



EPISODE 67

Enhancing Quality in PV System Construction: Common Challenges and Solutions

Bankable. Reliable. Local.

Enhancing Quality in PV System Construction: Common Challenges and Solutions

As solar technology advances, PV systems are becoming a cornerstone of residential and commercial projects. However, the quality of a PV system's construction is crucial to ensuring its safety, efficiency, and long-term performance. Drawing on years of on-site maintenance experience, Solis has identified recurring issues in photovoltaic system construction. Here, we explore these common challenges and provide actionable solutions to help ensure your PV project's success.

>> Electrical Construction Challenges

Electrical faults are one of the leading causes of inefficiency in PV systems. These faults, often found on the DC and AC sides, can significantly impact a system's performance. Let's break them down:

DC Side Challenges

Connector Mismatches

Using connectors from different manufacturers can result in size and specification mismatches. These mismatches increase contact resistance, leading to overheating and reduced power generation efficiency.

Improper MC4 Plug Installation

Secure connections require DC plugs to be crimped with specialized tools. Non-standard tools, such as pliers, result in unreliable connections and higher failure rates.

Cable Management

It's essential to use correctly rated cables with clearly marked polarity (+/-) to prevent wiring errors. Hanging or unsecured cables are prone to physical damage, posing safety risks and reducing reliability.

AC Side Issues

AC-side problems are often linked to improper cable selection, loose connections, or poor installation practices. Recommendations include:

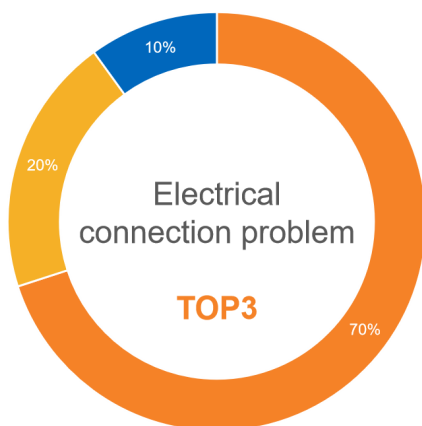
- Use cables with sufficient capacity, following the torque specifications outlined in product manuals (e.g., for Solis S6-GR1P inverters).
- Avoid excessive stress on cables during installation, which can loosen connections over time.

>> Electrical Construction Pitfalls

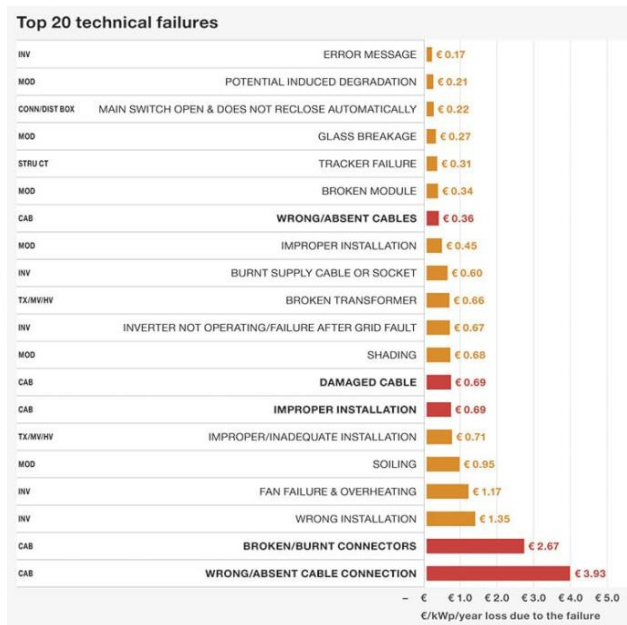
Electrical faults are a leading cause of PV system inefficiencies, with most issues stemming from the DC side. Key problems include:

DC Side

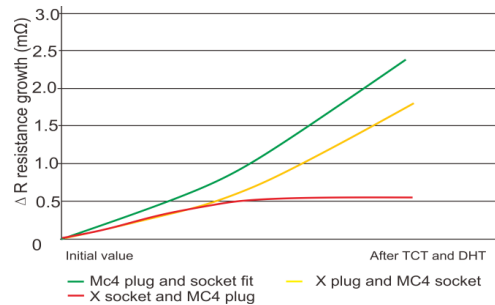
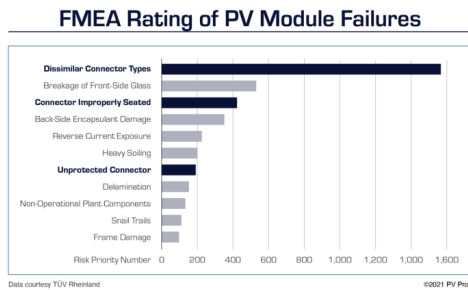
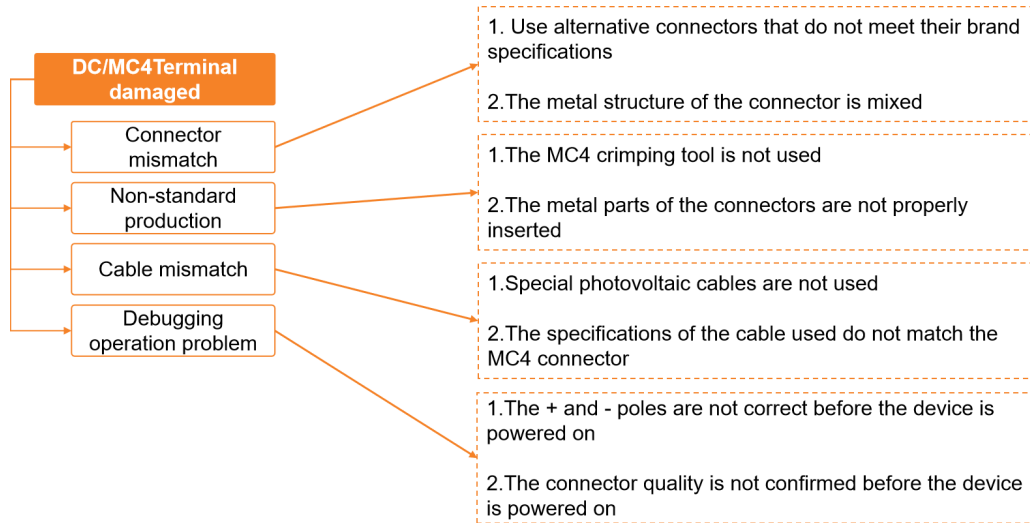
Terminal interlocking issues: Using connectors from different manufacturers can lead to size mismatches, increased contact resistance, and overheating, all of which diminish power generation efficiency.



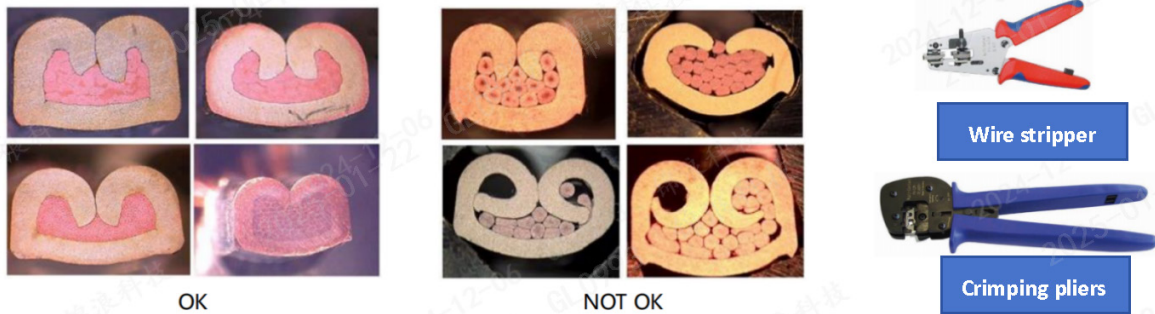
- The DC/MC4 terminal is damaged by heat
- The AC terminal is damaged by heat
- AC circuit breaker is damaged by heat



Among them, the DC side, terminal overheating damage mainly has the following aspects:

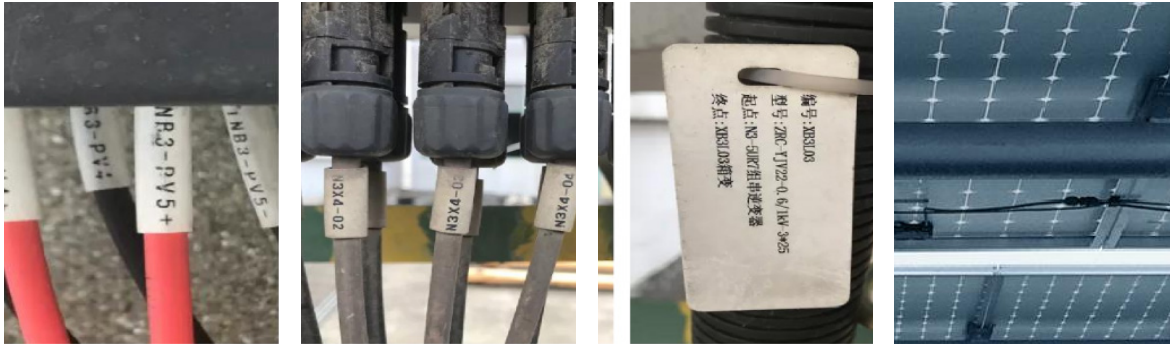


Improper MC4 plug installation: DC plugs should be crimped using specialized tools for secure connections. Using pliers or non-standard tools results in unreliable connections.



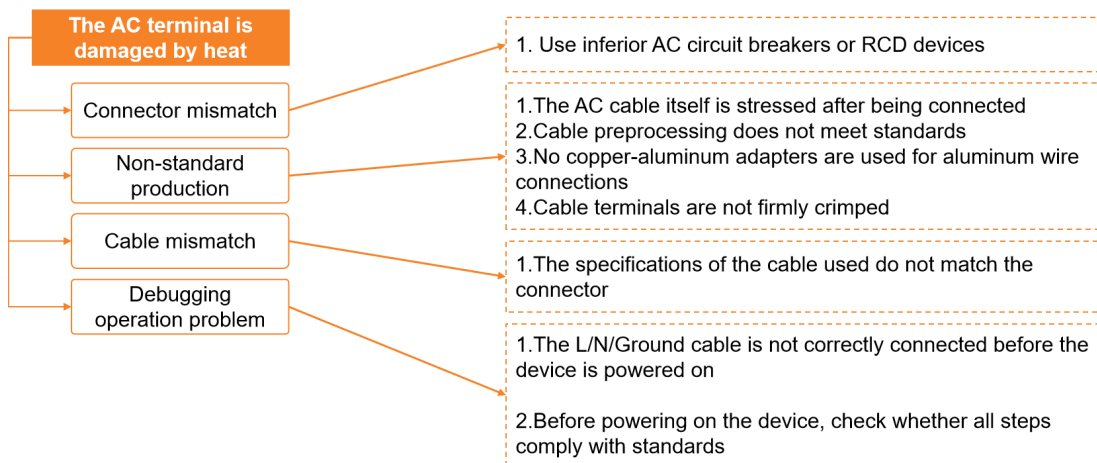
Cable mismatches:

Correctly rated cables should be clearly marked with polarity (+/-) to avoid wiring errors. Hanging or unsecured cables are prone to damage, creating reliability concerns.

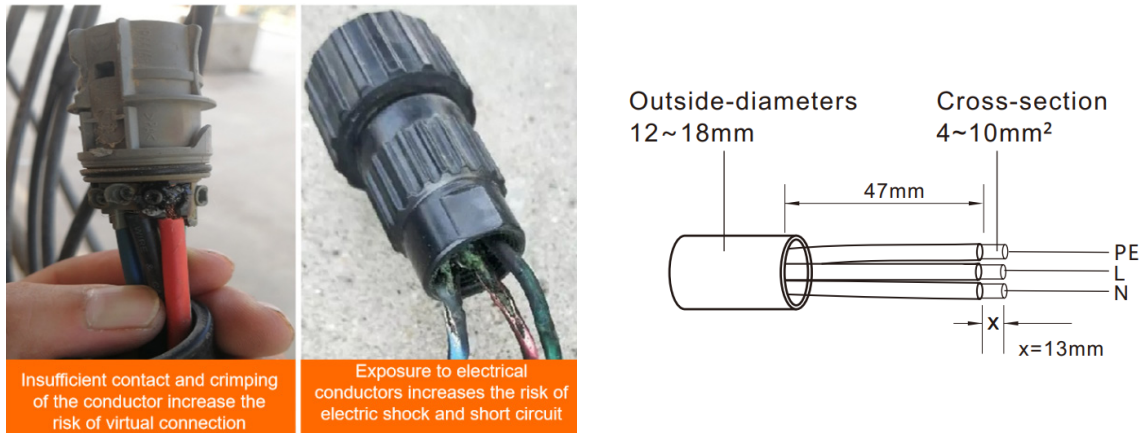


AC side:

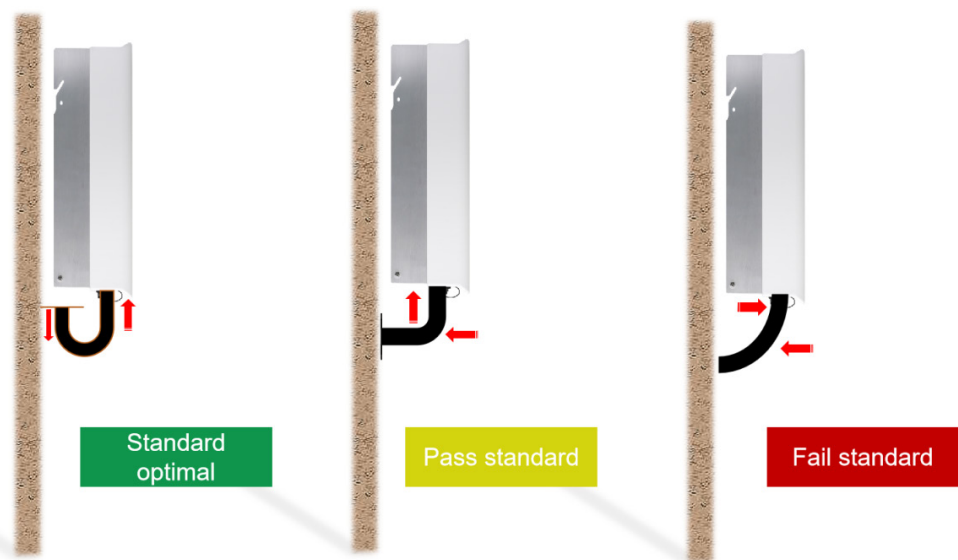
similar to the DC side, the main problems of AC test are also concentrated in cable selection, wiring operation, laying, etc., in the after-sales field electrical fault statistics, 20% of the electrical problems are concentrated in AC test. Among them, the AC side, terminal overheating damage mainly has the following aspects:



When selecting a cable, ensure that there is sufficient area between the terminal and the cable. For example, S6-GR1P(7-8)K2 is used as an example. The cable model, strip length, and torque are listed in the product manual.



During the installation of the inverter AC cable, avoid excessive stress on cables during installation, which can loosen connections over time.

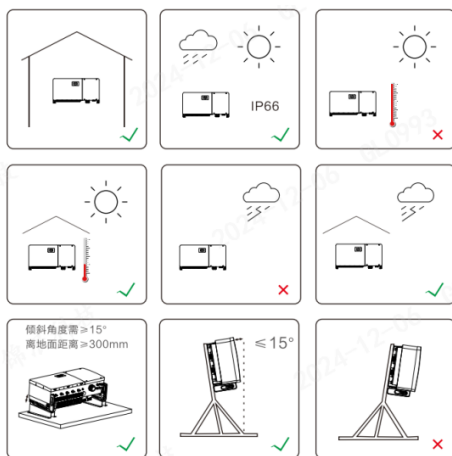


>> Inverter Installation Best Practices

Proper inverter installation is essential for optimal system performance. Consider the following guidelines:

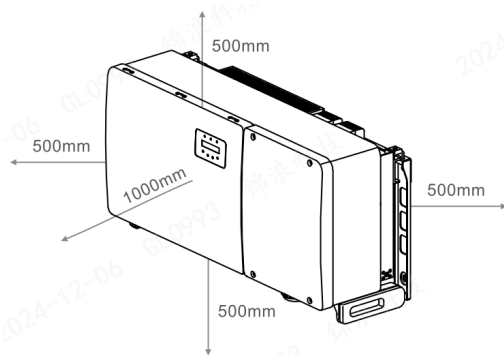
Placement: Install inverters in dry, well-ventilated locations, such as outdoor walls, rooftops, or equipment rooms. Avoid environments with high humidity, excessive heat, or vibration.

Support: Ensure wall mounts or brackets are secure to prevent movement due to external factors like wind.



Safety clearances: Maintain adequate space between the inverter and nearby equipment. Protective barriers can prevent unauthorized access or accidental damage.

Weather protection: Use shielding structures to protect inverters from direct sunlight or adverse weather.



Grounding and surge protection: Proper grounding is essential for electrical safety. Ensure that PV panels, bridge connections, and inverter casings are equipped with grounding jumpers, particularly in industrial and commercial installations. Please refer to previous solis seminars on grounding and lightning protection measures.

Site cleanup: Remove any debris left on or under the PV panels, as this can block components and reduce efficiency.



Waterproofing and drainage: Inspect for blocked drainage holes or roof damage. Properly seal cable entry and exit points using approved materials to maintain system integrity.



Conclusion:

>> A high-quality PV system begins with a meticulous construction process. By addressing these common challenges, installers can enhance efficiency, reduce maintenance issues, and ensure the long-term reliability of the system.