

Fire Detection for ESS Outdoor Installations - Required
2018/2021 IFC
2020 NFPA 855
2021 NFPA 1 Fire Code

Questions have arisen concerning the requirement for fire detection for outdoor installations of ESS due to a correlation issue with general language and specific language for installation locations. This document explains the history of the detection and alarm requirements, the correlation issue and that detection is still required regardless of the language correlation issue based upon language in Chapter 1 of the fire codes addressing such situations.

In the drafting and acceptance of the 2018 International Fire Code ESS requirements a general section was added requiring the energy management system to transmit an alarm to an approved location for any potentially hazardous temperature or other conditions including short circuits, over voltage or under voltage, early in the process, Section 1206.2.10.3. The purpose was so the fire department would be alerted of a need to respond. “Approved” is defined as acceptable to the fire code official and “approved location” is a common part of design and approval of monitoring/annunciation of signals for fire suppression and fire detection systems. The AHJ approves the location.

The 2018 edition of the IFC had not yet been published when difficulties were identified with this requirement as part of the energy management system. One problem was separating out specific signals that could be tied into listed FACP’s. The other problem was identifying what qualified as “potentially hazardous temperatures or *other conditions*”, the language was subjective. In discussing the requirement with fire departments, they didn’t want notification of events that the energy management system could handle safely based upon design and listing, i.e., preventing a cascading thermal runaway or other fire event. Many such events that the system could handle would end up causing a fire department response and upon arrival there would be nothing to address or even see.

Fire service members indicated they wanted to be alerted only when they needed to respond, i.e., a cascading thermal runaway or fire event, and as a result, providing fire detection in accordance with Chapter 9 of the IFC and NFPA 72 was recommended to be followed in place of applying the alarm signal language of Section 1206.2.10.3. Instructors intimate with the ESS code development process that were providing ESS presentations at that time advised attendees not to apply the alarm portion of Section 1206.2.10.3 of the 2018 IFC since it was problematic and instead require fire detection.

2018 IFC

1206.2.10.3 Energy management system. An approved energy management system shall be provided for battery technologies other than lead-acid and nickel cadmium for monitoring and balancing cell voltages, currents and temperatures within the manufacturer’s specifications. The system shall transmit an alarm signal to an approved location if potentially hazardous temperatures or other conditions such as short circuits, over voltage or under voltage are detected.

Based upon the above, the alarm signal language for energy managements systems was not included in the 2020 edition of NFPA 855 or in the 2021 edition language of the IFC, instead, fire detection was included for all the various locations that the ESS may be installed. Indoors, rooftops, open parking garages and outdoors.

Unfortunately, during the 2020 NFPA 855 and 2021 IFC code development process the general language was not completely correlated with the specific location requirements and if one was to simply read the general fire detection language a person could incorrectly believe the fire detection is not required for outdoor installations.

2021 IFC

1207.5.4 Fire detection. An approved automatic smoke detection system or radiant energy-sensing fire detection system complying with Section 907.2 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.

1207.5.4.1 System status. Where required by the fire code official, visible annunciation shall be provided on cabinet exteriors or in other approved locations to indicate that potentially hazardous conditions associated with the ESS exist.

1207.8 Outdoor installations. Outdoor installations shall be in accordance with Sections 1207.8.1 through 1207.8.3. Exterior wall installations for individual ESS units not exceeding 20 kWh shall be in accordance with Section 1207.8.4.

1207.8.1 Remote outdoor installations. For the purpose of Table 1207.8, 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.

1207.8.2 Installations near exposures. For the purpose of Table 1207.8, installations near exposures include all outdoor ESS installations that do not comply with Section 1207.8.1 remote outdoor location requirements.

**TABLE 1207.8
OUTDOOR ESS INSTALLATIONS^a**

COMPLIANCE REQUIRED		REMOTE INSTALLATIONS ^a	INSTALLATIONS NEAR EXPOSURES ^b
Feature	Section		
All ESS installations	1207.4	Yes	Yes
Clearance to exposures	1207.8.3	Yes	Yes
Fire suppression systems	1207.5.5	Yes ^c	Yes
Maximum allowable quantities	1207.5.2	No	Yes
Maximum enclosure size	1207.5.6	Yes	Yes
Means of egress separation	1207.5.8	Yes	Yes
Size and separation	1207.5.1	No	Yes ^d
Smoke and automatic fire detection	1207.5.4	Yes	Yes
Technology-specific protection	1207.6	Yes	Yes
Vegetation control	1207.5.7	Yes	Yes

a. See Section 1207.8.1.

b. See Section 1207.8.2.

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.

The portion of the IFC specific to outdoor installations, Section 1207.8 coupled with Table 1207.8 clearly indicates that fire detection is required. This correlation breakdown occasionally occurs and is typically identified as jurisdictions adopt the newer editions of codes and standards and start applying them. It is also common to have general language and specific language applying to the same topic within a code and as a result Chapter 1 of the IFC and Chapter 1 of NFPA 1 Fire Code contain provisions when such a collision occurs. (The IBC has the same language in it's Chapter 1).

Section [A] 102.10 of the IFC specifies that if there is a conflict between a general requirement and a specific requirement, the specific requirement shall be applicable. In this case Section 1207.5.4 is the general requirement for detection and Section 1207.8 is the requirement specific to outdoor installations and would prevail. The second sentence of [A]102.10 would also default to the fire detection being required because it would be the most restrictive in this case.

[A] 102.10 Conflicting provisions. Where there is a conflict between a general requirement and a specific requirement, the specific requirement shall be applicable. Where, in a specific case, different sections of this code specify different materials, methods of construction or other requirements, the most restrictive shall govern.

The bottom line is that fire detection is required for outdoor installations of ESS other than detached one- and two-family dwellings and townhouses.

In NFPA 855 the correlation issue involved the general requirement for detection with the outdoor and rooftop installation specific requirements.

2020-NFPA 855

4.10 Smoke and Fire Detection. 4.10.1 All fire areas containing ESS systems located within buildings or structures shall be provided with a smoke detection system in accordance with NFPA 72.

4.10.4 The smoke detection system shall be permitted to be replaced with a radiant energy-sensing detection system installed in accordance with NFPA 72 in open parking garages and similar occupancies where conditions negatively impact the use of smoke detection technologies.

4.4.3 Outdoor Installations. Outdoor ESS installations shall comply with this section and as detailed in Table 4.4.3.

4.4.4 Rooftop and Open Parking Garage Installations. Rooftop and open parking garage ESS installations shall comply with this section and as detailed in Table 4.4.4.

However, since the application of NFPA 855 by an AHJ is through its extraction into NFPA 1, similar language in NFPA 1, Chapter 1, as is in the IFC and IBC, provides for the specific location language to be applied.

2021 NFPA 1 Fire Code

1.3.3.2 When a conflict between a general requirement and a specific requirement occurs, the specific requirement shall apply.

Table 4.4.3 Outdoor Stationary ESS Installations

Compliance Required	Remote Locations ^a	Locations Near Exposures ^b	Reference
Administrative General	Yes	Yes	Chapters 1–3 Sections 4.1–4.3
Maximum size	Yes	Yes	4.4.3.2
Clearance to exposures	NA	Yes	4.4.3.3
Means of egress separation	NA	Yes	4.4.3.4
Walk-in units	Yes	Yes	4.4.3.5
Vegetation control	Yes	Yes	4.4.3.6
Enclosures	Yes	Yes	4.4.3.7
Size and separation	No	Yes ^c	Section 4.6
Maximum stored energy	No	Yes	Section 4.8
Smoke and fire detection	Yes	Yes	Section 4.10
Fire control and suppression	Yes ^d	Yes	Section 4.11
Water supply	Yes ^d	Yes	Section 4.13
Signage	Yes	Yes	4.3.5
Occupied work centers	Not allowed	Not allowed	Section 4.7
Technology-specific protection	Yes	Yes	Chapters 9–13

NA: Not applicable.

^aSee 4.4.3.1(1).

^bSee 4.4.3.1(2).

^cIn outdoor walk-in units, spacing is not required between ESS and the enclosure walls.

^dWhen agreeable with the ESS owner and approved by the AHJ, fire suppression systems and water supply are permitted to be omitted.

Table 4.4.4 Rooftop and Open Parking Garage ESS Installations

Compliance Required	Rooftops*	Open Parking Garages†	Reference
Administrative General	Yes	Yes	Chapters 1–3 Sections 4.1–4.3
Maximum size	Yes	Yes	4.4.3.2
Means of egress separation	Yes	Yes	4.4.3.4
Walk-in units	Yes	Yes	4.4.3.5
Enclosures	Yes	Yes	4.4.3.7
Clearance to exposures	Yes	Yes	4.4.4.2
Fire suppression and control	Yes	Yes	Section 4.11
Rooftop installations	Yes	No	4.4.4.4
Open parking garages	No	Yes	4.4.4.5
Size and separation	Yes	Yes	Section 4.6
Maximum stored energy	Yes	Yes	Section 4.8
Elevation	Yes	Yes	4.3.9
Smoke and fire detection	Yes	Yes	Section 4.10
Signage	Yes	Yes	4.3.5
Occupied work centers	Not allowed	Not allowed	Section 4.7
Open rack installations	Not allowed	Not allowed	4.3.11
Technology-specific protection	Yes	Yes	Chapters 9–13

NA: Not applicable.

*See 4.4.4.1(1).

†See 4.4.4.1(2).