No cross-mating of different manufacturer's connectors

Why solar safety matters

Solar power is the number one energy source in renewable energy for today and the near future. The increase of photovoltaic capacity accounts for more than two-thirds of the renewable energy market and is the fastest growing green energy source, according to analysis by the International Energy Agency (IEA). Solar energy is also set to attract more capital than oil production for the first time ever in 2023. Therefore, it's high time to have a look at the factors ensuring the reliability, safety, and profitability of PV systems to provide a safe supply of solar energy.

Small components, big impact

Only a few years ago, the Solar Bankability project funded by the European Commission's Horizon program determined the 20 most common failures in PV installations, relating them to their impact on profitable performance and reliable returns. The project is concerned with the financial impact of faulty installations.

In parallel to the publication of the 2020 project, Stäubli, as a market leader for PV DC connectors, launched its own awareness campaign around how small components, including PV DC connectors, can have a big financial impact. The correct assembly and mating of the small PV DC connectors and the proper handling of eBOS components and wiring have a significant impact on the safety of a PV installation. Then can also have a big influence on the reliable long standing performance and hence a substantial impact on profitability when installation failures may lead to risks such as damage, system downtime, or even fire.

Analysis of safety risks

Recently, the Clean Energy Associates (CEA) published a survey on PV rooftop safety, addressing the top ten safety concerns in rooftop solar systems. Shortly afterwards, Heliovolta, a trusted provider of independent inspection and technical field services for renewable energy projects and energy storage systems, launched its Solargrade PV Health Report. This white paper looks into the depth of the health of the inspected PV systems and analyses the findings.

High time for intervention

Both studies analyse the risks in operational PV systems and measure the type of shortcomings and also the frequency of faults in all PV systems inspected. The CEA Intertek PV Rooftop Safety survey is based on over 600 safety audits carried out worldwide. It detected major safety concerns in 97% of the inspected systems. Among the top ten most common safety problems, cross-mated connectors rank at number two and improperly assembled connectors at number five. A further issue in the DC cabling within the top ten list is broken or damaged connectors in PV rooftop installations.

The Solargrade PV Health Report is based on the analysis of more than 60,000 PV health points from real-world field projects and was conducted and documented with HelioVolta's cloud-based software SolarGrade, a professional fieldwork management platform. One of the results clearly reveals that more than two thirds of the inspected systems showed critical or major safety issues that require urgent intervention, and that three quarters of all issues were found in the DC distribution.

The safe choice in expert know-how

As the inventor of the Original MC4 PV DC connector, the most used worldwide with a share of approximately 55% of the globally connected PV capacity, Stäubli has a responsibility to share its many years of expertise with its customers and business partners. Being active in the photovoltaic industry since its beginning, the company is very well-connected and fosters its network. It is also an active contributor and member of the official local and international standardisation committees and PV associations and participates in the development of the industry's regulatory framework.

This intense exchange allows for learnings from business partners on a daily basis. The knowledge acquired through these interactions contributes to the design and development of new product solutions, as well as to the program of Stäubli training and education offerings for solar industry stakeholders. The Customer Academy provides on-site training for customers and installers using the brand's verified quality tools.

Safe product solutions

The Stäubli eBOS (electrical Balance of System) product portfolio provides components for easy and efficient installation of harness solutions. With a set of versatile and compact quality branch connector solutions for parallel or serial-parallel interconnections, the number of connection points and potential installation faults can be reduced. As these solutions are plug-and-play, with a customised cable configuration according to the application requirements, the risks of incorrect installation are minimised.

Based on the company's unique contact technology, these branch and splitter connection solutions have minimal energy loss and low heat generation to provide reliable and durable operation, as certified by official standardisation bodies. The robust insulation

and housings are compliant to safety class IP68 and even suitable for installations of PV systems in harsh environments.

Safe installation routines

Aside from the necessity for reliable, quality eBOS components, the published CEA PV Rooftop Safety survey and the Solargrade PV Health Report indicate that awareness of dos and don'ts as well as knowledge regarding handling, assembly, and installation practices in the field are key.

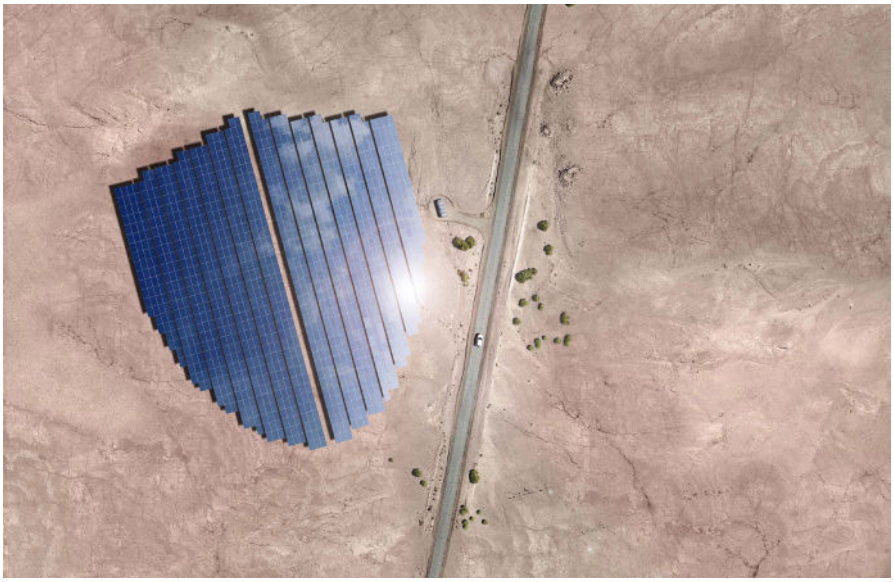
Bearing in mind that PV installations have to withstand prolonged weather exposure, it's worthwhile to consult the manufacturer's safety and assembly instructions and follow the installation's standards. Otherwise, corrosion of the metal parts of the connectors can lead to performance and reliability risk, water pooling can cause electrical faults, and conductors may become exposed over time and might provoke short circuits and fire risk.

Safe tooling

Another important part of the field assembly of connectors and field installation is trusted tooling. Stäubli launched a comprehensive tool case suited for the Original MC4 and MC4-Evo 2. The proper use of these tools can be seen at Stäubli Renewable Energy trade show booths and verified in an online tutorial on its website and YouTube channel. The training and education program includes seminars to improve reliability and safety in PV installations, with professional courses and onsite instructions for EPCs and PV installers.

No cross-mating of different manufacturer's connectors

A further issue discovered in field inspections of large ground-mounted PV plants is a huge number of cross-mated connections, despite the safety rules and official regulations. According to international standards and local regulations, coupling connectors from different manufacturers is prohibited because the contact technology inside the connectors is vastly divergent.



Stäubli: the safe choice in solar power connections

Cross-mating can cause cracks, leakage and increase the contact resistance of the connection system. Furthermore, the damage can go undetected, as it is not always visible at first glance. Subsequently, it can cause severe damage to local areas of the PV system or even the entire plant. Stäubli declares that Original MC4 PV connectors mated with third-party connectors will lose all relevant IEC and UL certifications in their end-use application. The responsibility for any damage or liability for any claims resulting from the negative effects of cross-mated connections lies exclusively with whomever recommended or performed such misuse.

Matthias Mack, Vice President Stäubli Renewable Energy, emphasises, 'Based on our longstanding experience in the solar industry and the substantial track record of our connection solutions, we are committed to enhancing our efforts in making the solar industry even safer. We strongly welcome and promote the safety reports by CEA Intertek and Heliovolta.

'At this year's Intersolar Europe in Munich, we launched the #SolarSafetyMatters campaign, which is supported by our skilled team. It is exactly this expertise that brings true value to our customers and partners. By sharing our knowledge, we can enhance the awareness of the success factors of safe PV systems and participate in building a safe future for long-term PV installations, which are needed for the global energy transition.'

www.staubli-renewable-energy.com

Stäubli Customer Academy offers training on PV connector installation and correct tooling

Matthias Mack, Vice President at Stäubli Renewable Energy and a member of the management board of Stäubli Electrical Connectors, joined the company 17 years ago at the former Multi-Contact.

He has led the renewable energy and photovoltaic category ever since and is responsible for the rapid growth of the business segment in the fast-growing market alongside an extremely dynamic global team.

Matthias has a degree in industrial engineering and is an active promoter of sustainability.