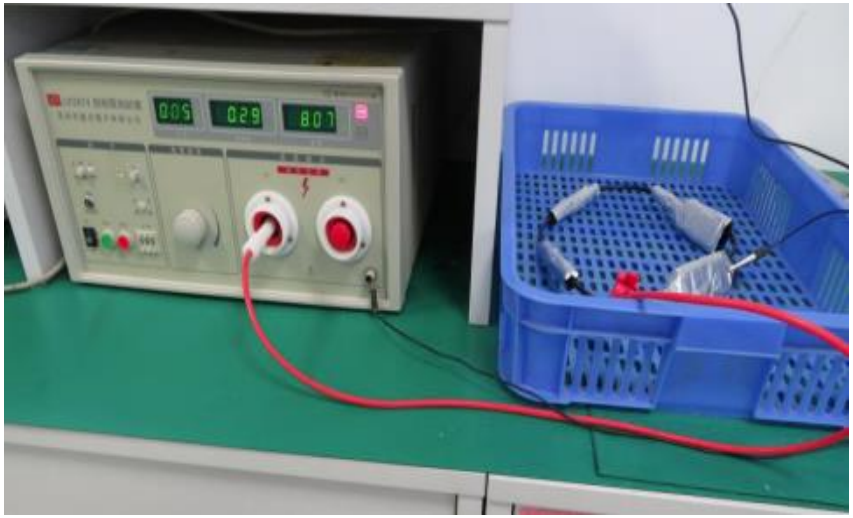
***Bad Example***

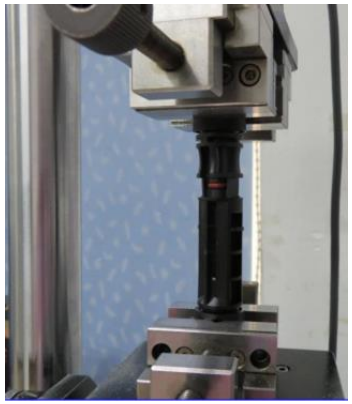
Gaps between conductor strands

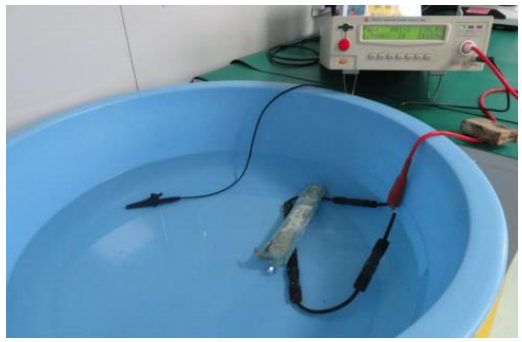


## Typical MC4 Compatibility Test

1) Contact Resistance
2) IP X7 / IP X8
3) Wet Leakage
4) Mating & Un-mating Force
5) Withstanding voltage test







# THANK YOU!

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# QUESTION & ANSWER

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