Here’s the practical core list of major IEEE and IEC photovoltaic standards that are most commonly referenced.

Because “all” PV standards is very broad and changes over time, I’m grouping them into the most relevant standards/series used in industry.

IEC Photovoltaic Standards

1) PV module qualification and safety

- IEC 61215 — Terrestrial PV module design qualification
- IEC 61730 — PV module safety qualification
  - IEC 61730-1 — Construction requirements
  - IEC 61730-2 — Testing requirements

2) Performance monitoring and testing

- IEC 61724 — PV system performance monitoring
  - IEC 61724-1 — Monitoring system concepts, equipment, and methods
  - IEC 61724-2 — Performance and energy yield estimation-related guidance
  - IEC 61724-3 — Evaluation of energy performance data

3) System documentation, commissioning, inspection

- IEC 62446 — Grid-connected PV system documentation, commissioning tests, inspection

- IEC 62446-1 — Documentation, commissioning tests, inspection requirements
- IEC 62446-2 — Maintenance of PV systems

4) PV system design and installation

- IEC 62548 — Design requirements for PV arrays
- IEC 60364-7-712 — Electrical installations of buildings: PV power supply systems

5) Grid interconnection / utility interface

- IEC 61727 — PV systems connected to the utility grid: characteristics of the utility interface
- IEC 62116 — Test procedure of islanding prevention measures for grid-connected PV inverters
- IEC 62891 — Low-voltage DC PV power systems, depending on application

6) Inverters and converters

- IEC 62109 — Safety of power converters for use in PV power systems
- IEC 62109-1
- IEC 62109-2

7) Batteries and storage integration

- IEC 62933 series — Electrical energy storage systems
- IEC 62619 — Safety requirements for secondary lithium cells and batteries for industrial applications
- IEC 63056 — Safety requirements for secondary lithium cells and batteries for use in EES systems

8) Environmental / durability / measurement support

- IEC 60891 — Procedures for temperature and irradiance correction of I–V characteristics

- IEC 60904 series — Photovoltaic devices

  - Measurement of photovoltaic current-voltage characteristics

  - Reference cells, spectral mismatch, and related methods

- IEC 61853 series — PV module performance testing and energy rating

- IEC 62804 — UV-induced degradation testing for PV modules

- IEC 62788 series — Measurement procedures for materials used in PV modules

IEEE Photovoltaic Standards

IEEE has fewer directly PV-specific standards than IEC, but the key ones commonly used are:

1) Grid interconnection and interoperation

- IEEE 1547 — Interconnection and interoperability of distributed energy resources with associated electric power systems interfaces

- IEEE 1547.1 — Conformance test procedures for equipment interconnecting distributed energy resources

- IEEE 1547.2 — Application guide for IEEE 1547

- IEEE 1547.3 — Guide for monitoring, information exchange, and control of distributed resources

- IEEE 1547.4 — Guide for design, operation, and integration of distributed resource island systems

2) PV-specific performance / monitoring / plant design guidance

- IEEE 1513 — Standard for qualifying and defining the performance of PV modules

- IEEE 1525 — Technical guide for PV system design and installation

- IEEE 1562 — Guide for array and battery sizing in stand-alone PV systems

- IEEE 1574 — Guide for design, operation, and maintenance of grid-connected PV systems

- IEEE 1635 / IEEE 1609? — Not generally PV-core; only include if your project specifically references them

3) Distributed generation / microgrid context

- IEEE 2030 series — Smart grid interoperability

- IEEE 2030.5 — Smart energy profile communication

- IEEE 2030.7 / 2030.8 — Microgrid controller and testing guides

t only the must-know PV standards, use this:

IEC

- 61215 — Module design qualification

- 61730 — Module safety

- 61724 — Performance monitoring

- 62446 — Documentation, commissioning, inspection

- 62548 — Array design

- 62109 — Inverter safety

- 62116 — Anti-islanding test

- 61727 — Grid interface

IEEE

- 1547 — Grid interconnection
- 1547.1 — Conformance testing
- 1547.2 — Application guide
- 1513 — PV module performance qualification
- 1525 — PV system design and installation
- 1562 — Stand-alone PV sizing

Short list:

IEC

61215 — Module design qualification

61730 — Module safety

61724 — Performance monitoring

62446 — Documentation, commissioning, inspection

62548 — Array design

62109 — Inverter safety

62116 — Anti-islanding test

61727 — Grid interface

IEEE

1547 — Grid interconnection

1547.1 — Conformance testing

1547.2 — Application guide

1513 — PV module performance qualification

1525 — PV system design and installation

1562 — Stand-alone PV sizing

Ali: ## UL standards relevant to photovoltaics

Module safety and qualification

- UL 61730-1 — PV module safety qualification, part 1: construction requirements
- UL 61730-2 — PV module safety qualification, part 2: testing requirements
- UL 61215 series — PV module design qualification / performance qualification

Legacy / still encountered

- UL 1703 — Flat-plate photovoltaic modules and panels
  - Older standard, still seen in legacy certifications and documentation

Mounting / racking / BOS

- UL 2703 — Mounting systems, mounting devices, clamping/retention devices, and ground lugs for use with flat-plate PV modules and panels

Plug-in / special PV systems

- UL 3700 — Interactive plug-in PV equipment and systems

Building-integrated PV

- UL 7130 — Often referenced for BIPV-related safety/certification contexts

NFPA standards relevant to photovoltaics

Electrical code and installation

- NFPA 70 (NEC) — National Electrical Code

- This is the most important NFPA document for PV system wiring, overcurrent protection, disconnects, grounding, labeling, and installation rules

Maintenance and safety work practices

- NFPA 70B — Standard for Electrical Equipment Maintenance

- Relevant for PV maintenance programs and electrical equipment upkeep

- NFPA 70E — Standard for Electrical Safety in the Workplace

- Critical for arc flash, shock protection, PPE, energized work practices, and O&M safety

PV with storage / fire safety context

- NFPA 855 — Standard for the Installation of Stationary Energy Storage Systems

- Important when PV is paired with batteries / ESS

Practical “most used” list

If you only want the core ones, use:

- UL 61730-1

- UL 61730-2

- UL 61215

- UL 2703

- NFPA 70 (NEC)

- NFPA 70E

- NFPA 70B

- NFPA 855 if storage is involved

How they fit with IEC and IEEE

- IEC: global technical standards for module testing, safety, monitoring, commissioning

- IEEE: grid interconnection and distributed energy resource integration

- UL: U.S. safety certification/testing, especially modules, racking, and equipment

- NFPA: U.S. installation code and electrical/fire safety practices

Ali: For BESS (Battery Energy Storage Systems), the relevant standards are a different set.

Core BESS standards by organization

IEC

- IEC 62933 series — Electrical energy storage systems

- IEC 62619 — Safety requirements for industrial lithium secondary batteries

- IEC 63056 — Safety requirements for lithium batteries used in electrical energy storage systems

- IEC 62477-1 — Safety requirements for power electronic converter systems

- IEC 61000 series — EMC compatibility requirements

IEEE

- IEEE 2030.2.1 — Guide for design, operation, and maintenance of BESS

- IEEE 1547 — Interconnection and interoperability of distributed energy resources

- IEEE 1547.1 — Conformance test procedures

- IEEE 2800 — Interconnection of inverter-based resources with transmission systems

- IEEE 2962-2025 — Recommended practice for design, installation, ventilation, operation, maintenance, and capacity testing of Li-ion battery systems

UL

- UL 9540 — Energy Storage Systems and Equipment

- UL 9540A — Test method for thermal runaway fire propagation in BESS

- UL 1973 — Batteries for stationary and related applications

- UL 1741 — Inverters, converters, controllers, and interconnection equipment for DER

NFPA

- NFPA 855 — Installation of stationary energy storage systems

- NFPA 70 (NEC) — Especially Article 706 for energy storage systems

- NFPA 70E — Electrical safety in the workplace

- NFPA 70B — Electrical equipment maintenance

Short “most important” list

If you only need the essentials for BESS, use:

- UL 9540
- UL 9540A
- NFPA 855
- NFPA 70 Article 706
- IEC 62933
- IEC 62619
- IEC 63056
- IEEE 1547
- IEEE 2030.2.1