

STANDARD INFORMATION

Amendment 1: See additional clauses below.

Standard: UL 9540

Standard ID: Energy Storage Systems and Equipment [ANSI/CAN/UL 9540:2020 Ed.2]

Previous Standard ID: Energy Storage Systems and Equipment [ANSI/CAN/UL 9540:2016 Ed.1]

EFFECTIVE DATE OF NEW/REVISED REQUIREMENTS

Effective Date: **July 15, 2022**

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.

Overview of Changes:

- Revisions to maximum rated energy and separation devices
- Revisions to installations instructions regarding exterior wall mounted ESS
- Addition of requirements for large scale fire testing in accordance with UL 9540A
- Additional production tests

Specific details of new/revised 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 – Please immediately identify any current Listing Reports or products that are no longer active and should be removed from our records.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>
1	Info	Scope <i><u>New clause added;</u></i> The maximum energy capacity of individual electrochemical ESS shall not exceed the following values: 1.4 <i>a) <u>Outdoor wall mounted electrochemical ESS shall not exceed 20 kWh (72 MJ);</u></i> <i>b) <u>Residential use electrochemical ESS shall not exceed 20 kWh (72 MJ); and</u></i> <i>c) <u>Non-residential use electrochemical ESS shall not exceed 50 kWh (180 MJ),</u></i> <i><u>except as allowed in 1.7 – 1.11.</u></i>
7	Info	Non-Metallic Materials Polymeric materials employed for enclosures, or parts of enclosures for ESS shall comply with 7.2 and the enclosure requirements outlined in UL 746C, Path III of the Enclosure Requirements, or CAN/CSA-C22.2 No. 0.17. 7.1 <i><u>Exception No. 1: Energy storage systems intended for outdoor installation shall employ an enclosure of non-combustible materials.</u></i> <i><u>Exception No. 2: Electrochemical ESS shall employ an enclosure of non-combustible materials.</u></i> <i><u>Exception No. 3: Equipment of a multi-part ESS that complies with the enclosure and material requirements in the appropriate standard for that equipment as listed in Appendix A is not required to comply with the requirements in Section 7 if the enclosure is determined suitable for the intended environmental conditions that the ESS will be exposed to.</u></i>
9	Info	Enclosures and Guarding of Hazardous Parts 9.3 <i>In service access areas, bare parts of hazardous voltage circuits, shall be located or guarded so that accidental shorting across circuits at opposite polarity, to ground, to SELV circuits or communications circuits, that could be caused by items such as, but not limited to, tools or test probes used by service personnel, is unlikely. Parts in Class 2 or limited power circuits need not be located or guarded from accidental contact by service personnel.</i>
10	Info	General Electrical Safety of Systems and Additional Requirements for Walk-in Units 10.3 <i>Entrances to the enclosure shall be designed to prevent persons from becoming trapped within the enclosure (i.e. entrances shall be able to be opened from inside the enclosure without use of a tool or key should they become closed). Personnel</i>



CLAUSE	VERDICT	COMMENT
		<p>door(s) intended for entrance to, and egress from an enclosure, shall open in the direction of egress. The egress door shall be marked with the word "Exit" and the line of sight to an exit sign shall not be interrupted. Any doorway or passage that might be mistaken for an exit shall be marked "Not an Exit" or with an indication of its actual use. See 39.9.</p> <p><u>Shipping container type enclosures with cutouts or other modifications to support walls that may affect their load bearing performance shall be re-evaluated to ASTM D4169 for ability to handle the intended loads post modification.</u></p>
		<p><i>New clause added;</i></p>
10.5		<p>If the walk-in unit is provided with an explosion venting system, the enclosure including any doors provided on the enclosure, shall be able to withstand the anticipated explosion pressure. The explosion materials to be vented, shall be vented only through the areas of the venting system designed for that purpose. Suppression systems integral to the walk-in unit shall be able to withstand the anticipated pressure, and their operation shall not be negatively affected. Compliance is determined through a review of the specifications for the explosion venting system, walk-in enclosure and a review of the installation of the venting system and suppression system within the enclosure.</p>
10.7		<p>Personnel doors of walk-in units shall be designed to prevent persons from becoming trapped within the unit and shall be able to be opened from the inside without use of a tool or key. <u>Door(s) intended for entrance to, and egress from a walk-in unit, shall open in the direction of egress and provide a clear width of at least 80 cm (32 in) and clear height of at least 183 cm (72 in) based on the dimensions specified in the ICC IBC. Each egress door shall be marked in accordance with 41.13 and the line-of-sight to an exit sign shall not be interrupted. Any doorway or passage that might be mistaken for an exit shall be marked in accordance with 41.13 or with an indication of its actual use. See also 41.12.</u></p>
		<p><i>New clause added;</i></p>
10.13		<p>Energy storage system enclosures that can be fully entered by persons such as walk in units, shall be designed to automatically provide mechanical ventilation using 100% outdoor air when anyone is working within the enclosure. The minimum amount of ventilation air shall be 5.1 L/s/m² (1 cf/min/ft²).</p>
10.16		<p><u>Lighting shall be provided in enclosed working spaces associated with the ESS. The lighting source shall provide at least 100 lux and controlled only by manual means.</u> Lighting within an ESS including lighting within a walk-in enclosures shall be installed in accordance with Article 410 of NFPA 70 or Section 30 of CSA C22.1 as applicable to the system where the system is installed.</p>



CLAUSE	VERDICT	COMMENT
11	Info	Wiring and Electrical Supply Connections <i>New clause added;</i>
11.9		Where multiple conductors are installed in parallel, they shall be installed in groups consisting of not more than one conductor per phase, neutral or ground so that the current in each group sums to zero. Where conductors pass through a metal opening, all conductors in a group shall pass through the same opening.
12	Info	General Electrical Equipment
12.2		Exposed hazardous voltage in an ESS shall be provided with a lockable manual disconnect to enable Lock-Out-Tag-Out (as required in NFPA 70E and CSA Z462) during servicing or for emergency procedures. The lockable manual disconnect shall have sufficient interrupt ratings, shall be accessible to the technician servicing the system and to first responders and shall be located as close to the exposed hazardous voltage conductors as possible. When the lockable manual disconnect is not provided directly on the system by the system manufacturer, <u>the installation instructions shall indicate the type and ratings of the disconnect to be provided in the installation and how it is to be installed in accordance with NFPA 70E and CSA Z462.</u>
12.3		Fuses, circuit breakers and disconnect devices shall be rated for the application including fault current ratings, suitability for disconnect under load, etc., as applicable to the device and application in the system. <u>The ESS shall be provided with short circuit protection within the system to mitigate hazards associated with a short circuit condition of the integral energy storage technology, including addressing the potential for additive fault currents when multiple battery systems are connected in parallel. This protection shall be provided as part of the energy storage technology or installed as a separate component within the ESS. Protection against overload and short circuits of external circuits shall use branch circuit rated protectors or electronic circuits evaluated for the purpose.</u>
12.7		<i>New clause added;</i> The inverter and other equipment connected to the output terminals of the battery or other storage device of the ESS shall be able to safely withstand the potential short circuit current from the storage device. The rated input short circuit current of the inverter and other equipment shall be equal to or greater than the rated output short circuit current of the battery or other energy storage mechanism. Compliance can be determined through evaluation of the output short circuit ratings of the energy storage mechanism (e.g. for the battery) as determined by testing in UL 1973. For equipment capable of providing an output short circuit current, the rating shall reflect the protection provided by any internal branch circuit protectors, including electronic circuit regulation, such as limitation of peak currents, inrush currents and time. An energy storage mechanism relying on a branch circuit protector installed on the output of the energy storage mechanism shall provide the maximum short circuit current from that device.



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14	Info	Insulation Levels and Protective Grounding
14.3		Accessible non-current carrying metal parts of an ESS containing hazardous voltage circuits that could become live in the event of an insulation fault shall be bonded to the equipment ground terminal. <u>The main grounding terminal shall be identified through use of grounding symbol, green coloring or word "GR" etc. to signify it as the equipment ground terminal and shall not be utilized for any other purpose than for the connection of the grounding and bonding conductors.</u>
		<i>New clause added;</i>
14.6		With reference to 14.5, when connecting conductive parts to be bonded, paint or coatings in areas of contact shall be removed or paint piercing lock washers shall be used with securement bolts or screws to provide good metal to metal contact. Thread-locking sealants, epoxies, glues, or other similar compounds, and solder alone shall not be used as a securement means as these are not considered reliable. In addition, rivets, hinges (unless metal-to-metal piano type hinges), and parts that may be removed as a result of servicing shall not be relied upon as connections for ensuring continuity of the protective grounding and bonding system. Bonding shall be achieved through the use of dedicated connections that are not utilized for other purposes.
		<i>New clause added;</i>
14.7		With reference to 14.5, methods of securement considered reliable and ensuring good metal-to-metal contact can consist of the following methods: a) Terminal blocks; b) Pressure connectors, grounding lugs and similar grounding and bonding equipment connectors; c) Fusion welding processes; d) Machine screw-type fasteners that engage not less than two threads or are secured with a nut; and e) Thread-forming machine screws that engage not less than two threads in the enclosure.
		<i>New clause added;</i>
14.8		For ESS greater than 100 V between conductors or to ground, the battery circuits can be ungrounded if the system is provided with a ground fault detector and indicator to monitor ground faults.
15	Info	Safety Analysis and Control Systems
		<i>New clause added;</i>
15.3		The safety analysis shall consider mechanical and other potential hazards associated with the ESS in addition to potential electrical hazards. This is especially critical when evaluating systems with hazardous kinetic energy and systems with



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		parts under hazardous pressure levels. Analysis of flywheel systems shall be conducted on the bearing failure detection system, which shall detect signs of bearing failure before catastrophic failure occurs and shall be designed to initiate safety mechanisms within the flywheel control system to bring the system to a safe state upon catastrophic failure of the bearings. Analysis of flywheel systems shall also include the feedback and control for any active bearing unloading systems.
		Electrical and electronic controls of the ESS that are determined to be critical for safety shall comply with an appropriate safety standard for the control and used within their ratings. Electronics and software controls determined to be critical for safety are to be tested to verify electromagnetic immunity in accordance with Section 32 if this testing is not part of the functional safety standard requirements, and shall be evaluated for functional safety to one of the following sets of standards and safety ratings as applicable to the system:
15.4		<u>a) UL 991 and UL 1998;</u> <u>b) CSA C22.2 No. 0.8 (Software Class B requirements for software controls);</u> <u>c) The Annex for Requirements for Electronic Controls, Annex H of UL 60730-1 or CAN/CSAE60730- 1 (Software Class B requirements for software controls);</u> <u>d) IEC 61508 (all parts) (minimum of Safety Integrity Level (SIL) "2" requirements for active protective devices with software controls);</u> <u>e) ISO 13849-1 and ISO 13849-2 (minimum of Performance Level (PL) "c" requirements for active protective devices with software controls); or</u> <u>f) ISO 26262 (all parts) (minimum Automotive Safety Integrity Level (ASIL) "C" requirements for active protective devices with software controls).</u>
		<i>New clause added;</i>
15.5		The required SIL, PL, or ASIL for a safety function shall be permitted to be reduced if the manufacturer provides additional safety analysis (e. g. Layer of Protection Analysis) showing that the required risk reduction level has been reduced by other measures within the ESS.
		<i>New clause added;</i>
		When conducting the functional safety evaluation of electronic controls, the interaction of the various parts of the system needs to be considered for their impact on each other. In particular, a number of disruptive interactions shall be considered in all cases. These interactions include:
15.6		a) Noise, or other disturbances introduced into the system as a result of the interaction of the various ESS components such as between the PCS and the BMS of the battery or other electronic controls, shall be considered when evaluating the reliability of electronic and programmable electronic controls; b) The surge protection evaluation of the BMS and other electronic controls shall be sufficient to address potential surges that may be transmitted from the PCS or other equipment;



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		<p>c) Surge suppression protection shall be provided to protect the BMS or other electronic safety controls devices, if the control functionality of a BMS or other controls can be impacted as a result of this interaction;</p> <p>d) Parts such as power conditioning system (PCS) connected to the storage devices of the system (e.g. batteries), shall be able to safely withstand a fault current from the storage devices including current that is transmitted prior to operation of the short circuit protection; and</p> <p>e) Delays or other faults in communication signals between the various parts of the ESS that can impact safety.</p>
		<i>New clause added;</i>
15.7		Software and its associated hardware determined critical to safety that can be updated remotely shall meet the requirements outlined in UL 5500.
		<i>New section added;</i>
16		Remote Controls
		See standard for details.
17	Info	Communication Systems
		<i>New clause added;</i>
17.1		Instructions for installation and operation of the ESS shall identify the communication protocols used by the ESS for communication with external systems intended to be connected to the ESS. Energy storage system components and subassemblies that need to communicate with each other to ensure safe operation of the system, shall utilize harmonized communication protocols, and evaluation of the compatibility of these interconnecting communication systems shall be included in the safety analysis of Section 15.
19	Info	Piping Systems, Pressure Vessels, Fuel and Other Fluid Supply Connections and Controls
19.7		Piping, hose, and tubing containing fluids, shall be routed and secured to prevent leakage that could result in a fire, explosion or shock hazard (e.g. liquid leaking onto electrical circuits that can lead to short circuits). <u>Pressure relief valves shall be located so that fluids are not directed toward live parts or safety critical circuits should they operate.</u>
22	Info	Combustible Vapor Concentrations
		<i>New clause added;</i>
22.2		Electrochemical ESS which are not addressed in 21.1 and which are dependent on mechanical ventilation as a protection measure against emission of flammable gas that can occur during fault conditions to prevent hazardous gas concentrations within the system, shall be equipped with a fault detection system that activates the mechanical ventilation in a manner which prevents the LFL from exceeding 25% in any non-hazardous area/zone within the ESS.



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23	Info	Fire Detection, Suppression and Propagation
23.1	Info	General
		<i>New clause added;</i>
23.1.1		Fire detection and fire suppression equipment provided as an integral part of an ESS shall comply with applicable product safety standards and shall be installed in accordance with the applicable safety product standards and the manufacturer's instructions.
		<i>New clause added;</i>
23.1.2		Energy storage systems with integral fire detection or fire suppression systems shall be provided with instructions for installing, commissioning, maintaining and testing these systems in accordance with applicable installation codes and standards. NFPA 1 and ICC IFC provide information on applicable requirements and codes for fire suppression systems. See also Appendix A.
		<i>New clause added;</i>
23.1.3		If the ESS manufacturer's instructions indicate that an integral fire detection or fire suppression system is optional, the ESS shall comply with all applicable performance requirements in this standard with and without the integral fire detection or fire suppression system in place and operational.
23.2	Info	Large scale fire testing
		<i>New clause added;</i>
		Electrochemical type ESS, including but not limited to capacitor and battery ESS, shall be subjected to the large scale fire testing in accordance with UL 9540A as follows in (a) – (g). See Appendix E for guidance on code limits related to separation distances and energy capacity.
23.2.1		a) Systems with increased energy capacities as required in codes and standards; b) Indoor systems with decreased separation distances to adjacent ESS units, doors and windows, or to combustibles, non-combustibles, or limited combustibles. This includes building construction components (e.g. wall and ceilings) or any materials in the vicinity of the ESS. See 42.2; c) Outdoor systems with decreased separation distances to adjacent units and to exposures. See 42.4; d) Outdoor wall mounted systems with reduced separation distances; e) Indoor wall mounted systems; f) Systems for installation in residential dwellings (where permitted); and g) When an explosion analysis is required to confirm the installations location is safe.
23.2.2		Electrochemical ESS intended for use in the living or habitable space of a residential dwelling unit (where permitted) shall meet the Performance – Cell Level Test requirements in UL 9540A. Systems complying with these requirements shall be marked in accordance with 41.3(n).



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24	Info	Power Conversion Equipment
24.1	Info	General
		<i>New clause added;</i>
24.1.1		Inverters, chargers, and charging charge control equipment that are part of an energy storage system shall be designed and rated for use with the battery system employed in the energy storage system and evaluated to UL 1741, UL 62109-1 or CAN/CSA C22.2 No. 62109-1, UL 1012, UL 1564, or CAN/CSA C22.2 No. 107.1 as applicable to the power conversion equipment and its application in the system.
24.2	Info	Utility Grid Interaction
		<i>New clause added;</i>
24.2.1		Energy storage systems intended to export energy to the electric power systems (EPS)/electric utility shall be designated as utility-interactive, grid support utility-interactive, or special purpose utility-interactive and shall utilize the appropriately evaluated power conditioning systems. See 6.29, 6.30, and 6.31.
24.2.3		Products that rely upon internal or external utility interconnection protection functions or devices <u>shall be specifically identified for the particular product in the ESS instructions.</u>
24.3	Info	Utility grid interactive inverter
		<i>New clause added;</i>
24.3.1		A utility-interactive inverter, grid support utility-interactive inverters, or subassembly of an ESS shall comply with UL 1741, UL 62109-1 or CAN/CSA C22.2 No. 62109-1, or CSA C22.2 No. 107.1.
		<i>New clause added;</i>
24.3.2		Utility-interactive ESS inverters shall be evaluated for compliance with additional utility interactive document(s) and standard(s) if those specific documents or requirements are referenced in the product ratings or instructions.
24.4	Info	Standalone and multi-mode power conditioning systems
		<i>New clause added;</i>
24.4.1		Power conditioning systems for standalone and multi-mode applications shall comply with UL 1741, UL 62109-1 or CAN/CSA C22.2 No. 62109-1, or CSA C22.2 No. 107.1.
27	Info	Normal Operations Test
27.2		In conducting the electrical tests required in this standard, the ESS shall be operated through a minimum of 2 cycles of charge and discharge of the system at the maximum loading rates as specified by the manufacturer. <u>If a duty cycle is</u>



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		<u>specified [in 41.3 (h)] then the discharge and charge cycles shall be repeated at the specified duty cycle until maximum temperatures during each part of the cycle achieve equilibrium. For each cycle, the ESS shall be discharged completely, recharged immediately to a full state of charge, followed by a delay to achieve the specified duty cycle.</u>
27.3		During the test, consideration shall be given to maximum and minimum room ambient conditions. During operation, temperatures on critical components that are temperature sensitive shall be monitored and operating parameters of components of the system monitored to determine that they are operating within their ratings. <u>If the ESS is intended for mounting on a wall, it shall be mounted as intended in accordance with installation instructions on a flat wall in an alcove that is painted a dull black, and temperatures shall be monitored on the wall surfaces during the test.</u>
		<i>New section added;</i>
32		Electromagnetic Immunity Tests See standard for details.
		<i>New section added;</i>
36		Wall Mount Fixture/Test See standard for details.
38	Info	Electrical Production Tests
38.3	Info	Check of safety controls
		<i>New clause added;</i>
38.3.1		Energy storage systems shall be subjected to 100% production screening to determine that any active controls utilized for safety are functioning. Exception: This check of the safety controls can be conducted on subassemblies or components of the system before final assembly.
		<i>New section added;</i>
39		Mechanical Production Tests See standard for details.
40	Info	Production Quality Control
		<i>New clause added;</i>
40.1		Manufacturers of ESS shall have documented production process controls in place that continually monitor the following key elements of the manufacturing process



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		that can affect safety, and shall include measured parametric limits enabling corrective/preventative action to address defects (out of limit parameters) found affecting these key elements: a) Supply chain control; and b) Assembly processes.
	Info	MARKINGS
41	Info	General
41.3		<p>Energy storage systems shall be marked as follows in (a) – (r). Energy storage systems shall also be marked with the manufacturer’s name, trade name, trademark or other descriptive marking, which identifies the organization responsible for the product, part number or model number, and electrical ratings and other ratings in (a) – (k) and (q) if applicable. All ratings and rating information necessary for the installation and operation of the ESS shall be provided in the system instructions. If the installation location of the system has limitations (i.e. can only be located indoors where it is sheltered from rain and UV or outdoors only), these location limitations shall be indicated on the label and installation instructions. If the system is intended for installation in a location where local regulations indicate a need for a seismic rating on equipment, an appropriate seismic rating shall be included on the label.</p> <p><u>n) Systems complying with 23.2.2 shall be marked "Suitable For Use in Residential Dwelling Units Where Permitted";</u> <u>o) Suppression system to be installed if applicable;</u> <u>p) Technology utilized in system (e.g. lithium ion, nickel cadmium, flywheel storage);</u> <u>q) Any additional ratings or markings that are required by UL 1741; and</u> <u>r) Systems meeting the cell level performance criteria of UL 9540A shall be marked with "This equipment meets the cell level performance criteria of UL 9540A."</u></p> <p><i>New clause added;</i></p> <p>For multi-part ESS, the complete label items (a) – (r) as applicable shall be marked on the main portion containing the energy storage mechanism (e.g. battery system) with the remaining separate parts of the system marked in accordance with the nameplate markings required per the component safety standard they were evaluated to as well as additional markings to indicate that they are part of the overall ESS system including the ESS manufacturer’s name as noted above, the ESS part number and some statement such as "part 1 of 4 parts" or equivalent. If these parts are not shipped from the ESS factory and are not assembled until they are in the field, the label on the main unit (i.e. energy storage mechanism) shall include the various parts of the system that are to be added in the field to comprise the complete ESS that has been evaluated to this standard.</p> <p>a) Output and input current (maximum) in A;</p>
41.4		



CLAUSE	VERDICT	COMMENT
		<p>b) Output and input voltage (minimum and maximum) in V; c) Power input and output (maximum) in W or VA; d) Energy output in Wh (maximum); e) Auxiliary output and input voltage (V), current (A) and frequency (Hz) if applicable; f) Number of phases (for input and output if applicable); g) Frequency in Hz (if applicable); h) Duty cycle (if applicable); i) Maximum short circuit current in A (based upon fault current tolerance of the power conditioning system at its output directly connected to the grid); j) Ambient temperature range in °C or °F; k) Special environmental ratings and limitations as applicable (e. g. seismic, indoor/outdoor only, etc.); l) Weight (maximum) in lbs or kg, etc.; m) Maximum dimensions for height, width, and length (this dimensions information need not be marked on the system as long as it is provided in the installation instructions); n) Systems complying with 23.2.2 shall be marked "Suitable For Use in Residential Dwelling Units Where Permitted"; o) Suppression system to be installed if applicable p) Technology utilized in system (e.g. lithium ion, nickel cadmium, flywheel storage); q) Any additional ratings or markings that are required by UL 1741; and r) Systems meeting the cell level performance criteria of UL 9540A shall be marked with "This equipment meets the cell level performance criteria of UL 9540A."</p>
		<p><i>New clause added;</i></p>
41.5		<p>Contact information for the system in the event of an emergency or problems with the system shall be marked on the system.</p>
		<p><i>New clause added;</i></p>
41.10		<p>Energy storage systems with walk-in enclosures shall be provided with necessary cautionary markings per 10.9 and 10.10, and shall be marked with the following or equivalent: "WARNING: Risk of Electric Shock or Other Serious Injury. Care shall be taken when entering enclosure – Authorized personnel only."</p>
		<p><i>New clauses added;</i></p>
41.13-41.16		<p>See standard for details.</p>



CLAUSE	VERDICT	COMMENT
	Info	INSTRUCTIONS
42	Info	General
		<i>New clause added;</i>
		The ESS shall be provided with complete instructions for installation, commissioning, operation and maintenance that includes the following information:
42.1		a) Procedures for system commissioning and decommissioning; b) Complete installation instructions, including calibration, programming, control sequence descriptions for battery management and other monitoring systems; c) Initial acceptance testing procedures; d) Ongoing inspection and testing procedures; e) Instructions for retrofitting system components (non-residential use systems); and f) Instruction for providing working clearances.
		<i>New clause added;</i>
42.2		The installation instructions shall identify the maximum rated energy capacity for the system and minimum separation distances from other ESS and from exposures (e. g. combustibles, structures) in accordance with the limitations to the system based on applicable codes or in accordance with the large scale fire testing of 23.2.
		<i>New clause added;</i>
42.3		Installation instructions for exterior wall-mounted ESSs shall identify the minimum separation distances from other ESS or from openings (e.g. windows, doors, HVAC inlets or other operable openings) in accordance with the code limitations or in accordance with the large scale fire testing of 23.2.
		<i>New clause added;</i>
42.4		For non-residential use systems that require large scale fire testing of 23.2 in order to exceed code capacity limitations or reduce separation distances for their anticipated installation, the instructions shall identify the UL 9540A test report that was used to validate the anticipated installation including the testing organization, report designation, and date.
		<i>New clause added;</i>
42.5		Non-residential use ESS requiring large scale fire testing per 23.2, the additional fire suppression and/or fire protection identified in the UL 9540A test report shall be included in the installation instructions.



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		<i>New clause added;</i>
42.6		Installation instructions for indoor residential electrochemical ESS shall indicate that the units are only intended to be installed in attached or detached garages, sheds and locations more than 152.4 cm (5 ft) from dwelling units, and are not intended for installation in habitable spaces and livings spaces in dwelling units, including bathrooms, toilet rooms, closets, halls and storage spaces, except as allowed in 42.7.
		<i>New clause added;</i>
42.7		Installation instructions for residential use electrochemical ESS shall be permitted to indicate the units are suitable for use in residential dwellings where permitted, including in the living or habitable spaces, provided that they meet the criteria as noted in 23.2.2.
		<i>New clause added;</i>
42.9		All cautionary markings and ratings provided on the system, as well as system specifications needed for installation and operation of the system, shall be included in the instructions. <u>If provided with remote controls, the system installation, operation and maintenance instructions shall be provided with instructions regarding operation of the remote controls and disconnecting the remote control in accordance with 16.1.</u>
42.10		The installation information shall include instructions for making all necessary connections for electrical, communications, piping for fuels and other fluids, etc. as well as connections to other equipment that are part of the system. Multi-part ESS shall have all parts identified in the installation instructions with instructions for the installation and interconnection of those parts. The instructions shall include information on electrical disconnects, shut off valves and other devices required to be installed with the system. The installation instructions shall include the parameters required for electrical connections and installed devices in electrical circuits (communication protocols, circuits and devices) as well as parameters for fuel and other fluid connections and control devices necessary for the operation of the ESS. <u>If the ESS controls were required to undergo a functional safety evaluation, the installation instructions shall include the functional safety standard to which the ESS was found compliant as well as the specific critical functions that were evaluated and found compliant.</u>
		<i>New clause added;</i>
42.14		Energy storage systems labeled for residential use in accordance with 41.3 (n) shall indicate in their installation instructions that they are suitable for residential use installations. Energy storage systems not labeled for residential use, shall indicate that they are not to be installed in one or two family residences or townhomes or in individual dwelling units of multifamily dwellings. Contact information for servicing of the system is to be included.



CLAUSE	VERDICT	COMMENT
		<i>New clause added;</i>
42.15		Indoor installation instructions for residential use ESS shall provide instructions on smoke alarms to be provided in the residence in accordance with building, fire and installation codes.
		<i>New clause added;</i>
42.20		Mechanical ESS utilizing bearings for their moving parts, shall have a scheduled routine inspection and maintenance for bearings outlined in the manual. Instructions shall indicate that bearings shall be inspected for signs of wear either through visible examination or review of bearing monitoring system data and replaced if worn. In the absence of visible signs of wear or monitoring data indicating wear, the instructions shall indicate that the bearings shall be replaced by the scheduled out of service date for the bearings.