



# Why the right termination matters in solar installations

When it comes to solar installations, the spotlight is often placed firmly on high-profile components: solar panels, inverters and increasingly, battery storage systems. These are, of course, critical to overall system performance. However, beneath the surface lies a less visible but equally vital aspect of every installation: the quality of its electrical terminations.



to heat, and heat is one of the primary causes of electrical failure. Over time, even small inefficiencies can escalate into significant issues, including energy loss, component degradation or in extreme cases, fire hazards.

Despite this, terminations are often underestimated. In reality, they are one of the most common sources of faults in electrical systems, not due to complex failures, but due to avoidable installation errors.

#### Terminals: the first point of integrity

The terminal is the interface between the conductor and the equipment. It must provide both a secure mechanical connection and a low-resistance electrical pathway. Selecting the correct terminal is therefore essential.

Terminals must be matched carefully to the conductor size, material, typically copper or aluminium, the current-carrying requirements and the operating environment.

For example, using a terminal that is too large for the conductor can result in insufficient contact pressure, while one that is too small may not accommodate the cable properly or could be damaged during installation.

Environmental factors also play a role. Installations exposed to moisture, temperature fluctuations or vibration require terminals designed to withstand those conditions. Corrosion resistance, mechanical strength and thermal performance must all be considered.

At Heamar, we emphasise that terminal selection is not a one-size-fits-all decision. It requires a clear understanding of the application and adherence to manufacturer specifications.

#### Lugs: ensuring a reliable connection

Lugs are used to connect cables to terminals, busbars and equipment. While they may appear simple, their role is critical in ensuring consistent electrical performance.

A properly selected lug must match the conductor size precisely, be compatible with the conductor material and be rated for the system's voltage and current.

Using the wrong lug can compromise the entire connection. An oversized lug may not crimp correctly, leading to gaps and increased resistance. An undersized lug may damage the conductor or fail under load.

Material quality is equally important. High-quality lugs are designed to maintain their integrity over time, resisting corrosion and mechanical stress. In solar installations, where systems are expected to operate reliably for 20 to 30 years, this durability is essential.

Inferior or incorrectly specified lugs can lead to hotspots due to increased resistance, progressive loosening of connections and premature failure of components.

These issues may not be immediately visible but can develop over time, making them particularly problematic in long-term installations.

#### Crimping: precision, tooling and the role of dies

Crimping is one of the most critical stages in creating a reliable electrical termination. It is not simply a matter of compressing a lug onto a cable; it is a controlled, repeatable process that must be carried out with the correct tooling to achieve a gas-tight connection.

A proper crimp eliminates air gaps between the conductor strands and the lug, preventing oxidation and ensuring optimal conductivity. This gas-tight bond is what allows the connection to maintain low resistance over time.

However, achieving this level of consistency depends heavily not just on the crimping tool itself, but on the correct crimp dies being used.

Crimp dies are specifically designed inserts that shape the lug during compression. They determine the geometry, pressure distribution and final form of the crimp. Using the wrong die, even with the correct tool and lug, can result in an incomplete or ineffective connection.

Key considerations for crimping include selecting the correct die set for the lug type and cable size, ensuring tool, die and connector compatibility and using calibrated crimping tools with verified output force. The die should also be positioned correctly on the lug barrel, and crimp profiles recommended by the manufacturer, such as hex and indent, should be followed.

Different applications require different crimp profiles, and the die must match both the connector design and the intended performance. For example, hexagonal crimp dies are often used for higher-current applications where uniform compression is essential.

Improper die selection or worn dies can lead to inconsistent compression across the lug, voids or air pockets within the crimp, reduced pull-out strength and increased electrical resistance.

These issues may not be immediately visible but can significantly reduce the lifespan and reliability of the connection.

At Heamar, we emphasise that crimping is a system, not just a tool. The correct combination of tool, die, lug and technique is what ensures a compliant, repeatable result. Regular inspection and maintenance of crimp dies are also essential to maintain performance over time.

#### Torque: the final critical step

Even with the correct terminal, a properly selected lug and a high-quality crimp, the

At Heamar Company Limited, we understand that the long-term reliability, safety and efficiency of a solar system are fundamentally dependent on getting the basics right. Having the correct terminals, selecting the appropriate lugs, executing precise crimps and applying the correct torque are not minor details; they are the backbone of a robust electrical installation.

Every solar PV system is a network of interconnected components, transferring electrical energy from generation through to consumption or storage. At each stage of this journey, current must pass through multiple connection points. These points, or terminations, are critical.

A poorly executed termination introduces resistance into the system. Resistance leads

installation is not complete without the correct application of torque.

Torque determines how tightly a connection is secured. It directly affects the contact pressure between components, which in turn influences electrical resistance and mechanical stability.

Applying too little torque can result in loose connections that may vibrate over time, increased resistance due to poor contact and arcing and heat generation.

Applying too much torque can be equally damaging, as threads may strip or become damaged, terminals may deform and contact surfaces may be compromised.

Both scenarios can lead to reduced performance and potential failure.

Correct torque application requires following manufacturer specifications, using calibrated torque tools and verifying settings for each connection.

It is not sufficient to rely on experience or estimation. Precision is essential.

In solar installations, where systems are exposed to thermal cycling and environmental stress, maintaining consistent contact pressure is critical. Proper torque ensures that connections remain stable over the lifetime of the system.

**The cumulative impact of small details**

Individually, terminals, lugs, crimps and torque may seem like minor aspects of an installation. Collectively, they define the integrity of the entire system.



A single poor connection can reduce overall system efficiency, create a point of failure, increase maintenance requirements and compromise safety.

Conversely, when each connection is executed correctly, the system benefits from improved electrical efficiency, reduced heat generation, enhanced reliability and an extended operational lifespan.

These benefits are not theoretical; they translate directly into better performance,

lower costs and increased confidence for both installers and end users.

**Raising standards across the industry**

As the solar industry continues to grow, the demand for high-quality installations is increasing. With this growth comes a responsibility to maintain and improve standards.

Attention to detail at the termination level is a key part of this. It requires proper training for installers, investment in quality tools and components, and adherence to best practices and standards.

At Heamar Company Limited, we are committed to supporting the industry in achieving these standards. By providing high-quality products and promoting best practices, we aim to ensure that every connection contributes to a safe and reliable system.

Solar technology is designed for longevity. Systems are expected to perform reliably for decades, often in challenging environments. Achieving this level of performance requires more than just advanced components; it requires excellence in installation.

The right terminal, the right lug, the right crimp and, crucially, the right crimp die and the right torque, are fundamental to this process. They are the details that ensure power flows efficiently, safely and consistently.

No detail is too small when it comes to electrical integrity. Because ultimately, a solar installation is only as strong as its weakest connection and getting the basics right is what ensures that connection stands the test of time.

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