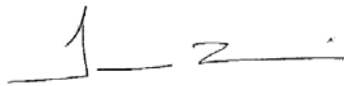


**SEATTLE
FIRE
DEPARTMENT**

Administrative Rule 12.01.22

| | |
|---|--|
| SUBJECT: ENERGY STORAGE SYSTEMS | EFFECTIVE DATE: 10/01/2022 |
| REFERENCES: 2018 Seattle Fire Code 2018 Seattle Building Code 2018 Seattle Mechanical Code 2021 International Fire Code 2024 International Fire Code NFPA 70 NFPA 76 NFPA 855-20 | SUPERSEDES: |
| | FCAB REVIEW DATE: September 13 th , 2022 |
| NOTICE: Administrative Rules are established per SFC Section 104.1, and they are subject to the Administrative Section 104.8 Modifications, Sections 104.9 Alternate Materials and Methods, and Section 108.1 Appeals. | APPROVED:  TIMOTHY J. MUNNIS, FIRE MARSHAL/FIRE CODE OFFICIAL |

Section 1. INTENT

The intent of this rule is to ensure that Energy Storage Systems (ESS) are installed and maintained to the most recent International Fire Code and NFPA Standards that are available. The 2021 Seattle Fire Code is anticipated to be in effect July of 2023 with new requirements for these systems. This rule will allow implementation of those changes before they are adopted and then this rule may be rescinded. Section 1206 "Electrical Energy Storage Systems" of the current 2018 Seattle Fire Code will not be used for enforcement and this rule will apply to those systems.

Section 2. SCOPE

This rule shall apply to all new stationary and mobile electrical energy storage systems (ESS) installed in the City of Seattle unless specifically exempted from this rule by the exceptions contained in Section 3.

Section 3. EXCEPTIONS

The following are exempt from the requirements in this Administrative Rule:

- (a) ESS in one and two family dwellings and townhouses.
- (b) Capacitor and capacitor equipment for electric utilities and industrial facilities used in applications such as flexible ac transmission (FACFS) devices, filter capacitor banks, power factor correction, and standalone capacitor banks for voltage correction and stabilization.
- (c) Mobile ESS deployed at an electric utility substation or generation facility for 90 days or less shall not add to the threshold values in Table 5.1 for the stationary ESS installation if both of the following conditions apply:
 1. The mobile ESS complies with this rule.
 2. The mobile ESS is only being used during periods in which the facility's stationary ESS is being tested, repaired, retrofitted or replaced.

Section 4. DEFINITIONS

For the purposes of this rule the following words and terms have the meanings indicated below:

BATTERY SYSTEM, STATIONARY STORAGE. A rechargeable energy storage system consisting of electrochemical storage batteries, battery chargers, controls and associated electrical equipment designed to provide electrical power to a building. The system is typically used to provide standby or emergency power, an uninterruptable power supply, load shedding, load sharing or similar capabilities.

BATTERY TYPES. For the purposes of this code, certain types are defined as follows:

Flow battery. A type of storage battery that includes chemical components dissolved in two different liquids. Ion exchange, which provides the flow of electrical current, occurs through the membrane while both liquids circulate in their respective spaces.

Lead-acid battery. A storage battery that is comprised of lead electrodes immersed in a solution of water and sulphuric acid electrolyte.

Lithium metal polymer battery. A storage battery that is similar to the lithium-ion battery except that it has a lithium metal anode in the place of the traditional carbon or graphite anode.

Lithium-ion battery. A storage battery with lithium ions serving as the charge carriers of the battery. The electrolyte is a polymer mixture of carbonates with an inorganic salt and can be in a liquid or a gelled polymer form. Lithiated metal oxide is typically a cathode and forms of carbon or graphite typically form the anode.

Nickel-cadmium (Ni-Cd) battery. An alkaline storage battery in which the positive active material is nickel oxide, the negative electrode contains cadmium and the electrolyte is a solution of water and potassium hydroxide.

Nickel-metal hydride (Ni-MH). An alkaline storage battery in which the positive active material is nickel oxide, the negative electrode is an intermetallic compound and the electrolyte is usually potassium hydroxide.

Stationary storage battery. A group of electrochemical cells interconnected to supply a nominal voltage of DC power to a suitably connected electrical load, designed for service in a permanent location.

CAPACITOR ENERGY STORAGE SYSTEM. A stationary, rechargeable energy storage system consisting of capacitors, chargers, controls and associated electrical equipment designed to provide electrical power to a building or facility. The system is typically used to provide standby or emergency power, an uninterruptable power supply, load shedding, load sharing or similar capabilities.

ENERGY STORAGE MANAGEMENT SYSTEM. An electronic system that protects stationary energy storage batteries systems from operating outside their safe operating parameters and disconnects electrical power to the ESS or places it in a safe condition if potentially hazardous temperatures or other conditions are detected.

ENERGY STORAGE SYSTEM (ESS). One or more devices, assembled together, capable of storing energy in order to supply electrical energy at a future time.

ENERGY STORAGE SYSTEM, ELECTROCHEMICAL. An energy storage system that stores energy and produces electricity using chemical reactions. It includes, among others, battery ESS and capacitor ESS.

ENERGY STORAGE SYSTEM, MOBILE. An energy storage system capable of being moved and utilized for temporary energy storage applications, and not installed as fixed or stationary electrical equipment. The system can include integral wheels for transportation or be loaded on a trailer and unloaded for charging, storage and deployment.

ENERGY STORAGE SYSTEM, STATIONARY. An energy storage system installed as fixed or stationary electrical equipment in a permanent location.

ENERGY STORAGE SYSTEM, WALK-IN UNIT. A prefabricated building that contains energy storage systems. It includes doors that provide walk-in access for personnel to maintain, test and service the equipment, and is typically used in outdoor and mobile ESS applications.

ENERGY STORAGE SYSTEM CABINET. A cabinet containing components of the energy storage system that is included in the 9540—2016 listing for the system. Personnel are not able to enter the enclosure other than reaching in to access components for maintenance purposes.

ENERGY STORAGE SYSTEM COMMISSIONING. A systematic process that provides documented confirmation that an energy storage system functions according to the intended design criteria and complies with applicable code requirements.

ENERGY STORAGE SYSTEM DECOMMISSIONING. A systematic process that provides documentation and procedures that allow an energy storage system to be safely de-energized, disassembled, readied for shipment or storage, and removed from the premises in accordance with applicable code requirements.

Section 5. General Requirements

5.1 ESS having capacities exceeding the values shown in Table 5.1 shall comply with this rule.

**TABLE 5.1
ENERGY STORAGE SYSTEM (ESS) THRESHOLD QUANTITIES**

| TECHNOLOGY | ENERGY CAPACITY ^a |
|---|------------------------------|
| Capacitor ESS | 3 kWh |
| Flow batteries ^b | 20 kWh |
| Lead-acid batteries, all types | 70 kWh ^c |
| Lithium-ion batteries | 20 kWh |
| Sodium nickel chloride batteries | 70 kWh |
| Nickel-cadmium batteries (Ni-Cd), Nickel Metal Hydride (Ni-MH), and Nickel Zinc (Ni-Zn) batteries | 70 kWh |
| Non-electrochemical ESS ^a | 70 kWh |
| Other battery technologies | 10 kWh |
| Other electrochemical ESS technologies | 3 kWh |
| Zinc manganese dioxide batteries (Zn-MnO ₂) | 70 kWh |

For SI: 1 kilowatt hour = 3.6 megajoules.

a. Energy capacity is the total energy capable of being stored (nameplate rating), not the usable energy rating. For units rated in amp-hours, kWh shall equal rated voltage times amp-hour rating divided by 1,000.

b. Shall include vanadium, zinc-bromine, polysulfide-bromide and other flowing electrolyte-type technologies.

c. Fifty gallons of lead-acid battery electrolyte shall be considered equivalent to 70 kWh.

d. Covers nonelectrochemical technologies such as flywheel and thermal ESS.

5.2 Permits are required for stationary ESS installations and for mobile ESS charging and storage installations. A construction and/or electrical permit will be required through SDCI and will be routed to SFD for review and approval. A SFD 1206-install or 6401-install permit will also be required.

5.2.1 Construction documents for permits shall include the following:

- A. Location and layout diagram of the room or area in which the ESS is to be installed.
- B. Details on the hourly *fire-resistance ratings* of assemblies enclosing the ESS.
- C. The quantities and types of ESS to be installed.

- D. Manufacturer's specifications, ratings and listings of each ESS.
- E. Description of energy (battery) management systems and their operation.
- F. Location and content of required signage.
- G. Details on fire suppression, smoke or fire detection, thermal management, ventilation, exhaust and *deflagration* venting systems, if provided.
- H. Support arrangement associated with the installation, including any required seismic restraint.
- I. A commissioning plan complying with this rule.
- J. A decommissioning plan complying with Section this rule.
- K. A fire safety and evacuation plan in accordance with Section 404 of the Seattle Fire Code.

5.2.2 Construction plans for Utility companies shall comply with the following:

- A. Plans and specifications associated with ESS owned and operated by electric utilities as a component of the electric grid that are considered critical infrastructure documents in accordance with the provisions of the North American Electric Reliability Corporation and other applicable governmental laws and regulations shall be made available to the fire code official for viewing based on the requirements of the applicable governmental laws and regulations.

5.3 A hazard mitigation analysis shall be provided under any of the following conditions:

- A. Where ESS technologies not specifically identified in Table 5.1 are provided.
- B. More than one ESS technology is provided in a single fire area where there is a potential for adverse interaction between technologies.
- C. Where allowed as a basis for increasing the maximum allowable quantities in Table 9.3.
- D. Where flammable gases can be produced under abnormal conditions.
- E. Where required by the fire code official to address a potential hazard with an ESS installation that is not addressed by existing requirements.

5.3.1 The hazard mitigation analysis shall evaluate the consequences of the following failure modes and only single failure modes shall be considered:

- A. A thermal runaway condition in a single electrochemical ESS unit.
- B. A mechanical failure of a non-electrochemical ESS unit.
- C. Failure of any battery (energy) management system or fire protection system within the ESS equipment that is not covered by the product listing failure mode effects analysis (FMEA).
- D. Failure of any required protection system external to the ESS including but not limited to ventilation (HVAC), exhaust ventilation, smoke detection, fire detection, gas detection or fire suppression system.

- 5.3.2** The hazard mitigation analysis provided shall demonstrate these consequences:
- A. Fires will be contained within unoccupied ESS rooms or areas for the minimum duration of the fire-resistance-rated separations identified in this rule.
 - B. Fires involving the ESS will allow occupants or the general public to evacuate to a safe location.
- 5.3.3** Construction, equipment, and systems that are required for the ESS to comply with the hazardous mitigation analysis, including but not limited to those specifically described in this rule, shall be installed, maintained and tested in accordance with nationally recognized standards and specified design parameters.

5.4 When required in this rule, large-scale fire testing shall be conducted on a representative ESS in accordance with UL 9540A. The testing shall be conducted or witnessed and reported by an approved testing laboratory and show that a fire involving one ESS will not propagate to an adjacent ESS, and where installed within buildings, enclosed areas and walk-in units will be contained within the room, enclosed area or walk-in unit for the duration of the test. The test report shall be provided to the fire code official for review and approval in accordance with Section 104.8.2 of the Seattle Fire Code.

5.5 Where a fire or other event has damaged the ESS and ignition or re-ignition of the ESS is possible, the system *owner*, agent or lessee shall take the following actions in Sections 5.6 and 5.6.1, at their expense, to mitigate the hazard or remove damaged equipment from the premises to a safe location.

5.6 Where, in the opinion of the *fire code official*, it is essential for public safety that trained personnel be on-site to respond to possible ignition or re-ignition of a damaged ESS, the system owner, agent or lessee shall dispatch within 15 minutes one or more fire mitigation personnel to the premise, as required and *approved*, at their expense. These personnel shall remain on duty continuously after the fire department leaves the premise until the damaged energy storage equipment is removed from the premises, or earlier if the *fire code official* indicates the public safety hazard has been abated.

- 5.6.1** On-duty fire mitigation personnel shall have the following responsibilities:
- A. Keep a diligent watch for fires, obstructions to *means of egress* and other hazards.
 - B. Immediately contact the fire department if their assistance is needed to mitigate any hazards or extinguish fires.
 - C. Take prompt measures for remediation of hazards in accordance with the decommissioning plan per this rule.
 - D. Take prompt measures to assist in the evacuation of the public from the structures.

Section 6. Commissioning, decommissioning, operation and maintenance.

6.1 Commissioning of newly installed ESS and existing ESS that have been retrofitted, replaced or previously decommissioned and are returning to service shall be conducted prior to the ESS being placed in service in accordance with a commissioning plan that has been *approved* prior to initiating commissioning. The commissioning plan shall include the following:

- A. A narrative description of the activities that will be accomplished during each phase of commissioning, including the personnel intended to accomplish each of the activities.
- B. A listing of the specific ESS and associated components, controls and safety-related devices to be tested, a description of the tests to be performed and the functions to be tested.
- C. Conditions under which all testing will be performed, which are representative of the conditions during normal operation of the system.
- D. Documentation of the owner's project requirements and the basis of design necessary to understand the installation and operation of the ESS.
- E. Verification that required equipment and systems are installed in accordance with the *approved* plans and specifications.
- F. Integrated testing for all fire and safety systems.
- G. Testing for any required thermal management, ventilation or exhaust systems associated with the ESS installation.
- H. Preparation and delivery of operation and maintenance documentation.
- I. Training of facility operating and maintenance staff.
- J. Identification and documentation of the requirements for maintaining system performance to meet the original design intent during the operation phase.
- K. Identification and documentation of personnel who are qualified to service, maintain and decommission the ESS, and respond to incidents involving the ESS, including documentation that such service has been contracted for.
- L. A decommissioning plan for removing the ESS from service, and from the facility in which it is located. The plan shall include details on providing a safe, orderly shutdown of energy storage and safety systems with notification to the code officials prior to the actual decommissioning of the system. The decommissioning plan shall include contingencies for removing an intact operational ESS from service, and for removing an ESS from service that has been damaged by a fire or other event.

Exceptions:

1. Lead-acid and nickel-cadmium battery systems less than 50 V ac, 60 V dc that are in telecommunications facilities for installations of communications equipment under the exclusive control of communications utilities and located outdoors or in building spaces or walk-in units used exclusively for such installations that are in compliance with NFPA 76 shall be permitted to have a commissioning plan in compliance with recognized industry practices in lieu of complying with this rule.
2. Lead-acid and nickel-cadmium battery systems that are used for dc power for control of substations and control or safe shutdown of generating stations under the exclusive control of the electric utilities and located in building spaces or walk-in units used exclusively for such installations shall be permitted to have a commissioning plan in compliance with applicable governmental laws and regulations in lieu of developing a commissioning plan in accordance with this rule.

6.1.1 During the commissioning process an ESS shall be evaluated for proper operation in accordance with the manufacturer's instructions and the commissioning plan prior to final approval.

6.1.2 A report describing the results of the system commissioning, including the results of the initial acceptance testing required in this rule, shall be provided to the *fire code official* prior to final inspection and approval and maintained at an *approved* on-site location.

6.2 An operation and maintenance manual shall be provided to both the ESS *owner* or their authorized agent and the ESS operator before the ESS is put into operation and shall include the following:

- A. Manufacturer's operation manuals and maintenance manuals for the entire ESS, or for each component of the system requiring maintenance, that clearly identify the required routine maintenance actions.
- B. Name, address and phone number of a service agency that has been contracted to service the ESS and its associated safety systems.
- C. Maintenance and calibration information, including wiring diagrams, control drawings, schematics, system programming instructions and control sequence descriptions, for all energy storage control systems.
- D. Desired or field-determined control set points that are permanently recorded on control drawings at control devices or, for digital control systems, in system programming instructions.
- E. A schedule for inspecting and recalibrating all ESS controls.
- F. A service record log form that lists the schedule for all required servicing and maintenance actions and space for logging such actions that are completed over time and retained on-site.

The ESS shall be operated and maintained in accordance with the manual and a copy of the manual shall be retained at an approved on-site location.

6.2.1 Systems that monitor and protect the ESS installation shall be inspected and tested in accordance with the manufacturer's instructions and the operation and maintenance manual. Inspection and testing records shall be maintained in the operation and maintenance manual.

6.3 The code official shall be notified prior to the decommissioning of an ESS. Decommissioning shall be performed in accordance with the decommissioning plan that includes the following:

- A. A narrative description of the activities to be accomplished for removing the ESS from service, and from the facility in which it is located.
- B. A listing of any contingencies for removing an intact operational ESS from service, and for removing an ESS from service that has been damaged by a fire or other event.

Section 7. ESS Equipment.

7.1 ESS equipment shall be listed in accordance with UL 9540

Exceptions:

- A. Lead-acid and nickel-cadmium battery systems less than 50 V ac, 60 V dc in telecommunications facilities for installations of communications equipment under the exclusive control of communications utilities located outdoors or in building spaces used exclusively for such installations that are in compliance with NFPA 76.
- B. Lead-acid and nickel-cadmium battery systems that are used for dc power for control of substations and control or safe shutdown of generating stations under the exclusive control of the electric utility and located outdoors or in building spaces used exclusively for such installations.
- C. Lead-acid battery systems in uninterruptible power supplies listed and labeled in accordance with UL 1778 and utilized for standby power applications.

7.2 Chargers, inverters and energy storage management systems shall be covered as part of the UL 9540 listing or shall be *listed* separately.

7.3 Inverters shall be *listed* and *labeled* in accordance with UL 1741. Only inverters *listed* and *labeled* for utility interactive system use and identified as interactive shall be allowed to operate in parallel with the electric utility power system to supply power to common loads.

7.4 Where required by the ESS listing, an *approved* energy storage management system that monitors and balances cell voltages, currents and temperatures within the manufacturer's specifications shall be provided. The system shall disconnect electrical connections to the ESS or otherwise place it in a safe condition if potentially hazardous temperatures or other conditions such as short circuits, over voltage or under voltage are detected.

7.5 Enclosures of ESS shall be of noncombustible construction.

7.6 Repairs of ESS shall only be done by qualified personnel. Repairs with other than identical parts shall be considered retrofitting and comply with this rule. Repairs shall be documented in the service records log.

7.7 Retrofitting of an existing ESS shall comply with the following:

- A. A permit shall be obtained in accordance with Section 5.2.
- B. New batteries, battery modules, capacitors and similar ESS components shall be *listed*.
- C. Battery management and other monitoring systems shall be connected and installed in accordance with the manufacturer's instructions.
- D. The overall installation shall continue to comply with UL 9540 listing requirements, where applicable.
- E. Systems that have been retrofitted shall be commissioned in accordance with this rule.
- F. Retrofits shall be documented in the service records log.

7.7.1 Changing out or retrofitting of lead-acid and nickel-cadmium batteries in the following applications shall be considered repairs where there is no increase in system size or energy capacity greater than 10 percent of the original design.

- A. At facilities under the exclusive control of communications utilities that comply with NFPA 76 and operate at less than 50 VAC and 60 VDC.

B. Battery systems designed in accordance with IEEE C2, used for dc power for control of substations and control or safe shutdown of generating stations under the exclusive control of the electric utility, and located outdoors or in building spaces used exclusively for such installations.

C. Batteries in uninterruptible power supplies listed and labeled in accordance with UL 1778 and used for standby applications only.

7.8 Replacements of ESS shall be considered new ESS installations and shall comply with the provisions of this rule as applicable to new ESS. The ESS being replaced shall be decommissioned in accordance with this rule.

7.9 Equipment and materials shall only be reused or reinstalled as permitted in Section 104.8.1 of the Seattle Fire Code. Storage batteries previously used in other applications, such as electric vehicle propulsion, shall not be reused in applications regulated by Chapter 12 of the Seattle Fire Code or this rule unless *approved* by the *fire code official* and unless the equipment is refurbished by a battery refurbishing company *approved* in accordance with UL 1974.

Section 8. Installation Requirements for Stationary and Mobile ESS.

8.1 Where the ESS disconnecting means is not within sight of the main electrical service disconnecting means, placards or directories shall be installed at the location of the main electrical service disconnecting means indicating the location of stationary storage battery system disconnecting means in accordance with NFPA 70.

Exception: Electrical disconnects for lead-acid and nickel-cadmium battery systems at facilities under the exclusive control of communications utilities and operating at less than 50 VAC and 60 VDC shall be permitted to have electrical disconnects signage in accordance with NFPA 76.

8.2 Access and working space shall be provided and maintained about all electrical equipment to permit ready and safe operation and maintenance of such equipment in accordance with NFPA 70 and the manufacturer's instructions.

8.3 Rooms and other indoor areas containing ESS shall be separated from other areas of the building in accordance with this rule. ESS shall be permitted to be in the same room with the equipment they support.

8.4 Stationary ESS shall comply with the seismic design requirements in the *Seattle Building Code*, and shall not exceed the floor loading limitation of the building.

8.5 Where ESS are subject to impact by a motor vehicle, including forklifts, vehicle impact protection shall be provided in accordance with Section 312 of the Seattle Fire Code.

8.6 Combustible materials shall not be stored in ESS rooms, areas or walk-in units. Combustible materials in occupied work centers covered by this rule shall be stored at least 3 feet (914 mm) from ESS cabinets.

8.7 ESS that have the potential to release toxic and highly toxic gas during charging, discharging and normal use conditions shall be provided with a hazardous exhaust system in accordance with the *Seattle Mechanical Code*.

8.8 *Approved* signs shall be provided on or adjacent to all entry doors for ESS rooms or areas and on enclosures of ESS cabinets and walk-in units located outdoors, on rooftops or in open parking garages. Signs designed to meet both the requirements of this section and NFPA 70 shall be permitted. The signage shall include the following or equivalent:

- A. "ENERGY STORAGE SYSTEM," "BATTERY STORAGE SYSTEM," "CAPACITOR ENERGY STORAGE SYSTEM" or the equivalent.
- B. The identification of the electrochemical ESS technology present.
- C. "ENERGIZED ELECTRICAL CIRCUITS."
- D. Where water-reactive electrochemical ESS are present, the signage shall include "APPLY NO WATER."
- E. Current contact information, including phone number, for personnel authorized to service the equipment and for fire mitigation personnel required by this rule.

Exception: Existing electrochemical ESS shall be permitted to include the signage required at the time they were installed.

8.9 Rooms, areas and walk-in units in which electrochemical ESS are located shall be secured against unauthorized entry and safeguarded in an *approved* manner. Security barriers, fences, landscaping and other enclosures shall not inhibit the required air flow to or exhaust from the electrochemical ESS and its components.

8.10 Electrochemical ESS located in rooms or areas occupied by personnel not directly involved with maintenance, service and testing of the systems shall comply with the following:

- A. Electrochemical ESS located in occupied work centers shall be housed in locked noncombustible cabinets or other enclosures to prevent access by unauthorized personnel.
- B. Where electrochemical ESS are contained in cabinets in occupied work centers, the cabinets shall be located within 10 feet (3048 mm) of the equipment that they support.
- C. Cabinets shall include signage complying with this rule.

8.11 Where electrochemical ESS are installed in a separate equipment room and only authorized personnel have access to the room, they shall be permitted to be installed on an open rack for ease of maintenance.

8.12 Walk-in units shall be entered only for inspection, maintenance and repair of ESS units and ancillary equipment, and shall not be occupied for other purposes.

Section 9. Electrochemical ESS protection.

9.1 The protection of electrochemical ESS shall be in accordance with this rule where required by this rule.

9.2 Electrochemical ESS shall be segregated into groups not exceeding 50 kWh (180 megajoules). Each group shall be separated a minimum of 3 feet (914 mm) from other groups and from walls in the storage room or area. The storage arrangements shall comply with this rule.

Exceptions:

- A. Lead-acid and nickel-cadmium battery systems in facilities under the exclusive control of communications utilities and operating at less than 50 VAC and 60 VDC in accordance with NFPA 76.
- B. Lead-acid and nickel cadmium systems that are used for dc power for control of substations and control or safe shutdown of generating stations under the exclusive control of the electric utility and located outdoors or in building spaces used exclusively for such installations.
- C. Lead-acid battery systems in uninterruptable power supplies and labeled in accordance with UL 1778, utilized for standby power applications, and limited to not more than 10% of the floor area on the floor on which the ESS is located.
- D. The *fire code official* is authorized to approve larger capacities or smaller separation distances based on large-scale fire testing complying with this rule.

9.3 Fire areas within rooms, areas and walk-in units containing electrochemical ESS shall not exceed the maximum allowable quantities in Table 9.3.

Exceptions:

- A. Where approved by the fire code official, rooms, areas and walk-in units containing electrochemical ESS that exceed the amounts in Table 9.3 shall be permitted based on a hazardous mitigation analysis in accordance with this rule and large-scale fire testing complying with this rule.
- B. Lead-acid and nickel-cadmium battery systems installed in facilities under the exclusive control of communications utilities and operating at less than 50 VAC and 60 VDC in accordance with NFPA 76.
- C. Dedicated-use buildings in compliance with this rule.

**TABLE 9.3
MAXIMUM ALLOWABLE QUANTITIES OF ELECTROCHEMICAL ESS**

| TECHNOLOGY | MAXIMUM ALLOWABLE QUANTITIES ^a |
|--|---|
| STORAGE BATTERIES | |
| Flow batteries ^b | 600 kWh |
| Lead-acid, all types | Unlimited |
| Lithium-ion | 600 kWh |
| Sodium nickel chloride | 600 kWh |
| Nickel-cadmium (Ni-Cd), Nickel metal hydride (NI-MH) and nickel zinc (Ni-Zn) | Unlimited |
| Zinc Manganese dioxide (Zn-MnO2) | Unlimited |
| Other battery technologies | 200 kWh |
| CAPACITORS | |
| All types | 20 kWh |
| OTHER ELECTROCHEMICAL ESS | |
| All types | 20 kWh |

For SI: 1 kilowatt hour = 3.6 megajoules.

a. For electrochemical ESS units rated in amp-hours, kWh shall equal rated voltage times the amp-hour rating divided by 1,000.

b. Shall include vanadium, zinc-bromine, polysulfide-bromide and other flowing electrolyte-type technologies.

9.3.1 Where rooms, areas and walk-in units contain different types of electrochemical energy technologies, the total aggregate quantities of the systems shall be determined based on the sum of percentages of each technology-type quantity divided by the maximum allowable quantity of each technology type. The sum of the percentages shall not exceed 100 percent of the maximum allowable quantity.

9.4 Electrochemical ESS shall not be located in the following areas:

- A. Where the floor is located more than 75 feet (22 860 mm) above the lowest level of fire department vehicle access.
- B. Where the floor is located below the lowest *level of exit discharge*.

Exceptions:

1. Lead-acid and nickel-cadmium battery systems less than 50 VAC and 60 VDC installed in facilities under the exclusive control of communications utilities in accordance with NFPA 76.
2. Lead-acid and nickel cadmium systems that are used for dc power for control of substations and control or safe shutdown of generating stations under the exclusive control of the electric utility and located outdoors or in building spaces used exclusively for such installations.
3. Lead-acid battery systems in uninterruptable power supplies and labeled in accordance with UL 1778, utilized for standby power applications, and limited to not more than 10% of the floor area on the floor on which the ESS is located.
4. Where *approved*, installations shall be permitted in underground vaults complying with NFPA 70, Article 450, Part III.
5. Where *approved* by the *fire code official*, installations shall be permitted on higher and lower floors.

9.5 An *approved* automatic smoke detection system or radiant energy-sensing fire detection system complying with Section 907.2 of the Seattle Fire Code shall be installed in rooms, indoor areas and walk-in units containing electrochemical ESS. An *approved* radiant energy-sensing fire detection system shall be installed to protect open parking garage and rooftop installations. Alarm signals from detection systems shall be transmitted to a central station, proprietary or remote station service in accordance with NFPA 72, or where *approved* to a constantly attended location.

Exception: Normally unoccupied, remote stand-alone telecommunications structures with a gross floor area of less than 1500 ft² (139 m²) utilizing lead-acid or nickel cadmium batteries shall not be required to have a fire detection system installed.

9.5.1 Lead-acid and nickel-cadmium battery systems that are used for dc power for control of substations and control or safe shutdown of generating stations under the exclusive control of the electric utility and located outdoors or in building spaces used exclusively for such installations shall be allowed to use the process control system to monitor the smoke or radiant energy-sensing fire detectors required in this rule.

9.6 Rooms and areas within buildings and walk-in units containing electrochemical ESS shall be protected by an automatic fire suppression system designed and installed in accordance with one of the following:

1. *Automatic sprinkler systems*, designed and installed in accordance with Section 903.3.1.1 of the Seattle Fire Code for ESS units (groups) with a maximum stored energy capacity of 50 kWh, as described in this rule, shall be designed with a minimum density of 0.3 gpm/ft² (1.14 L/min) based over the area of the room or 2,500 square-foot (232 m²) design area, whichever is smaller, unless a lower density is approved based upon large-scale fire testing in accordance with this rule.
2. *Automatic sprinkler system* designed and installed in accordance with Section 903.3.1.1 of the Seattle Fire Code for ESS units (groups) exceeding 50 kWh shall use a density based on large-scale fire testing complying with this rule.
3. The following alternative automatic fire-extinguishing systems designed and installed in accordance with Section 904 of the Seattle Fire Code, provided that the installation is *approved* by the *fire code official* based on large-scale fire testing complying with this rule:
 - 3.1. NFPA 12, *Standard on Carbon Dioxide Extinguishing Systems*.
 - 3.2. NFPA 15, *Standard for Water Spray Fixed Systems for Fire Protection*.
 - 3.3. NFPA 750, *Standard on Water Mist Fire Protection Systems*.
 - 3.4. NFPA 2001, *Standard on Clean Agent Fire-Extinguishing Systems*.
 - 3.5. NFPA 2010, *Standard for Fixed Aerosol Fire-Extinguishing Systems*.

Exceptions:

1. Fire suppression systems for lead-acid and nickel-cadmium battery systems at facilities under the exclusive control of communications utilities that operate at less than 50 VAC and 60 VDC shall be provided where required by NFPA 76.
2. Lead-acid and nickel cadmium systems that are used for dc power for control of substations and control or safe shutdown of generating stations under the exclusive control of the electric utility and located outdoors or in building spaces used exclusively for such installations shall not be required to have a fire suppression system installed.
3. Lead-acid battery systems in uninterruptable power supplies listed and labeled in accordance with UL 1778, utilized for standby power applications, which is limited to not more than 10% of the floor area on the floor on which the ESS is located shall not be required to have a fire suppression system.

9.6.1 Electrochemical ESS that utilize water-reactive materials shall be protected by an *approved* alternative automatic fire-extinguishing system in accordance with Section 904 of the Seattle Fire Code, where the installation is *approved* by the *fire code official* based on large-scale fire testing complying with this rule.

9.7 Outdoor walk-in units housing ESS shall not exceed 53 feet by 8 feet by 9.5 feet high (16154 mm × 2438 mm × 2896 mm), not including bolt-on HVAC and related equipment, as *approved*. Outdoor walk-in units exceeding these limitations shall be considered indoor installations and comply with the requirements in this rule.

9.8 Areas within 10 feet (3048 mm) on each side of outdoor ESS shall be cleared of combustible vegetation and other combustible growth. Single specimens of trees, shrubbery or cultivated ground cover such as green grass, ivy, succulents or similar plants used as ground cover shall be permitted to be exempt provided that they do not form a means of readily transmitting fire.

9.9 ESS located outdoors and in open parking garages shall be separated from any *means of egress* as required by the *fire code official* to ensure safe egress under fire conditions, but in no case less than 10 feet (3048 mm).

Exception: The fire code official is authorized to approve a reduced separation distance if large-scale fire testing complying with this rule is provided that shows that a fire involving the ESS will not adversely impact occupant egress.

Section 10. Electrochemical ESS technology-specific protection.

10.1 Electrochemical ESS installations shall comply with the requirements of this section in accordance with the applicable requirements of Table 10.1.

**TABLE 10.1
ELECTROCHEMICAL ESS TECHNOLOGY-SPECIFIC REQUIREMENTS**

| COMPLIANCE REQUIRED ^b | | BATTERY TECHNOLOGY | | | | | Sodium nickel chloride | OTHER ESS AND BATTERY TECHNOLOGIES ^d | CAPACITOR ESS ^b |
|----------------------------------|---------|--------------------|--|--|------------------|------|------------------------|---|----------------------------|
| Feature | Section | Lead-acid | Nickel cadmium (Ni-Cd), nickel metal hydride (Ni-MH) and nickel zinc (Ni-Zn) | Zinc Manganese dioxide (ZnMnO ₂) | Lithium-ion | Flow | | | |
| Exhaust ventilation | 10.2 | Yes | Yes | Yes | No | Yes | No | Yes | Yes |
| Explosion control | 10.4 | Yes ^a | Yes ^a | Yes | Yes | No | Yes | Yes | Yes |
| Safety caps | 10.5 | Yes | Yes | Yes | No | No | No | Yes | Yes |
| Spill control and neutralization | 10.3 | Yes ^c | Yes ^c | Yes ^f | No | Yes | No | Yes | Yes |
| Thermal runaway | 10.6 | Yes ^d | Yes ^d | Yes ^e | Yes ^e | No | Yes | Yes ^e | Yes |

- a. Not required for lead-acid and nickel-cadmium batteries at facilities under the exclusive control of communications utilities that comply with NFPA 76 and operate at less than 50 VAC and 60 VDC.
- b. Protection shall be provided unless documentation acceptable to the fire code official is provided in accordance with Section 104.8.2 that provides justification why the protection is not necessary based on the technology used.
- c. Applicable to vented-type (i.e., flooded) nickel-cadmium and lead-acid batteries.
- d. Not required for vented-type (i.e., flooded) batteries.
- e. The thermal runaway protection is permitted to be part of a battery management system that has been evaluated with the battery as part of the evaluation to UL 1973.
- f. Not required for batteries with gelled electrolyte.

10.2 Where required by Table 10.1 or elsewhere in this rule, exhaust ventilation of rooms, areas and walk-in units containing electrochemical ESS shall be provided in accordance with the *Seattle Mechanical Code* and section 10.2.1 or section 10.2.2.

10.2.1 The exhaust ventilation system shall be designed to limit the maximum concentration of flammable gas to 25 percent of the lower flammable limit (LFL) of the total volume of the room, area or walk-in unit during the worst-case event of simultaneous charging of batteries at the maximum charge rate, in accordance with nationally recognized standards.

10.2.2 Mechanical exhaust ventilation shall be provided at a rate of not less than 1 ft³/min/ft² (5.1 L/sec/m²) of floor area of the room, area or walk-in unit. The ventilation shall be either continuous or shall be activated by a gas detection system in accordance with this Section.

10.2.2.1 Mechanical exhaust ventilation shall be provided with a minimum of 2 hours of standby power.

10.2.2.2 Required mechanical exhaust ventilation systems shall be installed in accordance with the manufacturer's installation instructions and the *Seattle Mechanical Code*.

10.2.2.3 Required mechanical exhaust ventilation systems shall be supervised by an *approved* central station, proprietary or remote station service in accordance with NFPA 72 or shall initiate an audible and visible signal at an *approved* constantly attended on-site location.

10.2.2.4 Where required by Section 10.2.2, rooms, areas and walk-in units containing ESS shall be protected by an *approved* continuous gas detection system that complies with Section 916 of the Seattle Fire Code and with the following:

- A. The gas detection system shall be designed to activate the mechanical ventilation system when the level of flammable gas in the room, area or walk-in unit exceeds 25 percent of the LFL.
- B. The mechanical ventilation system shall remain on until the flammable gas detected is less than 25 percent of the LFL.
- C. The gas detection system shall be provided with a minimum of 2 hours of standby power in accordance with the Seattle Fire Code.
- D. Failure of the gas detection system shall annunciate a trouble signal at an approved central station, proprietary or remote station service in accordance with NFPA 72 or shall initiate an audible and visible trouble signal at an approved constantly attended on-site location.

10.3 Where required by Table 10.1 or elsewhere in this rule, areas containing free-flowing liquid electrolyte or hazardous materials shall be provided with spill control and neutralization in accordance with this section.

10.3.1 Spill control shall be provided to prevent the flow of liquid electrolyte or hazardous materials to adjoining rooms or areas. The method shall be capable of containing a spill from the single largest battery or vessel.

10.3.2 An *approved* method that is capable of neutralizing spilled liquid electrolyte from the largest battery or vessel to a pH between 5.0 and 9.0 shall be provided.

10.3.3 The requirements of Section 10.3 shall apply only when the aggregate capacity of multiple vessels exceeds 1,000 gallons (3785 L) for lead-acid and nickel-cadmium battery systems operating at less than 50 VAC and 60 VDC that are located at facilities under the exclusive control of communications utilities, and those facilities comply with NFPA 76 in addition to applicable requirements of this rule.

10.4 Where required by Table 10.1 or elsewhere in this rule, explosion control complying with Section 911 of the Seattle Fire Code shall be provided for rooms, areas, ESS cabinets or ESS walk-in units containing electrochemical ESS technologies.

Exceptions:

1. Where approved, explosion control is permitted to be waived by the fire code official based on large-scale fire testing complying with this rule that demonstrates that flammable gases are not liberated from electrochemical ESS cells or modules.

2. Where approved, explosion control is permitted to be waived by the fire code official based on documentation provided in accordance with Section 104.7 of the Seattle Fire Code that demonstrates that the electrochemical ESS technology to be used does not have the potential to release flammable gas concentrations in excess of 25 percent of the LFL anywhere in the room, area, walk-in unit or structure under thermal runaway or other fault conditions.

3. Where approved, ESS cabinets that have no debris, shrapnel, or enclosure pieces ejected during large scale fire testing complying with this rule shall be permitted in lieu of providing explosion control complying with Section 911 of the Seattle Fire Code.

4. Explosion control is not required for lead-acid and nickel cadmium battery systems less than 50 V ac, 60 V dc in telecommunication facilities under the exclusive control of communications utilities located in building spaces or walk-in units used exclusively for such installations.

5. Explosion control is not required for lead-acid and nickel cadmium systems used for dc power for control of substations and control or safe shutdown of generating stations under the exclusive control of the electric utility located in building spaces or walk-in units used exclusively for such installations.

6. Explosion control is not required for lead-acid battery systems in uninterruptible power supplies listed and labeled in accordance with UL 1778, utilized for standby power applications, and housed in a single cabinet in a single fire area in buildings or walk-in units.

10.5 Where required by Table 10.1 or elsewhere in this rule, vented batteries and other ESS shall be provided with flame-arresting safety caps.

10.6 Where required by Table 10.1 or elsewhere in this rule, batteries and other ESS shall be provided with a *listed* device or other *approved* method to prevent, detect and minimize the impact of thermal runaway.

Section 11. Indoor ESS installations.

11.1 Indoor ESS installations shall be in accordance with this Section and Table 11.1 where applicable.

**TABLE 11.1
INDOOR ESS INSTALLATIONS**

| COMPLIANCE REQUIRED | | DEDICATED-USE BUILDINGS ^a | NONDEDICATED-USE BUILDINGS ^b |
|---|---------|--------------------------------------|---|
| Feature | Section | | |
| Dwelling units and sleeping units | 11.2 | NA | Yes |
| Elevation | 9.4 | Yes | Yes |
| Fire suppression systems | 9.6 | Yes ^c | Yes |
| Fire-resistance-rated separations | 11.3 | Yes | Yes |
| General installation requirements | 8 | Yes | Yes |
| Maximum allowable quantities | 9.3 | No | Yes |
| Size and separation | 9.2 | Yes | Yes |
| Smoke and automatic fire detection ^e | 9.5 | Yes ^d | Yes |
| Technology specific protection | 10 | Yes | Yes |

NA = Not Allowed.

a. See Section 11.1.1.

b. See Section 11.1.2.

c. Where approved by the fire code official, fire suppression systems are permitted to be omitted in dedicated-use buildings located more than 100 feet (30.5 m) from buildings, lot lines, public ways, stored combustible materials, hazardous materials, high-piled stock and other exposure hazards.

d. Where approved by the fire code official, alarm signals are not required to be transmitted to a central station, proprietary or remote station service in accordance with NFPA 72, or a constantly attended location where local fire alarm annunciation is provided and trained personnel are always present.

e. Lead-acid and nickel-cadmium battery systems installed in Group U buildings and structures less than 1,500 square feet (139 m²) under the exclusive control of communications utilities and operating at less than 50 VAC and 60 VDC in accordance with NFPA 76, are not required to have an approved automatic smoke or fire detection system.

11.1.1 For the purpose of Table 11.1, dedicated-use ESS buildings shall be classified as Group F-1 occupancies and comply with all the following:

1. The building shall only be used for ESS, electrical energy generation and other electrical grid-related operations.
2. Occupants in the rooms and areas containing ESS are limited to personnel that operate, maintain, service, test and repair the ESS and other energy systems.
3. No other occupancy types shall be permitted in the building.
4. Administrative and support personnel shall be permitted in areas within the buildings that do not contain ESS, provided that:
 - 4.1 The areas do not occupy more than 10 percent of the building area of the story in which they are located.
 - 4.2. A means of egress is provided from the incidental use areas to the public way that does not require occupants to traverse through areas containing ESS or other energy system equipment.

11.1.2 For the purpose of Table 11.1, nondedicated-use buildings include all buildings that contain ESS and do not comply with Section 11.1.1.

11.2 ESS shall not be installed in *sleeping units* or in *habitable spaces of dwelling units*.

11.3 Rooms and areas containing ESS shall include *fire-resistance-rated* separations as follows:

- A. In dedicated-use buildings, rooms and areas containing ESS shall be separated from areas in which administrative and support personnel are located.
- B. In nondedicated-use buildings, rooms and areas containing ESS shall be separated from other areas in the building.

Separation shall be provided by 2-hour *fire barriers* constructed in accordance with the *Seattle Building Code* and 2-hour *horizontal assemblies* constructed in accordance with the *Seattle Building Code*, as appropriate.

Section 12. Outdoor ESS installations.

12.1 Outdoor installations shall be in accordance with this section. Exterior wall installations for individual ESS units not exceeding 20 kWh shall be in accordance with Section 12.5.

**TABLE 12.1
OUTDOOR ESS INSTALLATIONS^a**

| COMPLIANCE REQUIRED | | REMOTE INSTALLATIONS ^a | INSTALLATIONS NEAR EXPOSURES ^b |
|------------------------------------|---------|-----------------------------------|---|
| Feature | Section | | |
| All ESS installations | 8 | Yes | Yes |
| Clearance to exposures | 12.4 | Yes | Yes |
| Fire suppression systems | 9.6 | Yes ^c | Yes |
| Maximum allowable quantities | 9.3 | No | Yes |
| Maximum enclosure size | 9.7 | Yes | Yes |
| Means of egress separation | 9.9 | Yes | Yes |
| Size and separation | 9.2 | No | Yes ^d |
| Smoke and automatic fire detection | 9.5 | Yes | Yes |
| Technology-specific protection | 10.1 | Yes | Yes |
| Vegetation control | 9.8 | Yes | Yes |

a. See Section 12.2.

b. See Section 12.3.

c. Where approved by the fire code official, fire suppression systems are permitted to be omitted.

d. In outdoor walk-in units, spacing is not required between ESS units and the walls of the enclosure.

12.2 For the purpose of Table 12.1, remote outdoor installations include ESS located more than 100 feet (30 480 mm) from buildings, lot lines, public ways, stored combustible materials, hazardous materials, high-piled stock and other exposure hazards.

12.3 For the purpose of Table 12.1, installations near exposures include all outdoor ESS installations that do not comply with Section 12.1 remote outdoor location requirements.

12.4 ESS located outdoors shall be separated by a minimum of 10 feet (3048 mm) from the following exposures:

1. Lot lines.
2. Public ways.
3. Buildings.
4. Stored combustible materials.
5. Hazardous materials.
6. High-piled stock.
7. Other exposure hazards.

Exceptions:

1. Clearances are permitted to be reduced to 3 feet (914 mm) where a 1-hour free-standing fire barrier suitable for exterior use and extending 5 feet (1524 mm) above and 5 feet (1524 mm) beyond the physical boundary of the ESS installation is provided to protect the exposure.

2. Clearances to buildings are permitted to be reduced to 3 feet (914 mm) where noncombustible exterior walls with no openings or combustible overhangs are provided on the wall adjacent to the ESS and the fire-resistance rating of the exterior wall is a minimum of 2 hours.

3. Clearances to buildings are permitted to be reduced to 3 feet (914 mm) where a weatherproof enclosure constructed of noncombustible materials is provided over the ESS, and it has been demonstrated that a fire within the enclosure will not ignite combustible materials outside the enclosure based on large-scale fire testing complying with this rule.

12.5 ESS shall be permitted to be installed outdoors on exterior walls of buildings when all of the following conditions are met:

1. The maximum energy capacity of individual ESS units shall not exceed 20 kWh.
2. The ESS shall comply with applicable requirements in this rule.
3. The ESS shall be installed in accordance with the manufacturer’s instructions and their listing.
4. Individual ESS units shall be separated from each other by at least 3 feet (914 mm).
5. The ESS shall be separated from doors, windows, operable openings into buildings or HVAC inlets by at least 5 feet (1524 mm).

Exception: Where approved, smaller separation distances in Items 4 and 5 shall be permitted based on large-scale fire testing complying with this rule.

Section 13. Special installations.

13.1 Rooftop and open parking garage ESS installations shall comply with Section 13.

**TABLE 13.1
SPECIAL ESS INSTALLATIONS**

| COMPLIANCE REQUIRED | | ROOFTOPS ^a | OPEN PARKING GARAGES ^b |
|------------------------------------|---------|-----------------------|-----------------------------------|
| Feature | Section | | |
| All ESS installations | 8 | Yes | Yes |
| Clearance to exposures | 13.4 | Yes | Yes |
| Fire suppression systems | 9.6 | Yes | Yes |
| Maximum allowable quantities | 9.3 | Yes | Yes |
| Maximum enclosure size | 9.7 | Yes | Yes |
| Means of egress separation | 9.9 | Yes | Yes |
| Open parking garage installations | 13.7 | No | Yes |
| Rooftop installations | 13.6 | Yes | No |
| Size and separation | 9.2 | Yes | Yes |
| Smoke and automatic fire detection | 9.5 | Yes | Yes |
| Technology-specific protection | 10 | Yes | Yes |

a. See Section 13.2.
b. See Section 13.3.

13.2 For the purpose of Table 13.1, rooftop ESS installations are those located on the roofs of buildings.

13.3 For the purpose of Table 13.1, open parking garage ESS installations are those located in a structure or portion of a structure that complies with Section 406.5 of the Seattle Building Code.

13.4 ESS located on rooftops and in open parking garages shall be separated by a minimum of 10 feet (3048 mm) from the following exposures:

1. Buildings, except the building on which rooftop ESS is mounted.
2. Any portion of the building on which a rooftop system is mounted that is elevated above the rooftop on which the system is installed.
3. Lot lines.
4. Public ways.
5. Stored combustible materials.
6. Locations where motor vehicles can be parked.
7. Hazardous materials.
8. Other exposure hazards.

Exceptions:

1. Clearances are permitted to be reduced to 3 feet (914 mm) where a 1-hour free-standing fire barrier suitable for exterior use and extending 5 feet (1524 mm) above and 5 feet (1524 mm) beyond the physical boundary of the ESS installation is provided to protect the exposure.
2. Clearances are permitted to be reduced to 3 feet (914 mm) where a weatherproof enclosure constructed of noncombustible materials is provided over the ESS, and it has been demonstrated that a fire within the enclosure will not ignite combustible materials outside the enclosure based on large-scale fire testing complying with this rule.

13.5 ESS located in walk-in units on rooftops or in walk-in units in open parking garages shall be provided with automatic fire suppression systems within the ESS enclosure in accordance with Section 9.6. Areas containing ESS other than walk-in units in open parking structures on levels not open above to the sky shall be provided with an automatic fire suppression system complying with Section 9.6.

Exception: A fire suppression system is not required in open parking garages if large-scale fire testing complying with Section 5.4 is provided that shows that a fire will not impact the exposures in Section 13.4.

13.6 ESS and associated equipment that are located on rooftops and not enclosed by building construction shall comply with the following:

1. Stairway access to the roof for emergency response and fire department personnel shall be provided either through a bulkhead from the interior of the building or a stairway on the exterior of the building.
2. Service walkways at least 5 feet (1524 mm) in width shall be provided for service and emergency personnel from the point of access to the roof to the system.
3. ESS and associated equipment shall be located from the edge of the roof a distance equal to at least the height of the system, equipment or component but not less than 5 feet (1524 mm).
4. The roofing materials under and within 5 feet (1524 mm) horizontally from an ESS or associated equipment shall be noncombustible or shall have a Class A rating when tested in accordance with ASTM E108 or UL 790.

5. A Class I standpipe outlet shall be installed at an approved location on the roof level of the building or in the stairway bulkhead at the top level.
6. The ESS shall be the minimum of 10 feet (3048 mm) from the fire service access point on the rooftop.

13.7 ESS and associated equipment that are located in open parking garages shall comply with all of the following:

1. ESS shall not be located within 50 feet (15 240 mm) of air inlets for building HVAC systems.
Exception: This distance shall be permitted to be reduced to 25 feet (7620 mm) if the automatic fire alarm system monitoring the radiant-energy sensing detectors de-energizes the ventilation system connected to the air intakes upon detection of fire.
2. ESS shall not be located within 25 feet (7620 mm) of *exits* leading from the attached building where located on a covered level of the parking structure not directly open to the sky above.
3. An *approved* fence with a locked gate or other *approved* barrier shall be provided to keep the general public at least 5 feet (1524 mm) from the outer enclosure of the ESS.

Section 14. Mobile ESS equipment and operations.

14.1 Mobile ESS equipment and operations shall comply with Section 14.

**TABLE 14.1
MOBILE ENERGY STORAGE SYSTEMS (ESS)**

| COMPLIANCE REQUIRED | | DEPLOYMENT ^a |
|------------------------------------|---------|-------------------------|
| Feature | Section | |
| All ESS installations | 8 | Yes ^b |
| Fire suppression systems | 9.6 | Yes ^c |
| Maximum allowable quantities | 9.3 | Yes |
| Maximum enclosure size | 9.7 | Yes |
| Means of egress separation | 9.9 | Yes |
| Size and separation | 9.2 | Yes ^d |
| Smoke and automatic fire detection | 9.5 | Yes ^e |
| Technology-specific protection | 10 | Yes |
| Vegetation control | 9.8 | Yes |

- a. See Section 1207.10.2.
- b. Mobile operations on wheeled vehicles and trailers shall not be required to comply with Section 8.4 seismic and structural load requirements.
- c. Fire suppression system connections to the water supply shall be permitted to use approved temporary connections.
- d. In walk-in units, spacing is not required between ESS units and the walls of the enclosure.
- e. Alarm signals are not required to be transmitted to an approved location for mobile ESS deployed 30 days or less.

14.2 For the purpose of Section 14, charging and storage covers the operation where mobile ESS are charged and stored so they are ready for deployment to another site, and where they are charged and stored after a deployment.

Exception: Mobile ESS used to temporarily provide power to lead-acid and nickel cadmium systems that are designed in accordance with IEEE C2, used for dc power for control of substations and control or safe shutdown of generating stations under the

exclusive control of the electric utility, and located outdoors or in building spaces used exclusively for such installations.

14.3 For the purpose of Section 14, deployment covers operations where mobile ESS are located at a site other than the charging and storage site and are being used to provide power.

Exception: Mobile ESS used to temporarily provide power to lead-acid and nickel cadmium systems that are used for dc power for control of substations and control or safe shutdown of generating stations under the exclusive control of the electric utility and located outdoors or in building spaces used exclusively for such installations.

14.4 Construction permits shall be provided for charging and storage of mobile ESS and operational permits shall be provided for deployment of mobile ESS as required by Section 5.2.

14.5 The following information shall be provided with the permit applications for mobile ESS deployments:

1. Relevant information for the mobile ESS equipment and protection measures in the *construction documents* required by Section 5.2.1.
2. Location and layout diagram of the area in which the mobile ESS is to be deployed, including a scale diagram of all nearby exposures.
3. Location and content of signage, including no smoking signs.
4. Description of fencing to be provided around the ESS, including locking methods.
5. Details on fire suppression, smoke and automatic fire detection, system monitoring, thermal management, exhaust ventilation and explosion control, if provided.
6. For deployment, the intended duration of operation, including anticipated connection and disconnection times and dates.
7. Location and description of local staging stops during transit to the deployment site. See Section 14.13.
8. Description of the temporary wiring, including connection methods, conductor type and size, and circuit overcurrent protection to be provided.
9. Description of how fire suppression system connections to water supplies or extinguishing agents are to be provided.
10. Contact information for personnel who are responsible for maintaining and servicing the equipment and responding to emergencies as required by this rule.

14.6 Locations where mobile ESS are charged, stored and deployed shall be restricted to the locations established on the construction permit.

14.7 Installations where mobile ESS are charged and stored shall be treated as permanent ESS indoor or outdoor installations, and shall comply with the following sections, as applicable:

1. Indoor charging and storage shall comply with Section 11.
2. Outdoor charging and storage shall comply with Section 12.
3. Charging and storage on rooftops and in open parking garages shall comply with Section 13.

Exceptions:

1. Electrical connections shall be permitted to be made using temporary wiring complying with the manufacturer's instructions, the UL 9540 listing and NFPA 70.
2. Fire suppression system connections to the water supply shall be permitted to use approved temporary connections.

14.8 Deployed mobile ESS equipment and operations shall comply with this section and Table 14.1.

14.9 The duration of mobile ESS deployment shall not exceed 30 days.

Exceptions:

1. Mobile ESS deployments that provide power for durations longer than 30 days shall comply with Section 14.7.
2. Mobile ESS deployments shall not exceed 180 days unless additional permits are obtained.

14.10 Deployed mobile ESS operations shall not be located indoors, in covered parking garages, on rooftops, below grade or under building overhangs.

14.11 Deployed mobile ESS shall be separated by a minimum of 10 feet (3048 mm) from the following exposures:

1. Public ways.
2. Buildings.
3. Stored combustible materials.
4. Hazardous materials.
5. High-piled storage.
6. Other exposure hazards.

Deployed mobile ESS shall be separated by a minimum of 50 feet (15 240 mm) from public seating areas and from tents, canopies and membrane structures with an *occupant load* of 30 or more.

14.12 Electrical connections shall be made in accordance with the manufacturer's instructions and the UL 9540 listing. Temporary wiring for electrical power connections shall comply with NFPA 70. Fixed electrical wiring shall not be provided.

14.13 Mobile ESS in transit from the charging and storage location to the deployment location and back shall not be parked within 100 feet (30 480 mm) of an occupied building for more than 1 hour during transit, unless specifically *approved* by the *fire code official* when the permit is issued.

14.14 An *approved* fence with a locked gate or other *approved* barrier shall be provided to keep the general public at least 5 feet (1524 mm) from the outer enclosure of a deployed mobile ESS.

14.15 Smoking shall be prohibited within 10 feet (3048 mm) of mobile ESS. Signs shall be posted in accordance with Section 310 of the Seattle Fire Code.