STANDARDS UPDATE NOTICE (SUN)
ISSUED: June 13, 2025

STANDARD INFORMATION

Standard: UL 1741
Standard ID:
Inverters, Converters, Controllers and Interconnection System Equipment for Use with Distributed Energy Resources [UL 1741:2021 Ed.3+R:22Apr2025]
Previous Standard ID:
Inverters, Converters, Controllers and Interconnection System Equipment for use with Distributed Energy Resources [UL 1741:2021 Ed.3+R:23Oct2024]
Inverters, Converters, Controllers and Interconnection System Equipment for use with Distributed Energy Resources [UL 1741:2021 Ed.3+R:19May2023]

EFFECTIVE DATE OF NEW/REVISED REQUIREMENTS

Effective Date: **October 22, 2027**

IMPACT, OVERVIEW, AND ACTION REQUIRED

Impact Statement: Per our accreditation, Intertek is required to review reports against the standard revisions to confirm compliance. Once compliance is confirmed, the standard reference in the report is updated to show continued compliance to the technical requirements of the standard. Reports not updated to this version by the effective date above will be withdrawn.

All products must be certified to the April 22, 2025, revision prior to the effective date.

This standard contains Functional Safety requirements.

Overview of Changes:

October 23, 2024:

- Addition of Requirements to Reference the Outline of Investigation for Power Control Systems, UL 3141

April 22, 2025:

- Correction of Marking Signal Words to Match Severity of Hazards
  Addition of References to DER Cybersecurity standards

Specific details of new/revised requirements are found in table below.

Note: If the listing references a Canadian standard, per the Canadian Electrical Code (CSA C22.2#0) Section titled Language of markings, Caution and Warning Markings shall be in English and French.

Current Listings Not Active? – Please immediately identify any current Listing Reports or products that are no longer active and should be removed from our records. We will do this at no charge as long as Intertek is notified in writing prior to the review of your reports.

STANDARD INFORMATION

CLAUSE	VERDICT	COMMENT
		Additions to existing requirements are <u>underlined</u> and deletions are shown ~~lined out~~ below.
		The following changes reflect the October 23, 2024 revision:
	Info	**POWER CONTROL SYSTEMS**
103		***New section added;*** **General**
103.1		Equipment that performs power control system (PCS) functions for overload protection referenced by the National Electrical Code, NFPA 70, shall additionally comply with the applicable portions of the Outline of Investigation for Power Control Systems, UL 3141.
103.2		Equipment that performs area EPS power import limiting and/or export limiting (PIL, PEL) functions for restricting the power exchange shall comply with the applicable portions of the Outline of Investigation for Power Control Systems, UL 3141 and also the applicable portions of this standard including, but not limited to, Interactive Equipment, Section 43.
Supplement SA	Info	**GRID SUPPORT UTILITY INTERACTIVE EQUIPMENT**
SA18	Info	**Limit Active Power (Optional)**
SA18.1	Info	**General**
SA18.1.2		~~Where the manufacturer elects to implement the active power limit function as an export limit at the PCC, either exclusively or as an optional feature, the active power export limit function shall comply with the Power Control Systems requirements contained in UL 1741.~~ <u>Power export and power import limit functions are not addressed in IEEE 1547-2018 and IEEE 1547.1-2020. Those functions shall be evaluated in accordance with the Outline of Investigation for Power Control Systems, UL 3141.</u>

CLAUSE	VERDICT	COMMENT
		The following changes reflect the April 22, 2025 revision:
43A		***New section added;*** **Cybersecurity (Optional)**
43A.1		Equipment or components of a system identified by the manufacturer as compliant with any of the following cybersecurity documents shall be evaluated to and comply with that document: a) Outline of Investigation for Cybersecurity of Distributed Energy and Inverter-Based Resources, UL 2941; b) IEEE Guide for Cybersecurity of Distributed Energy Resources Interconnected with Electric Power Systems, IEEE 1547.3; c) SunSpec Cybersecurity Certification Program – Setting a Cybersecurity Baseline for DER Devices; or d) Standard for Security for Industrial Automation and Control Systems – Part 4-2: Technical Security Requirements for IACS Components, IEC 62443-4-2. NOTE: Cybersecurity requirements are evolving and may have specific needs depending on the site and organizations involved and may require periodic re-evaluation.
67	Info	**Cautionary Markings**
67.1		There shall be no substitute for the words "CAUTION," "WARNING," or "DANGER" in the text of a marking. Markings required for enclosures containing medium voltage equipment or circuits shall use the “DANGER” signal word. Exception No. 1: The words "WARNING" or "DANGER" are usable in lieu of the word "CAUTION." Exception No. 2: The word “DANGER” is usable in lieu of the word “WARNING.” Note: It should be considered that the use of the word “DANGER” is to be limited to a situation which, when not avoided, results in death or severe injury.
67.1A		***New section added;*** When multiple hazards with different hazard levels are addressed in one marking, only the highest hazard level shall be used.

CLAUSE	VERDICT	COMMENT
67.4		A live heat sink or other part that: a) Is mistakable for dead metal, b) Involves a risk of electric shock in accordance with Electric Shock, Section 13, and c) Is not guarded as specified in 12.7 shall be marked "~~CAUTION~~ DANGER – Risk of Electric Shock – Plates (or other word describing the type of part) are live. Disconnect unit before servicing." The marking shall be located on or near the live part so as to make the risk known before the part is touched. A single marking for multiple parts is usable.
67.5		An inverter intended to be used with an isolation transformer that is not supplied with the inverter shall be marked "~~CAUTION~~ WARNING – For Proper Circuit Isolation" and the following words or the equivalent "Risk of Electric Shock. Connect a minimum ___ kVA rated isolating transformer between the output of the unit and the utility power line connections. The transformer is to be an isolation type having separate primary and secondary windings."
67.6		For compliance with Exception No. 2 to 7.2.1, a unit shall be marked with the word "~~CAUTION~~ WARNING –" and the following or equivalent: "Risk of Electric Shock, Do Not Remove Cover. No User Serviceable Parts Inside. Refer Servicing To Qualified Service Personnel."
67.8		An inverter shall be marked with the word "DANGER High Voltage Risk of Electric Shock, –" and the following or the equivalent. The marking shall be located on the outside of the unit or shall be prominently visible with any cover or panel opened or removed: Exception: For equipment rated for voltages lower than medium voltage "DANGER: High Voltage Risk of Electric Shock." can be replaced by "WARNING: Risk of Electric Shock.". a) "Multiple voltage sources are terminated inside this equipment. Each circuit must be individually disconnected before servicing. XX voltage sources are terminated inside this equipment. Each circuit must be individually disconnected before servicing," (XX shall be replaced by the number "Two" or the number of sources if more than "two"), or "Both ac and dc voltage sources are terminated inside this equipment. circuit must be individually disconnected before servicing," and b) "When the photovoltaic array is exposed to light, it supplies a dc voltage to this equipment." Exception: Equipment not rated for PV input sources need not be marked with (b).

CLAUSE	VERDICT	COMMENT
67.10		A unit provided with single-pole circuit breakers in the input or output circuit in accordance with the Exception to 32.1.8 shall be marked internally with the word "~~CAUTION~~ WARNING" and the following or the equivalent: "~~To reduce the risk of electric shock and fire~~ Risk of Electric Shock and Fire – Do not connect to a circuit operating at more than 150 volts to ground."
67.11		A removable panel covering a capacitor in accordance with Exception No. 1 to 13.2.3 shall be marked "~~CAUTION~~ WARNING – Risk of electric shock from energy stored in capacitor" and the following or equivalent wording: "Do not remove cover until ___ minutes after disconnecting all sources of supply." The time indicated in the marking is to be the time required to discharge the capacitor to within the limitations specified in 13.2.1, and shall be less than 5 minutes.
67.12		With reference to Exception No. 2 to 13.2.3, a unit shall be marked "~~CAUTION~~ WARNING – Risk of electric shock and/or electric energy-high current levels" and the following or equivalent wording: "Disconnect and discharge (identify capacitor) before removing panel as follows." Appropriate instructions shall follow indicating how to discharge the capacitor. The procedure indicated shall be limited to functions such as operating a switch, unplugging a connector, or the equivalent. When the time to discharge the capacitor or capacitor bank is longer than 1 second, the unit shall be additionally marked to indicate the minimum discharge time with the following or the equivalent: "Do not remove cover until ___ minutes after connecting the discharge circuit." The time indicated in this marking shall not exceed 1 minute for momentary type switches and 5 minutes for other means that actuate the discharge circuit.
67.13		An ungrounded dead metal part specified in the Exception to 22.2(f), shall be marked with the word "~~CAUTION~~ WARNING" and the following or the equivalent: "Risk of Electric Shock. (Identify part o parts not earth grounded) (is) (are) not grounded – (it) (they) involve a risk of electric shock. Test before touching." The marking shall be provided on or adjacent to the ungrounded dead metal part and shall be visible so that each part or group of parts is positively identified.
67.14		With reference to Exception No. 3 to 13.2.3, a marking shall be provided indicating "~~CAUTION~~ WARNING – Risk of electric shock or electrical energy-high current levels" and the following or the equivalent: "High-energy electric charge is stored in (identify capacitor) and associated circuitry. Test before touching." The marking shall be located internally adjacent to the capacitor.
67.15		With reference to 34.10, units with integral ground-fault detector/interrupter or separate devices having the same function shall be marked with the word "~~CAUTION~~ WARNING" and the following or equivalent: "Risk of Electric Shock. Normally Grounded Conductors May Be Ungrounded and Energized When a Ground-Fault is Indicated." If the separate device is not self-contained and is intended for installation in another enclosure, the device shall be provided with a label for fixing to the outside of the enclosure to indicate the cautionary statement.

CLAUSE	VERDICT	COMMENT
69	Info	**Important Safety Instructions**
69.2		There shall be no substitute for the words "CAUTION," "WARNING," or "DANGER" in the text of the instructions. Markings required for enclosures containing medium voltage equipment or circuits shall use the “DANGER” signal word. Exception No. 1: The words "WARNING" or "DANGER" are usable in lieu of the word "CAUTION." Exception No. 2: The word “DANGER” is usable in lieu of the word “WARNING.” Note: It should be considered that the use of the word “DANGER” is to be limited to a situation which, when not avoided, results in death or severe injury.
69.4		The important safety instructions shall include instructions for the following items A – U. The statement "IMPORTANT SAFETY INSTRUCTIONS", and the statement "SAVE THESE INSTRUCTIONS" shall precede the list. The word "WARNING," "CAUTION," and "DANGER" shall be entirely in upper case letters. IMPORTANT SAFETY INSTRUCTIONS O. In accordance with 50.1.7, when an abnormal test is terminated by operation of the intended branch-circuit overcurrent protective device, the instruction manual for a unit shall include the word "~~CAUTION~~ WARNING" and the following or the equivalent: "~~To reduce the~~ Risk of fire. Connect only to a circuit provided with _____ amperes maximum branch-circuit overcurrent protection in accordance with the National Electrical Code, ANSI/NFPA 70." The blank space is to be filled in with the ampere rating of branch-circuit overcurrent protection described in 0.1.7.
	Info	**MARKING**
81	Info	**Cautionary Markings**
81.1		A charge controller which requires a specific connection method in accordance with 80.3.1 shall be marked "~~CAUTION~~ WARNING: Risk of fire and shock, ~~connect~~ energize _____ terminals prior to the ~~connection~~ energizing of _____ terminals" indicating the battery or array terminals as appropriate. Exception: Medium voltage rated equipment shall be marked “DANGER: High Voltage Risk of Electric Shock and Fire.” See 67.1.
82	Info	**Details**
82.4		A charge controller with an internal temperature compensating means shall be marked "~~CAUTION~~ WARNING: Risk of Fire. Internal temperature compensation. ~~RISK OF FIRE, USE WITHIN~~ Use within ____ m (ft) of ~~BATTERIES~~ batteries." or "~~RISK OF FIRE, MOUNT IN CONTACT WITH BATTERIES~~. CAUTION: Risk of Fire. Mount in contact with batteries."

CLAUSE	VERDICT	COMMENT
Supplement SA	Info	**GRID SUPPORT UTILITY INTERACTIVE EQUIPMENT**
SA6	Info	**Ratings, Markings and Instructions**
SA6.2		Grid support inverters or converters that have not been evaluated to and found compliant with the full set of applicable IEEE 1547-2003 and IEEE 1547.1-2005 interconnection protection function requirements (as defined for the specific product type) shall be permanently marked with the following markings: a) "~~ATTENTION~~ NOTICE:" and the following or equivalent: "This unit has not been evaluated for some of the IEEE 1547-2003 and IEEE 1547.1-2005 utility interconnection protective functions. This unit may need to be provided with external utility interconnection protection in accordance with local codes and local utility requirements." This marking is to be placed in a location that is readily visible adjacent or near the unit's ratings marking.
Supplement SB	Info	**GRID SUPPORT UTILITY-INTERACTIVE INVERTERS AND CONVERTERS BASED UPON IEEE 1547-2018 and IEEE 1547.1-2020**
SB5	Info	**Ratings, Markings and Instructions**
SB5.2		Grid support equipment that has been evaluated to and found compliant with a partial set of applicable IEEE 1547-2018 and IEEE 1547.1-2020 interconnection function requirements (as defined for the specific product type) shall be permanently marked with the following markings: a) "~~ATTENTION~~ NOTICE:" and the following or equivalent: "This unit has not been evaluated for some of the IEEE 1547-2018 and IEEE 1547.1-2020 utility interconnection functions. This unit may need to be provided with external utility interconnection system equipment in accordance with local codes and local utility requirements." This marking is to be placed in a location that is readily visible adjacent or near the unit's ratings marking.