

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:18Oct2022]

Previous Standard ID: Inverters, Converters, Controllers and Interconnection System Equipment for use with Distributed Energy Resources [UL 1741:2021 Ed.3]

EFFECTIVE DATE OF NEW/REVISED REQUIREMENTS

Effective Date: **October 18, 2025**

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 Reports not updated to this version by the effective date above will be withdrawn.

Overview of Changes: Addition of medium voltage requirements throughout the standard. Specific details of new/revise requirements are found in table below.

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 – Please immediately identify any current Listing Reports or products that are no longer active and should be removed from our records.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
		<i>Additions to existing requirements are <u>underlined</u> and deletions are shown lined-out below.</i>
2	Info	
2.1.3.3.A	Info	MEDIUM VOLTAGE – Voltage above 1000 Vac or above 1500Vdc.
7	Info	Frame and Enclosure
7.1	Info	General
		<i>New clause added;</i>
7.1.7		All medium voltage wiring and components shall be completely enclosed by grounded metal enclosures or metallic raceway, with the exception of viewing panes and ventilation openings. Polymeric enclosures shall not be used for enclosing medium voltage wiring or components. Exception: Shielded medium voltage wiring may be exposed in units rated only for installation in restricted areas which are not in general access areas.
7.2A		<i>New section added;</i> Doors for medium voltage equipment
7.2A.1		Doors providing access to live medium voltage components, equipment or wiring shall be interlocked to prevent opening the door when medium voltage parts are energized. This interlocking shall comply with Interlocking of Medium Voltage Equipment, Section 15A.
7.6	Info	Openings covered by glass
		<i>New clause added;</i>
7.6.3		Infrared viewports shall comply with the Outline of Investigation for Infrared Viewports, UL 50V.
7.8	Info	Openings for ventilation
7.8.1	Info	General
		<i>New clause added;</i>
7.8.1.2		Barriers shall be provided behind all ventilating openings into medium-voltage compartments. The barrier shall be effectively secured in place and shall be positioned such that a straight line (of zero diameter) may not be drawn from any point outside of the equipment, through the ventilation opening, to any insulated or uninsulated live part. Removable ventilation filters shall not be considered as barriers to meet this requirement.



CLAUSE	VERDICT	COMMENT
11	Info	<p>Protection of Users – Accessibility of Uninsulated Live Parts</p> <p><i>New clause added;</i></p>
11.9		<p>For medium voltage applications, interlocking is required by Interlocking of Medium Voltage Equipment, Section 15A, and barriers are required in accordance with 7.8.1.2 to be placed behind ventilation openings to prevent user access to medium voltage components, equipment and circuits.</p>
12	Info	<p>Protection of Service Personnel</p>
12,1		<p>The requirements in this Section apply to the protection of service personnel who reach over, under, across, or around uninsulated electrical parts or moving parts to make adjustments or measurements while the unit is energized. For requirements covering protection of users, see Protection of Users – Accessibility of Uninsulated Live Parts, Section 11.</p> <p><u>Exception: Performing service in medium voltage compartments when the equipment is energized is not possible based on the interlocking requirements of Interlocking of Medium Voltage Equipment, Section 15A.</u></p>
15	Info	<p>Disconnect Devices</p> <p><i>New section added;</i></p>
15.3		<p>Medium voltage disconnect devices (isolating means)</p> <p>Medium voltage isolating means may be any one of the following:</p> <p>See standard for details.</p>
15A		<p><i>New section added;</i></p> <p>Interlocking of Medium Voltage Equipment</p> <p>If an isolating means is not rated for making and breaking the required current, the isolating means shall be mechanically interlocked with a device capable of interrupting the current to prevent opening or closing the isolating means unless the load interrupting device is in the open position. The interlocking shall also prevent energizing the isolating means unless it is in the closed position or the drawout isolating means is separated by the isolating distance.</p> <p>See standard for details.</p>



CLAUSE	VERDICT	COMMENT
18	Info	Supply Connections
18.1	Info	General <i>New clause added;</i>
18.1.4		A wiring terminal for a circuit above 2000 V ac or dc shall be sized for connection to a field wiring conductor having an ampacity of no less than 100 percent of the current that the circuit carries during rated conditions, based on Tables 310.60(C)(77) and (78) of the National Electrical Code, ANSI/NFPA 70.
18.2	Info	Wiring terminals
		Terminals for field connection of medium voltage conductors shall conform to any one of the following:
18.2.11		a) Bus bars provided with hole patterns meeting the requirements of ANSI/NEMA CC 1-2018; b) Connectors complying with IEEE 386. <i>New section added;</i>
		Wire-bending Space for Medium Voltage Field Conductors
19A		Wire bending space shall be such that, during installation, field-installed conductors need not be bent to a radius less than: See standard for details.
		<i>New section added;</i>
22A		Connection of Medium Voltage Conductor Shields
		There shall be provision for bonding the conductor shields of each medium voltage field installed conductor to the ground bus. These provisions shall be located:
22A.1		a) Such that the shield bonding conductor need not exceed 1.5 m (4.92 ft), and b) In the same compartment as the wiring terminal for the associated shielded conductors <i>New section added;</i>
		Grounding of Medium Voltage Drawout Elements
22B		The metal frame of all drawout elements shall be grounded in the test and connected positions and in all locations between these positions. See standard for details.



CLAUSE	VERDICT	COMMENT
22C		<i>New section added;</i> Ground Bus for Medium Voltage Equipment
22C.1		A ground bus shall be provided for all medium voltage equipment and shall extend into each medium voltage compartment. The ground bus shall be of equivalent cross-sectional area to the conductors shown in column 2 of Table 20.1. Splice bars shall be provided for field splicing sections as needed.
23	Info	Internal Wiring
23.3	Info	Electrical connections
23.3.8		<i>New clause added;</i> Open-end spade lugs and quick-connect terminals shall not be used for medium voltage circuits.
25	Info	Separation of Circuits
25.1	Info	Factory wiring
25.1.4		<i>New clause added;</i> Medium voltage wiring and low voltage shall be reliably separated. They shall not be bundled together and shall not occupy the same raceway, wiring harness, or wire trough. Medium voltage wiring operating at above 7200 V shall be separated from low voltage components and wiring by grounded metal barriers, with the exception of short lengths of wire such as at instrument transformer terminals.
25.1.5		<i>New clause added;</i> Medium voltage internal wiring may be shielded or unshielded wire. Shielded wire shall have the shield bonded to the grounding system at one or both ends of the wire.
25.1.6		<i>New clause added;</i> Circuits that are connected to medium voltage circuits or circuits that do not have the required isolation and the required spacing from adjacent medium voltage circuits shall be treated as medium voltage circuits and shall comply with the medium voltage spacings defined in Table 26.1 as well as the medium voltage tests in Section 47A for the highest voltage in either circuit.
25.2	Info	Field wiring
25.2.4		<i>New clause added;</i> With reference to 25.2.1 – 25.2.3, conductors of all medium voltage circuits must always be separated from conductors of all low voltage circuits, even if both are insulated for the highest voltage.



CLAUSE	VERDICT	COMMENT
25.3	Info	Separation barriers <i>New clause added;</i>
25.3.3		With reference to 25.3.1(a), insulating material is not considered a suitable barrier between medium voltage circuits above 7200 V and all low voltage circuits. Circuits of 7200 V and greater shall be separated from low voltage circuits by a grounded metal barrier.
26	Info	Spacings <i>New section added;</i>
		Insulating liners and barriers for medium voltage circuits
26.3		Vulcanized fiber shall not be used as an insulating barrier for medium voltage circuits. See standard for details.
30	Info	Isolated Accessible Signal Circuits <i>New clause added;</i>
30.5		Accessible signal circuits shall be galvanically isolated from medium voltage circuits by medium voltage transformers, optical fiber systems, or connected through a voltage divider complying with Section 36A. The signal circuit shall comply with the maximum voltage, current, and power levels described in 30.3 and 30.4. <i>New section added;</i>
		Medium Voltage Overcurrent Protection
32A		Overcurrent protection in a three phase circuit shall protect all ungrounded conductors. Circuit breakers shall open all phases of the protected circuit. When fuses are used, there shall be a fuse in each ungrounded phase of the circuit. See standard for details.
		<i>New section added;</i>
		Medium voltage output ac power circuit overcurrent protection
33A		Medium voltage output circuits shall be provided with overcurrent protection. rated or set for the output current rating of the unit. See standard for details.



CLAUSE	VERDICT	COMMENT
		<i>New section added;</i>
		Voltage Dividers
36A		This section covers voltage dividers intended to be used in equipment rated over 1500 V to provide voltage measurement or signaling. While these voltage dividers do not provide galvanic isolation, compliance with this section provides protection for accessible signal circuits as required by 30.5.
43		Interactive Equipment
		<i>New clause added;</i>
43.8		Medium voltage switchgear provided to interface with a utility shall comply with IEEE C37.20.2, IEEE C37.20.3, or IEEE C37.20.9 as appropriate. Such switchgear shall be provided with an isolation means to disconnect the equipment from the utility and interlocking to prevent access to the parts of the switchgear operating above 1000 V if the switchgear is not isolated from the utility. Consideration shall be given to providing a means to isolate the switchgear from the inverter output to allow for servicing the switchgear without being exposed to hazardous voltages.
46	Info	Temperature
		<i>New clause added;</i>
46.12		Measuring the temperatures of components or conductors operating at medium voltage using thermocouples is inherently dangerous. Other methods, such as temperature indicating labels, may be used when agreeable to all concerned, and when it can be demonstrated that these methods have accuracy comparable to that of the thermocouple method. This may require a reduction the maximum allowable measured temperatures to adjust for anticipated measurement inaccuracies when using temperature indicating labels.
		<i>New section added;</i>
		Power Frequency Withstand Test on Medium Voltage Circuits
47A		Equipment having medium voltage circuits shall withstand for 1 minute without breakdown the application of an ac rms test potential equal to the dielectric voltage withstand rating of the equipment in accordance with Table 47A.1, between: See standard for details.



CLAUSE	VERDICT	COMMENT
64	Info	Rain and Sprinkler Tests <i>New section added;</i> Driven rain test
64.4		A unit with medium voltage ratings that is intended for outdoor use shall be subjected to the Driven Rain test as described in 64.4.2 – 64.4.9. This test is intended to simulate rain driven by a 29 m/s (65 mph) wind. See standard for details.
		<i>New section added;</i> Rod Entry Test
64A		This test is to be conducted to evaluate ventilation openings in medium voltage equipment. See standard for details.
		<i>New section added;</i> Medium Voltage Shutter Integrity Test
64B		Any shutter assembly provided in accordance with 15A.4 shall withstand the application of a 90 N (20 lbf) force using a 12.7 mm (0.5 in) square metal bar at any point on the shutter. See standard for details.
		<i>New section added;</i> Impulse Withstand Tests
64C		This Section shall be applied as referenced or required by other portions of this Standard. This test shall be performed for each EUT construction considering: distribution of charge, including location of any ground plane; changes in proximity of medium-voltage parts to grounded parts, other medium-voltage parts or low-voltage parts and shape of busbars and other medium-voltage parts. See standard for details.



CLAUSE	VERDICT	COMMENT
67	Info	Cautionary Markings
		An inverter shall be marked with the word "DANGER" and the following words "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:
67.8		a) "XX power sources are terminated inside this equipment. All circuits 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. All circuits must be individually disconnected before servicing," and
		<u>Exception: Equipment without a dc input source and having multiple ac sources shall be marked "CAUTION" and the following words "Risk Of Electric Shock –" and the following or the equivalent. "Multiple voltage sources are terminated inside this equipment. Each circuit must be individually disconnected before servicing".</u>
		b) "When the photovoltaic array is exposed to light, it supplies a dc voltage to this equipment."
		<u>Exception: Equipment not rated for PV input sources need not be marked with (b).</u>
68	Info	Equipment Information and Instructions
68.2	Info	Operating and installation instructions
		The operating and installation instructions shall:
68.2.1		j) <u>For medium voltage equipment, instructions shall include information on any restrictions of wire type or raceway location that may be required to maintain proper wire bending space as noted in 19A.3.</u>
		<i>New section added;</i>
		Power Frequency Voltage Withstand Test – Medium Voltage Circuits
70A		Medium voltage circuits of units shall be subjected to the power frequency withstand test requirements of Section 47A.
		See standard for details.