Ensure Quality in Your Photovoltaic System

The idea is simple. Get the highest yield and maximum durability with a high return on your investment. But, photovoltaic (PV) systems are relatively new to consumers and often difficult to evaluate with the rapid influx of vendors and products in this fast-growing marketplace. Today, we see many alternatives available and quality is difficult to judge, especially when PV systems are developed using components from many different manufacturers. Just as chains are as strong as their weakest link, so too are PV systems only as reliable as the lowest quality components in the system.

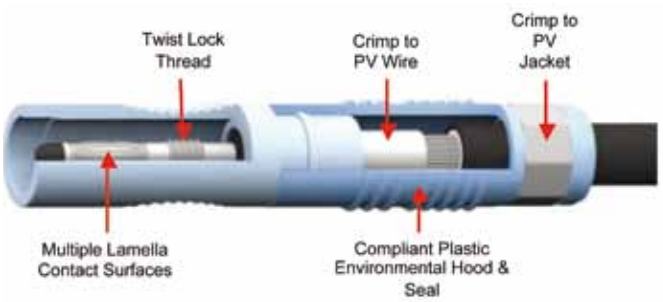
Lower-cost PV module components are often compared, side-by-side, with higher quality components which have slightly higher costs. But, many of the lower cost alternatives have yet to be market-proven over a long period of time. Consumers are often forced to make difficult choices without a clear understanding of which component differences are essential for safe, reliable, efficient, and long-term operation of PV module systems.

The weakest links in PV module systems

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.

H+S Connectors



The solid construction of the Huber+Suhner connectors lowers electrical resistance and increases the connector life.

Make the safe choice for the best return

Long service life of cables and connectors are adversely affected by environmental influences where there are wide temperature and humidity fluctuations. These harsh conditions severely test the design, materials and workmanship of cable assemblies.

In choosing the right PV system, research the system and make sure the components:

- Are mechanically robust
- Have long expected lifetimes
- Are independently approved for use in solar systems
- Are heat resistant and will not melt
- Will not "cold" flow or shrink over time

The Conergy PowerPlus uses PV connectors and cables that were developed in conjunction with Huber+Suhner, one of the world's foremost designers and manufacturers of PV cable and components. They are designed precisely for the wide temperature and humidity fluctuations that are common in residential and commercial PV installations. Compare the life expectancy of insulation materials and you'll see why Conergy chose Radox® cables for the PowerPlus.

Life Expectancy of Insulation Materials

Temperature	Huber+Suhber RADOX® Solar Cable	XLPE / Rubber	PVC
120°C	20,000 hours	2,500 hours	625 hours
90°C	160,000 hours	20,000 hours	5,000 hours
70°C	640,000 hours	80,000 hours	20,000 hours

Radox® cable insulation provides up to 32 times the life expectancy of other PV cable insulation materials

Optimize reliability and efficiency

Junction boxes are an extremely important PV module component and need to be designed and optimized to maximize PV panel reliability and operating performance. Simple thermal expansion and contraction due to normal, ambient air temperature variations during the day and over the seasons can cause mechanical connections such as screwed, bolted, crimp-on and slide-on connections to become loose. Loose connections, because they increase electrical resistance and reduce the flow of electricity can negatively affect your payback over time. But loose, high-resistance connections can have a much more serious impact.

High resistance connections generate heat which oxidizes metal surfaces and increases resistance further, generating more heat and still more resistance which can lead to catastrophic results. Junction

boxes with mechanical connector types have proven faulty, some with disastrous consequences. A large fire in a German warehouse had its beginning in a faulty junction box.

Atmospheric humidity can also cause degradation of mechanical connections. As ambient temperatures rise and fall, air in many junction boxes is expelled and drawn in, exposing the connections to humidity and pollutants in the air. The resulting corrosion increases the resistance of electrical connections and can lead to the same dire sequence of events described above.

Uncompromised quality

Conergy does not compromise on quality. The selection of Huber+Suhner components is one of the many ways that Conergy demonstrates its adherence to that maxim. Our customer commitment is to produce the highest quality product and never compromise on safety, reliability or yield. We know that time will demonstrate that our quality choices will lead to the safest, most reliable and efficient system and give you the maximum return on your investment.

Refer to the chart below to see how the junction box plays a critical role in maximizing reliability and operating performance.

Quality Criteria	Conergy PowerPlus with integrated Huber+Suhner HA3 junction box	Others
Maximized PV panel reliability	All electrical connections are soldered or welded eliminating possibility of loose junctions	Use higher resistance, mechanical methods for electrical connections within the junction box and to the power tags on the panel.
	Components and connectors are completely encapsulated and sealed preventing air incursion and corrosion. Cable entries into the cable box are sealed and strain-relieved to maintain junction box seal integrity.	Unsealed junction boxes allow humidity and pollutants to corrode internal components.
Optimized PV operating performance	Junction box surfaces form a large, flat heat sink that dissipates heat from the bypass diodes. Unique "flat-pack" diodes provide increased surface contact with the heat sink, resulting in more effective heat dissipation.	Standard, axial diodes and smaller heat sinks increase internal operating temperatures and potential for failure.
	Unique, air-gap design provides an air-flow gap between the heat sink and the rear of the module. The gap allows air flow above and below junction box keeping diode heat away from the module, maintaining high energy yield. Prevents normal module heat from transferring to the junction box.	Standard junction boxes attach directly to module allowing heat in bypass mode to reach module and normal module heat to increase internal temperatures in box, increasing potential for heat-related problems.
	Vanes molded into the junction box rear surface direct cooling air over the diodes and heat sink providing better performance and longer life	Not available on other modules.

The underside of the HA3 junction box used in the PowerPlus box has flat-pack diodes and air-flow vanes that result in greater heat dissipation and thus better energy production.