

NFPA 855, NFPA 70 and NFPA 70B and It's effects on Stationary Batteries and Energy Storage Systems (ESS)

William Cantor, PE

Chair ESSB Codes Working Group

Member NFPA-70 CMP-13 Technical Committee

Member NFPA 70B Technical Committee

Member NFPA 855 Technical Committee

Key NFPA documents on ESS

- ▶ NFPA 855 -Standard for the Installation of Stationary Energy Storage Systems
 - ▶ Current Version 2020
 - ▶ No Scope
 - ▶ Undergoing first revision ballot for 2023 version
 - ▶ FR report 256 pages
- ▶ NFPA 70 - National Electrical Code
 - ▶ Current Version 2020
 - ▶ First Revision just passed ballot

Key Documents continued

- ▶ NFPA 70B - Recommended Practice for Electrical Equipment Maintenance
 - ▶ Current edition 2019
 - ▶ Document is being changed to a standard
 - ▶ Mostly rewritten
 - ▶ Next Edition 2023?
 - ▶ Draft first revision completed

NFPA 855 - Key Issues

- ▶ Energy Storage Systems are defined broadly and the intention is to cover all batteries and battery systems over a threshold amount
 - ▶ 3.3.9 Energy Storage Systems (ESS).
 - ▶ One or more devices, assembled together, capable of storing energy in order to supply electrical energy at a future time to the local power loads, to the utility grid, or for grid support.
- ▶ Controversy surrounded the initial scope and the 2020 version was issued without a scope
- ▶ The proposed first revision scope is again very broad

NFPA 855 - Key Issues continued

- ▶ All ESSs covered in the scope must meet UL 9540 even for batteries not sold/packaged/designed as a system
 - ▶ There are some very narrow exceptions for lead-acid/nickel-cadmium batteries in certain applications
 - ▶ These exceptions can be easily misused, misapplied (e.g. UPS)
- ▶ ESSB committee, working with UL, has proposed an exception for lead-acid/nickel-cadmium batteries that meet UL 1973
 - ▶ UL 1973 includes a test to induce thermal runaway and the battery will not pass if a fire results.
 - ▶ Requires flame retardant materials
 - ▶ More consistent approach - Much easier to interpret/enforce

NFPA 855 - Key Issues continued

- ▶ All ESSs covered in the scope must meet strict size and separation requirements unless large scale (UL 9540A) testing proves otherwise
 - ▶ These are built around Li-Ion systems
 - ▶ Again there are some very narrow exceptions for lead-acid/nickel-cadmium batteries in certain applications
 - ▶ These exceptions can be easily misused, misapplied (e.g. UPS)
- ▶ ESSB committee, working with UL, has proposed an exception for lead-acid/nickel-cadmium that meet UL 1973
 - ▶ More consistent approach - Much easier to interpret/enforce

NFPA 855 - Key Issues continued

- ▶ Overall very comprehensive requirements for ESS
 - ▶ With few exceptions, treats all battery chemistries and applications the same
- ▶ One- and Two-Family Dwellings and Townhouse Units
 - ▶ Strict requirements, no exceptions for traditional battery technologies

NFPA 70

- ▶ Separate Articles for ESS (706) and standby stationary batteries (480)
- ▶ Approved first revision (2023) adds a very clear distinction between the two articles
- ▶ Traditional Lead-acid and Nickel-Cadmium batteries have been covered under article 480 for many years with a high degree of safety
 - ▶ Recognized by CMP-13 committee

NFPA 70B

- ▶ Separate new chapters created for ESS and standby stationary batteries in first revision (2023+)
- ▶ Prior editions of NFPA 70B battery maintenance wording has all been for standby stationary batteries, similar to the scope of NFPA 70 article 480
- ▶ NFPA 70B technical committee is following lead of NFPA 70 with the separation between ESS and standby stationary batteries.

Summary

- ▶ There is a clear trend to increase requirements/regulations on all ESSs and traditional stationary standby batteries.
 - ▶ Driven by Li-Ion concerns
- ▶ IEEE PES Energy Storage and Stationary Battery committee has focused on making a distinction between Energy Storage Systems and traditional stationary standby batteries.
 - ▶ There is a clear safety/risk difference
 - ▶ Incentivizing, through code changes, the lead-acid and nickel-cadmium industry to move towards universal UL 1973 listing for all batteries.