STANDARDS UPDATE NOTICE (SUN)
ISSUED: August 14, 2018

STANDARD INFORMATION

Standard Number: UL 1741
Standard Name: Inverters, Converters, Controllers and Interconnection System Equipment for Use with Distributed Energy Resources
Standard Edition and Issue Date: 2nd Edition Dated January 28, 2010
Date of Revision: December 22, 2017 and February 15, 2018
Date of Previous Revision of Standard: September 7, 2016

EFFECTIVE DATE OF NEW/REVISED REQUIREMENTS

Effective Date: **February 15, 2020**

IMPACT, OVERVIEW, AND ACTION REQUIRED

Impact Statement: A review of all Listing Reports is necessary to determine which products comply with new/revised requirements and which products will require re-evaluation. **NOTE:** Effective immediately, this revised standard will be exclusively used for evaluation of new products unless the Applicant requests in writing that current requirements be used along with their understanding that their listings will be withdrawn on Effective Date noted above, unless the product is found to comply with new/revised requirements.

Overview of Changes:

December 22, 2017
- Additional Requirements for PV Rapid Shutdown Equipment and Systems.

February 15, 2018
- Removal of Table 68.1
- Addition of a Reference to Tables 1 and 2 of the Standard for Interconnecting Distributed Resources with Electric Power Systems, IEEE 1547.

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

If the applicable requirements noted in the table are not described in your report(s), these requirements will need to be confirmed as met and added to your report(s) such as markings, instructions, test results, etc. (as required).

Client Action Required:

Information – To assist our Engineer with review of your Listing Reports, please submit technical information in response to the new/revised paragraphs noted in the attached or explain why these new/revised requirements do not apply to your product (s).

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 – Please immediately identify any current Listing Reports or products that are no longer active and should be removed from our records.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 revisions dated December 22, 2017 were issued to incorporate the following:
1	Info	**Scope**
1.6		***New clause added;*** These requirements also cover rapid shutdown equipment and systems.
11	Info	**Electric Shock**
11.2	Info	**Stored energy**
11.2.4		***New clause added;*** Any equipment connecting to a controlled conductor of PV source or output circuits and has devices that may store energy (e.g. batteries, capacitors, etc.) shall comply with 92.1.10 and provide the markings and instructions in accordance with 96.3 and 97.4.
13	Info	**Disconnect Devices**
13.1	Info	**General**
13.1.1		~~A disconnect device shall:~~ ~~a) Open all ungrounded conductors of the circuit to which it is connected,~~ ~~b) Consist of a manually operated switch or a circuit breaker,~~ ~~c) Employ an operating handle that is accessible from outside of the enclosure or located behind a hinged cover not requiring a tool for opening, and~~ ~~d) Be marked in accordance with 63.26.~~ <u>A disconnect device serving as an isolating device, equipment disconnect or system disconnect means required by the NEC shall be evaluated to the requirements in this section.</u>

13.1.2		***New clause added;*** A disconnect device shall open all conductors of the circuit to which it is connected that are not solidly grounded. Note: "Grounded" PV systems with overcurrent devices, resistors, etc. in the connection between the PV system and ground are "functional grounded" systems, and the "functional grounded" conductors are not solidly grounded.
13.1.3		***New clause added;*** System Disconnecting Means: A device serving the function of the NEC-required system disconnecting means shall: a) Consist of a manually operated switch or a circuit breaker, b) Employ an operating handle that is accessible from outside of the enclosure or located behind a hinged cover not requiring a tool (other than a key) for opening, and c) Be marked in accordance with 63.26.
13.1.3.1		***New clause added;*** Equipment Disconnecting Means: A device serving the function of the NEC-required equipment disconnecting means shall: a) Consist of a manually operated switch or a circuit breaker, b) Employ an operating handle that is capable of being operated without exposing the operator to inadvertent contact with live parts, and c) Be marked in accordance with 63.26 to indicate its function.
13.2		~~Where the operating handle of a disconnect device is operated vertically rather than rotationally or horizontally, the up position of the handle shall be the on position.~~ **Provision for locking**
13.2.1		***New clause added;*** Isolating and disconnecting devices serving as the means of de-energization of external sources of supply to the equipment, to facilitate safe servicing, shall have provision for being locked in the "off" (open or de-energized) position.
	Info	**RATING**
62	Info	**Details**

New table added;

Table 62.1

Unit ratings

Rating type	Utility-interactive (UI)	Stand-alone (SA)	UI w/ CC[d]	SA w/ CC[d]	ISE	CC[d]	PVRSE-dc	PVRSE-ac	Product Marking
Max input voltage (dc)[a]	X[b]	X	X	X	X	X	X		
Range of input Operating voltage (dc)	X[b]	X	X	X	X	X	X		X
Max input current (ac or dc)	X[b]	X	X	X		X	X	X	X
Max Input short circuit current	X	X	X	X	X	X	X	X	
Max backfeed current (see 47.6.2)	X		X						
Output power factor rating	X	X	X	X					
Operating voltage range (ac)	X	X	X	X	X	X		X	
Operating frequency range or single freq	X	X	X	X		X		X	X
Nominal output voltage (ac)	X	X	X	X					X
Normal output frequency	X	X	X	X					X
Max cont. output current (ac)	X	X	X	X					X
Max cont. output power (ac)	X	X	X	X					X
Max output fault current and duration (ac)	X	X	X	X					
Max output overcurrent Protection (amps)[c]	X	X	X	X		X		X	
Nominal output voltage (dc)			X	X		X			X
Charging output voltage operating range (dc)			X	X		X			
UI trip limits and times	X				X				
Rapid shutdown time limit							X	X	
Sychronization in-rush current	X		X						
Rating type	**Utility-**	**Stand-**	**UI**	**SA**	**ISE**	**CC**	**PVRSE-**	**PVRSE-**	**Product**

	interactive (UI)	alone (SA)	w/ CC [d]	w/ CC [d]		[d]	dc	ac	Marking
Trip limit and trip time accuracy	X		X		X				
Normal operation temperature range	X	X	X	X	X	X	X	X	
Output pwr temp derate/ max pwr ambient [e]	X	X	X	X		X			
Control power source (ac/dc)							X	X	X
Control power or current range							X	X	X
Conductor AWG range	X	X	X	X	X	X	X	X	X

Notes:

AWG is American Wire Gauge
CC is charge controller

[a] The maximum input voltage determined in accordance with Section 690.7(a) of the National Electrical Code, NFPA 70, may be used for photovoltaic inverters and charge controllers.

[b] Not required for ac modules.

[c] Normally the branch-circuit overcurrent protection.

[d] Charging of batteries is able to originate from dc or ac sources. The rating types for either ac or dc are to be applied accordingly.

[e] Only for units that derate with output temperature.

	Info	**MARKING**
63	Info	**Details**
63.2		A unit shall be plainly and permanently marked ~~where it is readily visible after installation~~ <u>on the exterior surface or behind an accessible cover</u> with: a) The manufacturer's name, trademark, or other descriptive marking by which the organization responsible for the product is able to be identified – hereinafter referred to as the manufacturer's name, b) A distinctive catalog number or the equivalent, c) The electrical ratings as specified in Table 62.1 for the specific type(s) of equipment, and d) The date or other dating period of manufacture not exceeding any three consecutive months. The repetition time cycle of a date code shall not be less than 20 years. The date code shall not require reference to the manufacturer's records to determine when the unit was manufactured. Exception No. 1: The manufacturer's identification is able to be in a traceable code when the unit is identified by the brand or trademark of a private labeler. Exception No. 2: The date of manufacture is able to be abbreviated in a nationally accepted conventional code, or in a code affirmed by the manufacturer.

	Info	***New category added;*** **RAPID SHUTDOWN EQUIPMENT AND SYSTEMS**
	Info	**INTRODUCTION**
87		***New section added;*** **General**
88		***New section added;*** **Protection of Emergency Personnel**
89		***New section added;*** **Electrical Isolation Systems (EIS)**
90		***New section added;*** **Initiators**
91		***New section added;*** **PVRSS that Includes Disconnect Functionality**
92		***New section added;*** **PVRSS and PVRSE Functional Safety**
93		***New section added;*** **General**
94		***New section added;*** **Functional Safety Evaluation and Environmental Stress Testing For PVRSS/PVRSE**
	Info	**RATINGS**
95		***New section added;*** **General**
96		***New section added;*** **Details**
97		***New section added;*** **Installation Instructions**

		The revisions dated February 15, 2018 were issued to incorporate the following:
68	Info	**Utility Voltage and Frequency Variation Test**
68.1		As a routine production line test, each utility-interactive inverter ~~initially exporting power within its normal operating range shall cease to export power to the simulated utility source after the output voltage and frequency of the simulated utility source are adjusted to each condition specified in Table 68.1 within the time specified in the table. The inverter is to be tested to each condition once to verify compliance~~. shall comply with the applicable requirements in the latest publication of the Standard for Interconnecting Distributed Resources with Electric Power Systems, IEEE 1547.1, Section 6 (Production Tests). ~~Exception: After it has been determined that an inverter with an automatic reset control complies with the 5 minute minimum, programming the control to reset in less than 5 min to reduce test time meets the intent of the requirement. The 5-min wait time shall be reset and verified prior to shipping the product.~~
Table 68.1		***Table deleted;***
68.2		***Clause deleted;***
68.3		***Clause deleted;***
83	Info	**AC Module Inverter Securement Test**
83.6		A shear force of ~~47.6~~ 156 N (35 lbf) or 4 times the weight of the complete inverter assembly, whichever is greater, is to be applied to the top most outer portion of the enclosure furthest from the mounting surface in the direction parallel to the adhesive or similar attachment bond.
		CUSTOMERS PLEASE NOTE: This Table and column “Verdict” can be used in determining how your current or future production is or will be in compliance with new/revised requirements.