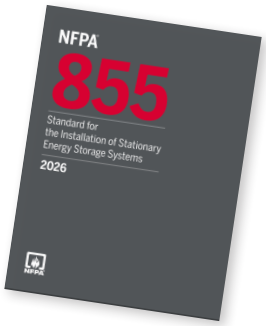
Energy Storage

NFPA 855: Improving Energy Storage System Safety

What is NFPA 855?

NFPA 855, *Standard for the Installation of Stationary Energy Storage Systems*—now in its recently published third edition (2026)—provides mandatory requirements and explanatory text on energy storage systems (ESS) safety. The standard applies to all energy storage technologies and includes chapters for specific technology classes. This overview focuses on electrochemical (battery) systems in Chapter 9 and specifically on lithium-ion (Li-ion) batteries.



NFPA 855 and Fire Codes

While NFPA 855 is a standard and not a code, its provisions are enforced by NFPA 1, Fire Code, in which Chapter 52 outlines requirements, along with references to specific sections in NFPA 855.

The *International Fire Code* (IFC) 2024 edition has its own ESS provisions for Section 1207, which are largely harmonized with those in the NFPA 855 2023 edition. This will change with the 2027 IFC, which will follow the same approach as NFPA 1 by mandating compliance with NFPA 855.

In the revision process for the NFPA 855 2026 edition, 26 Task Groups address specific topics. The Task Groups comprise fire safety professionals, industry experts, and other interested parties—and they engage in robust debates aimed at improving the standard. As with other NFPA documents on their three-year revision cycle, the document underwent two major drafts for public comment.

Photo credit: Fluence

Authorities Having Jurisdiction (AHJs) and NFPA 855

NFPA 855 includes a range of prescriptive requirements for metrics such as maximum energy and spacing between units. The standard also lists several items to submit to the AHJ, including the following:

- Hazard mitigation analysis (HMA)
- Emergency operations plan
- Emergency response plan
- Details of all safety systems
- Results of fire and explosion testing, including large-scale fire testing (LSFT) to UL 9540A or equivalent

This information, especially the UL 9540A results, allows a performance-based assessment of the ESS safety characteristics, and NFPA 855 allows the AHJ to waive many of the prescriptive measures. The LSFT, which is new for 2026, verifies that complete combustion of one enclosure will not cause thermal runaway in adjacent units at the spacing that the manufacturer recommends. The LSFT is carried out at a specialized testing facility and its results reviewed by a registered design professional to verify applicability for anticipated site wind conditions.

The fire codes require ESS to be listed to UL 9540. For existing ESS that were not listed to UL 9540, NFPA 855 provides a measure of retroactivity, requiring the operator to provide an HMA and empowering the AHJ to require safety upgrades based on the HMA findings.

The AHJ oversees the entire lifecycle of an ESS including plans for commissioning and decommissioning.

1 Arizona ESS Explosion Investigation and Line of Duty Injury Reports Now Available

Explosion Control and Fire Suppression

Recognizing that fire suppression is rarely effective with Li-ion batteries, the new edition is written around the assumption that fire suppression will not be used, instead prioritizing explosion prevention in accordance with NFPA 69. There is an exception for approved explosion management systems, which generally trigger controlled partial-volume deflagrations.

Changes to NFPA 855 reflect a developing philosophy regarding the interaction between explosion control and fire suppression. The 2023 edition allowed either deflagration management in accordance with NFPA 68 or explosion prevention to meet NFPA 69.

In 2026, the option for a standalone NFPA 68 arrangement is no longer allowed: Such a system, especially if combined with fire suppression, could increase the risk of an explosion. If there is a propagating thermal runaway event without fire (whether suppressed or not), flammable gases could be vented into the enclosure to a point where their concentration exceeds the upper flammable limit. Such a situation would be stable, preventing combustion until first responders open a door and allow oxygen to enter. This is what happened at the McMicken ESS in Surprise, Arizona in 2019, resulting in four firefighters suffering injuries[1].

The current industry best practice combines explosion prevention with fire containment, where ESS fires are allowed to burn out in a controlled fashion while protecting nearby equipment as needed. The LSFT assures that adjacent battery enclosures are not at risk. This approach avoids the possibility of contaminated runoff while eliminating risks associated with stranded energy and reignition.

Toxic Gases

One area in which the 2026 edition of NFPA 855 did not impose additional requirements is on toxic gases. While laboratory testing of burning Li-ion batteries produces measurable quantities of some of these compounds, they have not been detected at dangerous levels during actual incidents. Most fires involving plastic materials produce similar gases, and the NFPA 855 Task Group on Toxic Gases debated this issue, determining that ESS should not be singled out for special treatment.

Fire Code Revision Cycles

As with the model fire codes, NFPA 855 is on a three-year revision cycle. NFPA 855 is a year ahead in its cycle, meaning that the 2026 edition will be referenced by the 2027 editions of the model codes. The local adoption process can delay implementation, sometimes by many years. ACP believes new editions of NFPA 855 should be adopted quickly and advocates for compliance with the latest edition as part of permitting. This position is reflected in ACP's Model Ordinance for Utility-Scale Battery Energy Storage Systems.[2]

Photo credit: Pearce Renewables

1 Arizona ESS Explosion Investigation and Line of Duty Injury Reports Now Available
2 https://cleanpower.org/resources/model-ordinance-utility-scale-battery-energy-storage-systems/