

2021 SEATTLE FIRE CODE SIGNIFICANT CHANGES

The Seattle Fire Code is updated (replaced) every three years in line with updated International Fire Code, Washington State Fire Code, and the other construction codes adopted in Seattle such as Building Code, Mechanical Code, Electrical Code, etc. The updates incorporate current technologies, designs, and the latest evaluations of what is an acceptable level of safety.

The following are provisions contained in the 2021 Seattle Fire Code that are a significant change from requirements contained in the 2018 Seattle Fire Code.

Section 322 Storage of Lithium-ion and Lithium Metal Batteries

The Washington State Fire Code has added a new section with requirements for the storage of Lithium-ion and Lithium metal batteries. Lithium-ion and lithium metal batteries can create challenging fire hazards. This proposal includes requirements that regulate the collection and storage of these batteries so as to reduce the probability of an event and mitigate any adverse impact on the affected facility and public safety. The requirements are intended to cover all types of lithium-ion and lithium metal batteries (e.g., new, used, waste, refurbished), used batteries being collected for recycling or disposal, and batteries at recycling and disposal facilities.

Details on the proposal are as follows:

Section 322.1 identifies the threshold quantities of batteries that are regulated by Section 322. As noted in the exceptions, it is not the intent to cover lithium-ion and lithium metal batteries in products, devices, or vehicles, in small retail packaging, or the temporary storage of batteries at manufacturing facilities or in transit.

Section 322.2 requires an operational permit if more than 15 cubic feet of these types of batteries are accumulated at a location.

Section 322.3 requires a fire safety and evacuation plan to be provided in accordance with a new section 403.10.6.

Section 322.4.1 includes requirements for limited indoor battery storage in containers. This is primarily intended to cover the containers used to collect used batteries for recycling or disposal. These types of containers can be found in many establishments, including mercantile and other occupancies. There is a limitation for an individual container to not exceed 7.5 cubic feet, which is approximately the size of a 55-gallon barrel. A maximum 15 cubic feet of storage (two 55-gallon barrels) are allowed in this code application. Indoor storage more than these values will be regulated in accordance with Section 322.4.2, and will require, among other things, an operational permit as noted in 322.2.

Indoor storage areas other than the limited storage applications covered by 322.4.1 are required to comply with all applicable requirements in 322.4.2.1 through 322.4.2.6. Based on the significant hazard of storing more than 15 cubic feet of batteries, these sections require a possible technical report to evaluate the fire and explosion risks associated with the storage, fire protection systems such as fire sprinklers and fire detection systems along with explosion control if the technical report requires it for safety.

Section 322.4.2.6 recognizes that lithium-ion batteries not exceeding 30% state of charge (SOC) have been shown to be less likely to undergo thermal runaway or propagate than fully charged batteries, and the 30% SOC level is recognized by the U.S. Department of Transportation (DOT) and other transport agencies (e.g., Transport Canada, International Civil Aviation Organization) as providing an additional level of safety for shipping by air. This section allows the fire code official to waive specific protection requirements based on approval of the procedures used for limiting and verifying that the state of charge will not exceed 30 percent. It is assumed that the procedures used to verify the SOC can be periodically checked as part of the operational permit on the operation.

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Section 322.4.3 includes requirements covering the outdoor storage of lithium-ion or lithium metal batteries. It includes criteria for:

1. Location of storage in proximity to exposures
2. Storage area size limits and separation
3. Fire detection requirements.

Section 323.6 includes new listing and labeling requirements for batteries for micromobility devices that are for distribution, sale, lease, or rental. These requirements will help to ensure that the batteries are listed per Underwriter's Laboratory safety standards.

Section 403 Emergency Preparedness Requirements

Washington State Fire Code has added a new section 403.10.6 for storage of batteries. Lithium-ion and lithium batteries have been a contributing factor in a growing number of fire incidents for several years, and they are being used in an ever-increasing number of products and applications. This proposal requires a fire safety and evacuation plan to be prepared and maintained for occupancies involving battery related activities, and storage, handling, and use. Emergency action plans and early mitigation are key elements in providing for occupant and facility safety and for reducing the size of an event.

Section 1103.5.4 existing High-rise buildings

The International Fire Code has added a new section 1103.5.4 which will also be in the Washington State Fire Code for existing high-rise buildings that do not have a previously approved fire sprinkler system shall be equipped with an automatic sprinkler system.

Following a comprehensive data analysis of buildings that may need to comply with this new section, a written notice from the Seattle Fire Department will be sent to building owners requiring them to file a compliance schedule with the fire code official not later than 365 days after receipt of the written notice. The compliance schedule shall not exceed 12 years for completion of the automatic sprinkler system retrofit. Building types that would need to comply with providing a compliance schedule are as follows:

1. The high-rise building has an occupied floor located more than 120 feet (36 576 mm) above the lowest level of fire department vehicle access.
2. The high-rise building has occupied floors located more than 75 feet (22 860 mm) and not more than 120 feet (36 576 mm) above the lowest level of fire department vehicle access and the building does not have at least two interior exit stairways complying with Section 1104.10 that are separated from the building interior by fire assemblies having a fire-resistance rating of not less than 2 hours with opening protection in accordance with Table 716.1(2) of the *International Building Code*.
3. The high-rise building has occupied floors located more than 75 feet (22 860 mm) and not more than 120 feet (36 576 mm) above the lowest level of fire department vehicle access and the building does not have a fire alarm system that includes smoke detection in mechanical equipment, electrical, transformer, telephone equipment and similar rooms; corridors; elevator lobbies; and at doors penetrating interior exit stairway enclosures.

Chapter 12 Electrical Energy Storage Systems (ESS)

The Seattle Fire Department proposes amendments to Chapter 12 of the 2021 Seattle Fire Code. SFD is aligning with the Washington State Fire Code which just recently enacted an emergency amendment adopting NFPA 855 which provides the most up to date regulations on these types of systems.

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The addition of energy storage system (ESS) requirements into the 2018 Seattle Fire Code was an initial effort to address safety hazards associated with the increased use of lithium-ion batteries, capacitors, and other modern energy storage system (ESS) technologies for a growing number of energy storage applications. The 2018 SFC requirements were a huge step toward addressing modern ESS technologies and grid-based applications. However, as written the requirements made it difficult to apply appropriate safety requirements for different installations, each with their own risks and exposures. For example, a lead-acid battery ESS installation in an unstaffed telecommunications repeater does not present the same risks and exposures as a lithium-ion battery ESS installation in a mixed occupancy high rise in downtown Seattle. Since the 2018 Seattle Fire Code adoption, a significant amount of evaluation and testing by private and government stakeholders has occurred to better address the hazards and exposures associated with various types of ESS installations, technologies, and operations. This chapter rewrite not only retains many of the basic protection concepts in the 2018 code, but also provides customized requirements for different types of installations and different types of ESS technologies.

The 2018 SFC contained certain variances based on large scale fire and fault condition testing, however the criteria for conducting such testing were undefined. Section 1207.1.5 has been revised to specify that the large scale fire testing shall be conducted in accordance with UL 9540A “Standard for Safety Test Method for Evaluating Thermal Runaway Fire Propagation in Battery Energy Storage Systems.”

Section 1207.1.6 is added to address fire events involving lithium-ion battery systems, since lithium-ion battery fires have the potential to re-ignite hours or even days after initial extinguishment by the fire department, who cannot remain on scene indefinitely until the fire damaged ESS is safely removed from the premises. The fire remediation requirements, similar to fire watch requirements, make the owner responsible for sending mitigation personnel to the scene to take over the remediation process.

New requirements in Section 1207.2 include criteria on commissioning, decommissioning, maintenance, and testing requirements. These provisions are important considerations for providing a safe installation.

ESS equipment is addressed in Section 1207.3. New requirements in this section address retrofitting existing energy storage systems and reuse or repurposing of electric vehicle batteries that are converted for ESS use in buildings. This can only occur if the equipment is refurbished in accordance with UL 1974 and the use and installation is approved by the fire code official.

Section 1207.5 identifies the specific protection requirements applicable for each type of battery technology. The requirements differ based on the exposure hazard, such as indoor versus outdoor, dedicated use building versus nondedicated use buildings, remote locations or rooftop installations.

Table 1207.5.2 lists the maximum allowable quantity of energy storage allowed in a room or walk-in units. The ESS can only exceed these amounts if justified by a hazard mitigation analysis or large-scale fire testing. The facility no longer becomes a Group H (Hazardous) occupancy. Rather, mitigation measures are added to address the increased hazard.

All ESS rooms and walk-in units must be protected by an automatic fire-extinguishing system. The 2018 code required a fire sprinkler system unless the ESS was water reactive. When designing the sprinkler system, it was difficult or impossible to determine the required fire sprinkler design density. Section 1207.5.5 now specifies a minimum design density. Additionally, other fire-extinguishing agents and systems are allowed when the design is based on large scale testing in accordance with UL 9540A.

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Lithium-ion battery systems and other electrochemical ESS technologies have the potential to rapidly build up potentially explosive atmospheres in the battery or electrochemical ESS room during thermal runaway and other conditions. Section 1207.6.3 now addresses explosion control in these rooms.

Section 1207.7.4 requires that rooms containing ESS be separated from the remainder of the building. The separation must be fire-resistance construction with a minimum of 2-hour rating.

Chapter 32 High-Piled Combustible Storage

Washington State Fire Code has added “lithium-ion” as a High-hazard item. Lithium-ion batteries will burn vigorously with a high heat release rate. Presently, the 2018 SFC lacks guidance on the fire sprinkler protection levels for the storage of this product. NFPA 13 which is used for the design of automatic fire sprinkler systems does not include any specific criteria for protection of lithium-ion batteries. But by classifying lithium-ion batteries as a high-hazard, it allows the fire code official to regulate lithium-ion battery storage as high-piled storage when the storage height exceeds 6 feet and now they can use Chapter 32 to regulate the fire sprinkler system requirements. This section is not intended to consider batteries installed in equipment or appliances. The hazard associated with a pile or storage rack of lithium-ion batteries far exceeds the hazard of those same batteries located in devices and placed in packaging.