Seattle Fire Department
Permit Conditions

1206-Install
6401-Install

Site Address: _____ Inspector: _____

Installation of Stationary Storage Battery Systems or Capacitor Energy Storage Systems

Permission is hereby granted under the provisions of the Seattle Fire Code (SFC) to install a Stationary Storage Battery System or Capacitor Energy Storage System in accordance with the Seattle Fire Code and the following conditions:

STATIONARY STORAGE BATTERY SYSTEMS
(INDOOR)

PERMIT CONDITIONS:

1. Permits shall be kept on the premises designated herein at all times and shall be posted in a conspicuous location or shall be kept on the premises in an approved location. [SFC 105.1]

2. Stationary storage battery systems having capacities exceeding the values in Table 1206.2 shall comply with these conditions and the SFC where applicable. [SFC 1206.2]

TABLE 1206.2
BATTERY STORAGE SYSTEM
THRESHOLD QUANTITIES.

BATTERY TECHNOLOGY	CAPACITY[a]
Flow batteries[b]	20 kWh
Lead acid, all types	70 kWh
Lithium, all types	20 kWh
Nickel cadmium (Ni-Cd)	70 kWh
Sodium, all types	20 kWh[c]
Other battery technologies	10 kWh

For SI:1 kilowatt hour = 3.6 megajoules.
a. For batteries rated in amp-hours, kWh shall equal rated voltage times amp-hour rating divided by 1000.
b. Shall include vanadium, zinc-bromine, polysulfide-bromide, and other flowing electrolyte-type technologies.
c. 70 kWh for sodium-ion technologies.

3. Stationary storage battery systems shall not be located in areas where the floor is located more than 75 feet (22 860 mm) above the lowest level of fire department vehicle access, or where the floor level is more than 30 feet (9144 mm) below the finished floor of the lowest level of exit discharge. [SFC 1206.2.8.1]
   Exceptions:
   1. Lead-acid and nickel-cadmium stationary storage battery systems.
   2. Installations on noncombustible rooftops of buildings exceeding 75 feet (22 860 mm) in height that do not obstruct fire department rooftop operations, where *approved* by the *fire code official*.

4. Battery Systems used for facility standby power, emergency power or uninterrupted power supplies shall have the following separations:
   1-hour fire barriers and floor/ceiling assemblies in Group B, F, M, S, and U occupancies.
   2-hour fire barriers and floor/ceiling assemblies in Group A, E, I, and R occupancies
   [SFC 1206.2.8.2 and SBC Table 509]

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Installation of Stationary Storage Battery Systems or Capacitor Energy Storage Systems

5. Storage batteries, prepackaged stationary storage battery systems and pre-engineered stationary storage battery systems shall be segregated into stationary battery arrays not exceeding 50 kWh (180 megajoules) each. Each stationary battery array shall be spaced not less than 3 feet (914 mm) from other stationary battery arrays and from walls in the storage room or area. The storage arrangements shall comply with Chapter 10. [SFC 1206.2.8.3]

   Exceptions:

   1. Lead-acid and nickel-cadmium storage battery arrays.
   2. Listed pre-engineered stationary storage battery systems and prepackaged stationary storage battery systems shall not exceed 250 kWh (900 megajoules) each.
   3. The fire code official is authorized to approve listed, pre-engineered and prepackaged battery arrays with larger capacities or smaller battery array spacing if large-scale fire and fault condition testing conducted or witnessed and reported by an approved testing laboratory is provided showing that a fire involving one array will not propagate to an adjacent array, and be contained within the room for a duration equal to the fire-resistance rating of the room separation specified in Table 509 of the SBC.

6. Where stationary storage battery systems are subject to impact by a motor vehicle, including forklifts, vehicle impact protection shall be provided in accordance with SFC Section 312. [SFC 1206.2.5]

7. Where stationary batteries are installed in a separate equipment room that can be accessed only by authorized personnel, they shall be permitted to be installed on an open rack for ease of maintenance. [SFC 1206.2.8.4]

8. Where stationary storage batteries are located in an occupied work center, they shall be housed in a noncombustible cabinet or other enclosure to prevent access by unauthorized personnel. [SFC 1206.2.8.5]

9. Where stationary batteries are contained in cabinets in occupied work centers, the cabinet enclosures shall be located within 10 feet (3048 mm) of the equipment that they support. [SFC 1206.2.8.5.1]

10. Combustible materials not related to the stationary storage battery system shall not be stored in battery rooms, cabinets or enclosures. Combustible materials in occupied work centers covered by Section 1206.2.8.5 shall not be stored less than 3 feet (915 mm) from battery cabinets. [SFC 1206.2.6]

11. Storage batteries and associated equipment and systems shall be tested and maintained in accordance with the manufacturer's instructions. Any storage batteries or system components used to replace existing units shall be compatible with the battery charger, energy management systems, other storage batteries and other safety systems. Introducing other types of storage batteries into the stationary storage battery system or other types of electrolytes into flow battery systems shall be treated as a new installation and require approval by the *fire code official* before the replacements are introduced into service. [SFC 1206.2.7]

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Installation of Stationary Storage Battery Systems or Capacitor Energy Storage Systems

12. Approved signs shall be provided on doors or in locations near entrances to stationary storage battery system rooms and shall include the following or equivalent:
    1. The room contains energized battery systems.
    2. The room contains energized electrical circuits.
    3. The additional markings required in SFC Section 1206.2.12 for the types of storage batteries contained within the room.

    Exception: Existing stationary storage battery systems shall be permitted to include the signage required at the time it was installed. [SFC 1206.2.8.6]

13. Battery storage cabinets provided in occupied work centers in accordance with Section 1206.2.8.5 shall have exterior labels that identify the manufacturer and model number of the system and electrical rating (voltage and current) of the contained battery system. There shall be signs within the cabinet that indicate the relevant electrical and chemical hazards, as required by Section 1206.2.12. [SFC 1206.2.8.6.2]

14. Storage batteries and battery storage systems shall be listed in accordance with UL 1973. Prepackaged and pre-engineered stationary storage battery systems shall be listed in accordance with UL 9540, unless they are Lead-acid batteries. [SFC 1206.2.10.1]

15. Energy management systems shall be provided for other than lead-acid and nickel cadmium battery technologies. The system shall monitor and balance cell voltages, currents and temperatures to be maintained within the manufacturer's specifications. These systems shall transmit an alarm signal to an approved location if potentially hazardous temperatures, short circuits, over or under voltage is detected, or other hazardous conditions occurs. [SFC 1206.2.10.3]

16. Battery charges shall be listed and labeled in accordance with UL 1564 or be part of a listed pre-engineered or prepackaged stationary storage battery system. [SFC 1206.2.10.4]

17. Inverters shall be listed and labeled in accordance with UL 1741. [SFC 1206.2.10.5]

18. Vented batteries shall be provided with flame-arresting safety caps. [SFC 1206.2.10.6]

19. Rooms containing stationary storage battery systems shall be equipped with an automatic fire sprinkler system designed per NFPA 13 or an alternative fire-extinguishing system for battery systems that utilize water-reactive materials. [SFC 1206.2.11.1 and 1206.2.11.1.1]

20. An approved automatic smoke detection system shall be installed in rooms of stationary battery systems. [SFC 1206.2.11.2]

21. Rooms with Lead-acid storage battery systems shall provide ventilation, spill control and neutralization, thermal runaway protection for VRLA batteries, and signage that indicates the room contains lead-acid batteries. [SFC 1206.2.12.1]

22. Rooms with Nickel-cadmium (Ni-Cd) batteries shall provide ventilation, spill control and neutralization, thermal runaway protection for valve-regulated sealed nickel-cadmium batteries, and signage to indicate the room contains nickel-cadmium batteries. [SFC 1206.2.12.2]

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Installation of Stationary Storage Battery Systems or Capacitor Energy Storage Systems

23. Signs for rooms that have Lithium-ion storage batteries shall indicate the type of lithium batteries contained in the room. [SFC 1206.2.12.3]

24. Rooms with Sodium-beta storage batteries shall have ventilations and signage that indicates “APPLY NO WATER”. [SFC 1206.2.12.4]

25. Rooms with Flow storage batteries shall have ventilation, spill control and neutralization and signage that indicates the type of flow batteries in the room. [SFC 1206.2.12.5]

26. Other battery technologies indicated in Table 1206.2 shall be provided with applicable gas detection systems, ventilation, spill control and neutralization and signage to indicate the types of batteries storage and their potential hazards. [SFC 1206.2.12.6]

27. Fire areas inside buildings containing stationary storage battery systems exceeding the maximum allowable quantities in Table 1206.2.9 shall comply with all applicable Group H occupancy requirements in the SFC and the Seattle Building Code. Where buildings contain different types of storage battery technologies, the total aggregate quantities based on percentages shall not exceed 100 percent or the area of the building storing the mixed battery systems shall be treated as a Group H. [SFC 1206.2.9 and 1206.2.9.1]

TABLE 1206.2.9
MAXIMUM ALLOWABLE BATTERY QUANTITIES

BATTERY TECHNOLOGY	MAXIMUM ALLOWABLE QUANTITIES[a]	GROUP H OCCUPANCY
Flow batteries[b]	600 kWh	Group H-2
Lead-acid, all types	Unlimited	Not Applicable
Lithium, all types	600 kWh	Group H-2
Nickel-cadmium (Ni-Cd)	Unlimited	Not Applicable
Sodium, all types	600 kWh	Group H-2
Other battery technologies	200 kWh	Group H-2[c]

For SI:1 kilowatt hour = 3.6 megajoules.

a. For batteries rated in amp-hours, Kilowatt-hours (kWh) shall equal rated battery voltage times the amp-hour rating divided by 1,000.

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

c. Shall be a Group H-4 occupancy if the fire code official determines that a fire or thermal runaway involving the battery technology does not represent a significant fire hazard.

28. Where the stationary storage battery system disconnecting means is not within sight of the main service disconnecting means, placards or directories shall be installed at the location of the main service disconnecting means indicating the location of stationary storage battery system disconnecting means in accordance with NFPA 70. [SFC 1206.2.8.6.1]

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Installation of Stationary Storage Battery Systems or Capacitor Energy Storage Systems

STATIONARY STORAGE BATTERY SYSTEMS (OUTDOOR)

1. Permits shall be kept on the premises designated herein at all times and shall be posted in a conspicuous location or shall be kept on the premises in an approved location. [SFC 105.1]

2. Outdoor Stationary Storage Battery Systems shall comply with the applicable conditions in Section 1206 of the SFC. [1206.2.8.7]

3. Installations in outdoor enclosures or containers than can be occupied for servicing, testing, maintenance and other functions shall be treated as batter storage rooms [SFC 1206.2.8.7]

4. Stationary storage battery systems located outdoors shall be separated by a minimum of 5 feet from lot lines, public ways, buildings, stored combustible materials, hazardous materials, high-piled stock and any other exposure hazard. [SFC 1206.2.8.7.1]

5. Stationary storage battery systems located outdoors shall be separated from any means of egress by 10 feet. [SFC 1206.2.8.7.2]

6. Outdoor areas in which stationary storage battery systems are located shall be secured against unauthorized entry. [SFC 1206.2.8.7.3]

7. Walk-in units with outer enclosures shall only be entered for inspection, maintenance and repair of batteries and electronics. No other occupancy is allowed. [SFC 1206.2.8.7.4]

CAPACITOR ENERGY STORAGE SYSTEMS (INDOOR)

1. Capacitor energy storage systems having capacities exceeding 3kWh (10.8 megajoules) shall be required to obtain a permit. [SFC 1206.3 and 1206.3.1]

2. Permits shall be kept on the premises designated herein at all times and shall be posted in a conspicuous location or shall be kept on the premises in an approved location. [SFC 105.1]

3. Fire areas with buildings containing capacitor energy storage systems that exceed 600 kWh of energy capacity shall comply with all applicable Group H occupancy requirements in the SFC and the Seattle Building Code. [SFC 1206.3.4]

4. Capacitor energy storage systems shall not be located on floors more than 75 feet above the lowest level of fire department access or floor levels that are more than 30 feet below the finished floor of the lowest level of exit discharge. [SFC 1206.3.2.1]

5. Rooms in Group B, F, M, S or U occupancies shall be separated with fire barriers or horizontal assemblies or both of 1-hour fire-resistant construction. Group A, E, I and R occupancies shall be provided with 2-hour fire-resistant construction. [SFC 1206.3.2.2]

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Installation of Stationary Storage Battery Systems or Capacitor Energy Storage Systems

6. Capacitor arrays shall not exceed 50 kWh (180 megajoules) each and be separated by at least 3 feet from other arrays and from walls. [SFC 1206.3.2.3]

7. Signage that indicates “CAPACITOR ENERGY STORAGE ROOM”, “THIS ROOM CONTAINS ENERGIZED ELECTRICAL CIRCUTIS” and that provides the type of capacitors present and the potential hazards shall be installed on the doors and adjacent to the entrances to the storage rooms. [SFC 1206.3.2.4]

8. Where the capacitor energy storage system disconnecting means is not within sight of the main service disconnect, placards or directories shall be installed at the main service disconnect identifying the location of the capacitor energy storage system. [SFC 1206.3.2.5]

9. Capacitors shall be listed in accordance with UL 1973. Prepackaged and pre-engineered stationary energy storage systems shall be listed in accordance with UL 9540 and installed in accordance to their listing and manufacturer’s instructions. [SFC 1206.3.4.1]

10. Energy management systems shall be provided for monitoring and balancing capacitor voltages, currents and temperatures within the manufacturer’s specifications. These systems shall transmit an alarm signal to approved location if potentially hazardous temperatures or other conditions such as short circuits, over voltage or under voltage are detected. [SFC 1206.3.4.3]

11. Capacitor charges shall be listed and labeled in accordance with UL 1564 or be part of a listed pre-engineered or prepackaged capacitor energy storage system.

12. Rooms containing capacitor energy storage systems shall be provided with an automatic sprinkler system designed per NFPA 13 or an alternative fire-extinguishing system designed per SFC 904 for capacitor energy storage systems that utilize water-reactive materials. [SFC 1206.3.5.1 and 1206.3.5.1.1]

13. An approved automatic smoke detection system shall be installed per SFC 907.2 in rooms containing capacitor energy storage systems. [SFC 1206.3.5.2]

14. Where capacitors release flammable gases during normal operating conditions, ventilation of the room shall be provided by either providing a ventilation system that is designed to limit the maximum concentration of flammable gas to 25 percent of the LFL or continuous ventilation at a rate of not less than 1 cubic foot per minute per square foot of floor area and not less than 150 cfm. These mechanical ventilation systems shall be supervised by an approved central station or initiate an audible and visible signal at an approved constantly attended on-site location. [SFC 1206.3.5.3 and 1206.3.5.3.1]

15. Capacitors that contain liquid electrolyte in rooms shall be provided with methods to control and neutralize spills. [SFC 1206.3.5.4]

16. Capacitors and associated equipment and systems shall be tested and maintained in accordance with their manufacturer’s instructions. All components shall be compatible. [SFC 1206.3.6]

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Installation of Stationary Storage Battery Systems or Capacitor Energy Storage Systems

CAPACITOR ENERGY STORAGE SYSTEMS
(OUTDOOR)

1. Outdoor Capacitor energy storage systems shall comply with the applicable conditions in Section 1206.3.2.6 through 1206.3.2.6.4 of the SFC. Installations that have outdoor enclosures or containers that can be occupied for servicing, testing, maintenance, and other functions shall be treated as capacitor storage rooms. [SFC 1206.3.2.6]

2. Permits shall be kept on the premises designated herein at all times and shall be posted in a conspicuous location or shall be kept on the premises in an approved location. [SFC 105.1]

3. Capacitor energy systems located outdoors shall not be less than 5 feet from lot lines, public ways, buildings, stored combustible materials, hazardous materials, high-piled stock, or other hazards. [SFC 1206.3.2.6.1]

4. Capacitor energy storage systems located outdoors shall be separated from any means of egress by 10 feet. [SFC 1206.3.2.6.2]

5. Outdoor areas in which Capacitor energy storage systems are located shall be secured against unauthorized entry. [SFC 1206.3.2.6.3]

6. Walk-in units with outer enclosures shall only be entered for inspection, maintenance and repair of capacitors and electronics and electronics. No other occupancy is allowed. [SFC 1206.3.2.6.4]