

Does certification matter ?

Understanding certification for solar pumps

Summary

Certification ensures products meet safety, quality, and performance standards, particularly in rural or unsupervised environments. It involves independent testing to protect users and enable fair comparisons. Reliable certification is conducted by accredited organizations and includes:

1. **Management Systems:** Focus on processes, not product performance (e.g., ISO 9001).
2. **Industry Testing Programs:** Vary in scope; some lack pass/fail clarity.
3. **International Product Certification:** Standards like IEC 62109 (PV systems) and IEC 60335 (pumps) ensure safety and reliability.

Certification benefits organizations by protecting public safety, supporting fair trade, promoting sustainability, and reducing regulatory costs, fostering trust and sustainable economic development.

The reason for certification

When we purchase or specify a product that needs to do a job it is usually quite easy to set out the basic requirements, for a pump this is typically how much water should be pumped and at what pressure. What is much more difficult is to specify how the product is designed, built, its operation in non standard conditions, life time, safety for users and general indicators of quality. Certification provides a way of having trusted independent tests to be done, to expert created standards, ensuring that the products that you buy will do the job required.

While some certification may be assumed to be unimportant, for example why is EMC certification important in a rural setting ? Other certification, such as safety, is critical to protect the users of equipment, children, animals and the livelihoods of communities. Consider injuries to a child by touching a product, or a fire being started that destroys a harvest.

Certification also provides a level of trust and a way to compare products on a fair basis. A certified product will have had extensive testing, will meet design, performance, safety and environmental requirements and targets.

In the context of rural equipment, equipment deployed in developing economies, and equipment that is operating unsupervised, this is very important.

Can I trust certification ?

You can trust certification where it has been done by a recognized organisation. International certification is carried out by organisations that are themselves audited and accredited. This

accreditation ensures that tests are done correctly, with the correct equipment and using competent staff.

Types of certification

It is important to understand the different types of certification and what value they add to your purchasing decision. There are 3 key types of “certification” that are often misunderstood and also can be misrepresented by manufacturers and sellers of equipment.

Management systems – related to companies or facilities, not products

Management system certification provides some assurances that a manufacturer has systems in place to manage their processes. It does not provide product performance, safety or reliability confidence.

Quality Management: EN / ISO 9001

shows that there is a quality management system in place, it does not ensure that products are of good quality or well designed, only that there are procedures in place that help to ensure consistency of design and production, it does not assess the ability of products to perform, to do so safely or provide any other assurances beyond getting a repeatable product.

Environmental Management: EN / ISO 14001

shows that there is an environmental management system in place. ISO 14001 does not relate to product performance or environmental performance of specific products.

Health and Safety Management: EN / ISO 45001

shows that there is a management system to proactively manage health and safety in the workplace.

Industry testing programs

Industry testing programs can vary. There are some country specific programs and some industry wide programs. You need to investigate the details of the program and be sure that the testing is appropriate for your product use case and that the testing “rates” the product. Some programs will test the product, will list the product as tested but do not list pass or fail results. Products may be listed as tested that have failed critical tests. One example of an industry testing program would be Verasol.

International product certification

International product certification, performed by international recognised testing organisations provides reassurance and confidence that products are safe, are built to recognised standards and are appropriately tested.

Safety of control equipment - IEC 62109-1 and IEC 62109-2 / EN 62109-1 and EN 62109-2

IEC 62109-1 and IEC 62109-2 are international standards that specify safety requirements for the design and construction of power converters used in photovoltaic (PV) systems. It is part of the IEC 62109 series, which focuses on the safety of equipment for use in renewable energy systems, especially solar PV installations. IEC 62109 is a key standard for manufacturers of solar inverters and related equipment, providing critical safety benchmarks to ensure safe and reliable operation. Here's what the standard ensures:

Electrical Safety: IEC 62109 covers protections against electric shock hazards for both users and maintenance personnel. This includes insulation requirements, overcurrent protection, and fault detection, which help prevent electric shocks and short circuits.

Thermal Safety: The standard addresses potential hazards from overheating by setting temperature limits and requiring cooling mechanisms or temperature controls. This ensures that equipment can operate safely under high temperatures and reduces the risk of fires.

Mechanical Safety: The standard mandates specific requirements for enclosure strength, mechanical durability, and stability. This protects against mechanical failures, such as housing breaks or component detachment, that could endanger users.

Protection Against Environmental Factors: IEC 62109 ensures that products can withstand various environmental conditions such as humidity, dust, and exposure to sunlight. This is especially important for PV equipment that is typically installed outdoors and exposed to harsh environmental conditions.

Functional Safety: The standard also outlines requirements for the proper functioning of the PV power conversion equipment, including safe shutdowns and disconnections. This minimizes risks associated with power surges, grid faults, or other functional failures that could affect user safety or system integrity.

Compatibility and Interference: IEC 62109 sets requirements to prevent electromagnetic interference (EMI) and ensures the compatibility of the PV equipment with other systems. This is critical for maintaining the stability of the PV system and preventing interference with nearby electronics or communication systems.

By meeting IEC 62109-1 and IEC 62109-2, manufacturers demonstrate that their products meet essential safety standards for PV systems, making them more reliable, user-safe, and suitable for both residential and commercial solar applications. The -2 variant of this standard provides a higher level of safety to protect "non expert" users from risks, this is important in a residential or application where children may be exposed to products without supervision such as a solar pump in a field.

IEC 60335-1 – Safety of Household and similar electrical and 60335-2-41:2012 – Safety of pumps

IEC 60335 series addresses the safety of household and similar electrical appliances. IEC 60335-2-41 specifically addresses enhanced requirements for electric pumps, including submersible and circulation pumps. Here's what IEC 60335-2-41:2012 ensures for a product:

1. **Protection Against Electric Shock:** The standard sets strict requirements to prevent electric shock, covering insulation, grounding, and protection from live parts. This is

particularly important for pumps that may operate in wet environments where the risk of shock is higher.

2. **Thermal Safety and Overheating Prevention:** IEC 60335-2-41:2012 includes requirements to prevent the pump from overheating, which could lead to fires or damage to the equipment. Temperature controls, automatic shutdown mechanisms, or insulation requirements are often mandated to ensure safe operation.
3. **Mechanical Safety:** The standard mandates robust construction to avoid mechanical hazards such as sharp edges, weak enclosures, or unstable parts. This is to protect users and maintenance personnel from injuries related to the physical operation of the pump.
4. **Protection Against Water and Moisture:** Since pumps often operate in wet environments, IEC 60335-2-41:2012 specifies protection against moisture, water ingress, and corrosion. This includes requirements for waterproof casings and specific design criteria to prevent water from entering electrical components.
5. **Testing and Performance Verification:** The standard outlines testing protocols to verify compliance with all safety requirements, including dielectric strength, insulation resistance, mechanical durability, and thermal performance. These tests confirm that the pump can safely operate under both normal and foreseeable abnormal conditions.
6. **Environmental Suitability:** The standard also specifies requirements for pumps used outdoors or in other specific environments. This includes ensuring the pump's resilience against dust, varying temperatures, and exposure to direct sunlight or other environmental factors.

By meeting IEC 60335-2-41:2012, manufacturers ensure that their pumps are safe for households and similar applications, even in potentially hazardous conditions like wet or outdoor environments. This certification protects consumers, minimizes the risk of electrical and mechanical failure, and enhances the overall reliability and durability of the pump.

UL 778:2016 R6.21 – Safety requirements for pumps

UL 778:2016 R6.21 is a standard developed by Underwriters Laboratories (UL) that specifies safety requirements for motor-operated water pumps used in various applications, including residential, commercial, and agricultural settings. This standard provides comprehensive criteria to ensure the safe design, construction, and operation of water pumps. Here's what UL 778:2016 R6.21 ensures for a product:

1. **Electrical Safety:** UL 778 includes requirements to protect against electric shock and reduce risks associated with electrical hazards. This involves insulation requirements, grounding, and ensuring safe access to live parts, especially crucial for pumps in wet or outdoor environments.
2. **Thermal Safety and Overheating Protection:** The standard sets thermal limits and requires mechanisms to prevent overheating, which could lead to fires or equipment failure. This includes requirements for automatic shut-off features and thermal protection devices to manage temperature risks during operation.

3. **Mechanical Integrity and Durability:** UL 778 specifies requirements for the physical construction and robustness of the pump, ensuring it can withstand mechanical stress and avoid failures like casing breaks, part detachment, or sharp edges that could harm users. This includes testing for durability and impact resistance.
4. **Protection Against Water Ingress:** Given that pumps are frequently exposed to water, UL 778 outlines protection levels for moisture and water resistance, ensuring the electrical and mechanical components are safeguarded against water ingress, corrosion, and degradation over time.
5. **Environmental Suitability:** UL 778 addresses the environmental conditions under which pumps may be used, including exposure to rain, dust, and temperature variations. It also includes requirements for the resilience of materials used in the pump's construction, particularly for pumps intended for outdoor or submersible applications.
6. **Performance and Reliability Testing:** The standard includes rigorous testing protocols to verify compliance with safety requirements. Tests cover aspects like insulation resistance, dielectric strength, thermal response, and mechanical durability, ensuring that the pump performs safely under normal and foreseeable abnormal conditions.

By meeting UL 778:2016 R6.21, manufacturers demonstrate that their water pumps are designed for safe operation across a range of environments, particularly in applications where water exposure is a risk factor. This certification provides assurance of electrical and mechanical safety, helping protect users from hazards, enhancing the reliability of the pump, and meeting regulatory compliance requirements for North American markets.

Benefits for governments, NGOs and Foundations (organizations) of setting certification product requirements for programs

Organizations benefit significantly from setting certification requirements for imported products, as it helps protect public safety, boost economic stability, and support sustainable development goals. Here's how:

1. **Protects Public Health and Safety:** Certification ensures that imported products meet specific safety and quality standards, minimizing risks to consumers. By mandating certification, organizations reduce the chance of unsafe, low-quality goods entering the market, protecting citizens from potential health and safety hazards.
2. **Promotes Economic Stability and Consumer Confidence:** Requiring certification for imports fosters a level playing field for local businesses by ensuring that all products meet consistent standards. This helps avoid market disruption from low-cost, substandard goods, supporting fair competition and boosting consumer confidence in the quality of available products.
3. **Reduces Environmental Impact:** Certified products often meet environmental criteria for energy efficiency, emissions, or sustainable resource use. By requiring certification, organizations can ensure that imported goods align with national sustainability goals, reducing environmental degradation and supporting international climate commitments.
4. **Enhances Trade Relations and Compliance:** Certification requirements streamline import compliance and align with international standards, making it easier for countries to facilitate trade while maintaining quality. These standards encourage foreign manufacturers to adhere to recognized benchmarks, helping the organization maintain positive trade relationships and protect local interests.
5. **Minimizes Organization Costs and Oversight Burden:** Certified products reduce the likelihood of defects, recalls, and regulatory issues, saving resources in monitoring, inspection, and enforcement. By establishing clear certification requirements, organizations can allocate fewer resources to quality control, focusing instead on other areas of economic development and public welfare.

Overall, certification requirements for imported products help organizations safeguard the public, promote economic fairness, protect the environment, and enhance trade efficiency, benefiting both the country and its citizens.