

Telecom Energy Standards: A Practical Compliance Map

A practical guide to ITU-T, ETSI, IEC and project requirements for telecom solar power, DC interfaces, batteries, cabinets and monitoring.

POLICY, STANDARDS & COMPLIANCE

Telecom Energy Standards: A Practical Compliance Map

A standards-aware route from the telecom site boundary and power interface to solar, batteries, outdoor cabinets, monitoring, market access and final site acceptance.

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Engineering reference guide
Approx. 9 minute read

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The practical answer: there is no single certificate called “telecom site compliance.” A working compliance path combines network requirements, product rules, installation codes, destination-market law and contract acceptance. The applicable set changes with the system boundary, voltage, battery chemistry, radio equipment, grid connection, country and the party placing each product on the market.

For hybrid sites, this distinction matters. A PV module may have valid type-test evidence, a lithium battery may meet a transport test, and an outdoor cabinet may carry an IP rating. Even so, the integrated site can fail because of incorrect protection coordination, incompatible interfaces, poor thermal design or missing local approval. Compliance therefore needs to be designed into the architecture and traced through commissioning.

Treat compliance as four connected requirement levels

First, define the supplied system and its boundaries. Is the supplier delivering separate components, a wired cabinet, a complete hybrid power plant or a turnkey telecom site? Because the answer changes the scope of supply, it also determines who owns interface verification, technical documentation, installation design and the final declaration or acceptance record.

Requirement level	What it governs	Typical evidence	Owner to identify
Network and site	Energy boundary, service availability, DC interface, backup policy and operating modes	Operator specification, site standard, load schedule and architecture review	Operator, tower company or system designer
Product and subsystem	Electrical safety, EMC, battery, PV conversion, environmental performance and enclosure	Test reports, certificates, declarations, model lists and technical files	Manufacturer, importer or authorized representative as applicable
Installation	Protection, earthing, cables, structural works, fire strategy, access and workmanship	Drawings, calculations, permits, inspection and commissioning records	EPC, licensed installer, designer and local inspector
Country and contract	Market access, grid connection, construction permits, dangerous-goods transport and customer acceptance	Local approvals, customs documents, FAT, SAT and handover package	Contract parties and local authority having jurisdiction

In practice, a standard can be relevant without being legally mandatory, while a law may reference a standard as one route to demonstrate conformity. Contract requirements can also be stricter than the legal minimum. For that reason, record three categories separately: mandatory law and code, contractually required standards, and voluntary engineering references.

Telecom-specific references

ITU-T L.1350 - define and measure the whole base-station site

For site-level measurement, ITU-T L.1350 provides metrics and a boundary for base-station energy efficiency. That boundary may include telecom equipment, power conversion, cooling and other supporting loads. As a result, it helps the parties agree which inputs, loads and losses are included when a contract refers to “site efficiency.”

However, L.1350 is not a general product-safety certificate. Site-level energy metrics should not be used as evidence that a battery, rectifier or enclosure satisfies its own safety or environmental requirements.

ITU-T L.1310 - compare telecom equipment within the right class

By contrast, ITU-T L.1310 (09/2024) specifies energy-efficiency metrics and measurement methods for telecommunications equipment. The Recommendation states that comparisons are intended for equipment using the same technology and class. Consequently, test configuration, traffic profile, environmental conditions and modular population all matter.

When a proposal quotes an energy-efficiency value, ask for the measurement method, equipment configuration, load profile and report. Otherwise, a radio unit, rectifier module and complete site may be compared using one percentage that does not describe the same boundary.

ITU-T L.1395 and L.1396 - structure monitoring interfaces and data

For monitoring architecture, ITU-T L.1395 (07/2025) defines a generic control approach for power, cooling and building-environment systems in telecom networks. Meanwhile, ITU-T L.1396 (10/2025) addresses an information model for power, energy and environmental parameters of ICT equipment.

These references are especially helpful when multiple vendors must report to one NOC or EMS. Nevertheless, the project still needs a protocol map, data-point list, units, alarm priorities, timestamps, user roles, cybersecurity controls and fallback behavior when the remote link fails.

ETSI ES 203 700 - power feeding for 5G and converged access

At the power-system level, ETSI ES 203 700 V1.2.1 (2025-09) is the current published ETSI version reviewed for this update. It covers sustainable power-feeding solutions for 5G and converged wireless and wireline access, including power architectures, backup, intelligent management, renewable energy, efficiency and maintenance considerations.

Before design freeze, use the edition named in the contract or standards register. An older project specification may cite an earlier edition, whereas a new tender may require the current one. The design team should therefore record edition changes and decide whether they affect interfaces, tests or acceptance criteria.

Common equipment-standard families to investigate

At this stage, the following map is a starting point rather than a universal mandatory list. Applicability depends on the offered model, destination and conformity route. Before design freeze, confirm the current edition and national adoption with a qualified laboratory, certification body, local engineer or authority.

Product, subsystem and environmental references

Equipment or issue	Standards and rules often investigated	What the project should verify
PV modules	IEC 61215 series for design qualification; IEC 61730 series for module safety	Exact module model, construction, test scope, mechanical loading and suitability for the site's operating

Equipment or issue	Standards and rules often investigated	What the project should verify
		temperature
PV converters and arrays	IEC 62109 series where applicable; IEC 60364-7-712 and locally adopted wiring rules	String voltage, isolation, earthing, disconnects, overcurrent and surge protection
Industrial lithium batteries	IEC 62619:2022 ; destination-specific stationary storage requirements	Whether evidence covers the cell, module, battery or complete system and the intended stationary application
Lithium-battery transport	UN Manual of Tests and Criteria, subsection 38.3 , plus the applicable road, sea and air transport rules	Test summary, model identity, state-of-charge limits, packaging, labels and carrier documentation
Outdoor enclosures	IEC 60529 for IP classification; IEC 62262 for IK classification; relevant IEC 60068 and ETSI EN 300 019 environmental tests	Rain, dust, impact, heat, cold, humidity, condensation, salt, solar load and the complete populated configuration
Power electronics and ICT equipment	Applicable IEC or UL safety standards, EMC emissions and immunity requirements, plus national electrical rules	Product classification, voltage range, installation category, report scope and regional deviations
Monitoring and remote access	Operator cybersecurity baseline, secure-development requirements and applicable national or regional cyber rules	Authentication, encryption, logging, firmware signing, vulnerability handling, update support and local fallback

Market-specific conformity routes

In Europe, determine which EU legislation applies to each product and economic operator. For example, a review may include electrical safety, EMC, RoHS, radio-equipment rules when radio functions are present, and Regulation (EU) 2023/1542 concerning batteries and waste batteries . CE marking is a legal conformity process supported by a technical file and EU declaration of conformity; it is not a generic third-party quality award. In addition, national wiring, construction, fire and grid-connection rules still apply.

In the United States and Canada, the route often depends on adopted electrical and fire codes, the authority having jurisdiction, utility requirements and certification or listing by an accepted laboratory. For stationary storage, project teams commonly investigate UL 1973 for batteries, UL 9540 for energy storage systems and UL 9540A as a thermal-runaway fire-propagation test method where relevant. Even then, a component report does not automatically establish acceptance of the assembled site.

Across Africa, the Middle East and other export markets, many projects refer to IEC standards. However, national adoption, telecom-operator requirements, customs documentation, language, grid codes and local certification can differ considerably. Instead of describing a product as “Africa compliant,” name the country, operator,

product model, installation scope and approval route.

Important distinction: “designed with reference to” a standard is not the same as tested to it, certified to it, listed under it or legally compliant in a destination market. Therefore, each public and contractual claim should use the term that matches the available evidence.

Build a traceable project evidence package

For review purposes, a useful evidence package connects every requirement to the exact supplied model and then to a report, drawing, calculation or acceptance result. By comparison, a certificate with no model match, expired scope or missing test report may add little confidence.

What the compliance file should contain

- Approved requirement matrix and standards register with edition, applicability and owner
- System boundary, load schedule, single-line diagram and operating-state description
- Ratings, cable calculations, protection coordination, earthing and lightning-protection design
- Product datasheets, model lists, declarations, certificates and underlying reports where required
- Accreditation and laboratory details appropriate to the requested test route
- Battery UN 38.3 test summary, safety documentation and transport instructions where applicable
- Software version, protocol map, alarm list, access-control matrix and configuration backup
- Factory acceptance test plan, calibrated instruments, witnessed results and deviation log
- Installation inspection, commissioning and site acceptance records
- As-built drawings, spare-parts list, maintenance schedule, emergency response and end-of-life instructions

What each evidence label actually proves

Evidence label	What it normally means	Question to ask
Test report	Recorded test method, sample, conditions and results	Does the sample and configuration match the supplied model?
Certificate or listing	A certification body’s statement within a defined scope	Is it valid, verifiable and accepted in the destination market?

Evidence label	What it normally means	Question to ask
Declaration of conformity	The responsible economic operator's legal declaration for identified legislation and models	Who signed it, for which product and on what supporting evidence?
FAT record	Factory evidence for the integrated supplied configuration	Were operating transitions, alarms and failures tested, not just energization?
SAT or commissioning record	Evidence that the installed system works at the actual site	Were settings, protection, communications and as-built changes captured?

A compliance workflow that prevents late redesign

1. Identify the destination country, operator, grid status, authority and contract requirements during discovery.
2. Define the supplied system boundary and assign responsibility for every interface.
3. Create a requirement-to-evidence matrix before selecting product models.
4. Review electrical, mechanical, thermal, fire and digital interfaces at architecture stage.
5. Freeze applicable editions, national deviations and acceptance criteria before production.
6. Check that certificates and reports cover the exact model, options, battery and cabinet configuration.
7. Verify integrated operating modes, alarms and credible failures during FAT.
8. Close installation records, settings, as-built changes and open deviations during commissioning.
9. Maintain a controlled compliance file through replacements, firmware updates and system expansion.

After approval, even a seemingly small change can affect compliance. For instance, replacing a battery cell, breaker, fan, surge device, communications module or cabinet coating may alter the tested configuration or technical file. The change-control process should classify the impact, record the decision and determine whether retesting, document revision or customer approval is required.

Finally, this article is an engineering-planning resource rather than legal, certification or authority approval advice. Huijue Group can prepare a preliminary compliance matrix for stated models, destination, customer requirements and EPC scope. However, the final route must be confirmed with the responsible economic operator, qualified local professionals, laboratories and authorities.

Define the compliance path before the bill of materials.

Bring the destination market, operator specification, site architecture, product boundary

and acceptance plan into the first technical review. In most projects, that is less expensive than discovering a missing test or incompatible interface after production.

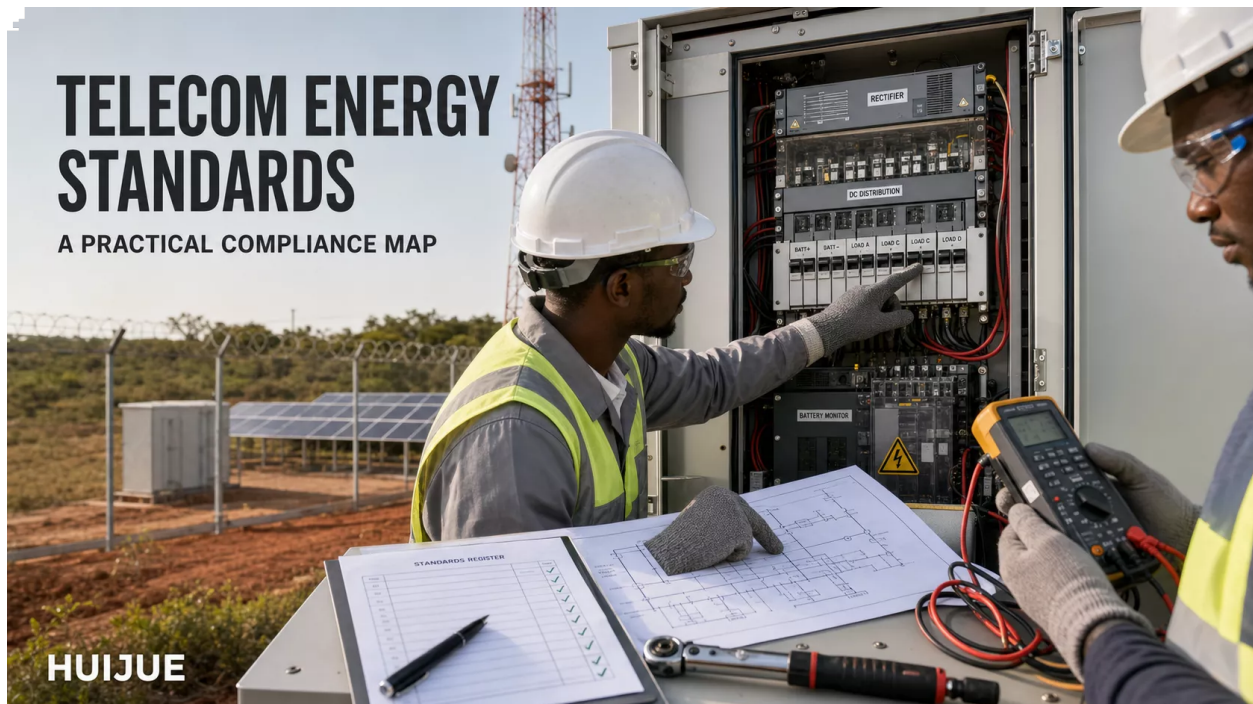
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