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MEMORANDUM

TO: Technical Committee on Energy Storage Systems

FROM: Sarah Caldwell, *Technical Committee Administrator*

DATE: March 13, 2020

SUBJECT: NFPA 855 Proposed Tentative Interim Amendment No. 1486
Public Comment Review

The attached Public Comments are being submitted to the Technical Committee for review.

During the comment review period you may change your vote or submit your ballot through the NFPA online ballot system at the following link: NFPA Ballot Link**.** If you do not wish to change your vote, no response is necessary.

Please complete the ballot on or before **March 19, 2020 by 11:59PM (ET).**

While completing your ballot, please remember the following:

- **A comment is required for both Question No. 1 and Question No. 2 for the online TIA ballot. Comments must accompany all Negative, Abstaining and Agree votes.**

- **If you vote "Agree" on Question 1, simply add "Agree" to the comment field and if you vote "Agree" on Question 2, insert the applicable letter(s) selections in the comment field which can be found in the Instructions box on the ballot site.**

You must hit SUBMIT to SAVE your work**. Note**: the system session will time you out after 60 minutes; any work not submitted at that time will not be saved! You may return to finish or change your ballot at any time up to the closing date. Ballot comments exceeding 4,000 characters must be submitted in a Word document via email, to Sarah Caldwell at scaldwell@nfpa.org.

The return of ballots is required by the *Regulations Governing the Development of NFPA Standards.*

Attachment: Public Comments

NFPA 855-2020 Edition
Standard for the Installation of Stationary Energy Storage Systems
TIA Log No.: 1486
Reference: 4.11.2.1, 4.11.2.1.1, and A.4.11.2.1.1
Comment Closing Date: March 12, 2020
Submitter: E. Paul Hayes, American Fire Technologies
www.nfpa.org/855

1. Revise 4.11.2.1 to read as follows:

4.11.2.1 Sprinkler systems for ESS units (groups) with a maximum stored energy of 50 kWh, as described in 4.6.2, shall be designed using a minimum density of 0.3 gpm/ft^2 (12.2 mm/min) based over the area of the room or 2500 ft^2 (230 m^2) design area, whichever is smaller, unless a lower density is approved based upon large-scale fire testing in accordance with 4.1.5.

2. Revise 4.11.2.1.1 to read as follows:

~~**4.11.2.1.1**~~**4.11.2.2*** Sprinkler systems for ESS units (groups) exceeding 50 kWh shall ~~be permitted to~~ use ~~an alternate~~ a density based on large-scale fire testing in accordance with 4.1.5.

3. Revise A.4.11.2.1.1 to read as follows:

~~**A.4.11.2.1.1**~~ **A.4.11.2.2** UL 9540A Installation Level Test, Method 1, provides the data needed to determine if automatic sprinkler design densities can be changed. A sprinkler density in excess of 0.3 gpm/ft^2 (12.2 mm/min) can be necessary to provide an adequate level of protection, especially for some lithium-ion battery ESS designs. However, test results for some ESS designs and technologies indicate sprinkler densities less than 0.3 gpm/ft^2 (12.2 mm/min) could be acceptable. Equivalent test standards, as permitted in 4.1.5, might provide comparable data.

Substantiation: Recent fire testing and fire research on protecting ESS with automatic sprinkler systems, in particular protecting lithium-ion battery based ESS, suggest that a sprinkler density of 0.3 gpm/ft^2 may not provide adequate fire control and suppression. This is of particular concern for larger ESS units above 50 KWh. This TIA revises Section 4.11.2 to require sprinkler densities for these individual ESS > 50 KWh to be established based on UL 9540A fire testing, as referenced in Section 4.1.5.

The TIA does not change the current code requirements that exempt sprinkler protection in certain applications, see Sections 4.11.4 through 4.11.9. This includes lead acid battery systems in certain telecommunication, electric utility, UPS and other installations.

Emergency Nature: The proposed TIA intends to correct a previously unknown existing hazard.

Without changes to the code prior to publication, there is a risk to the public by accepting the existing language. The suppression requirements of .3 gpm density would not control the fire in an ESS of 50 kwh. In an urban or mixed us environment the fire would continue to propagate and potentially spread to other areas and building threating life and safety of the occupants. The FM and Fire Protection Research Foundations reports on Full scale fire testing have indicated the above findings.

Foran, Rosanne

Comment No. 1
OPPOSE

From:
Sent: Wednesday, February 19, 2020 12:36 PM
To: Shared TIAs
Subject: Proposed Tentative Interim Amendment (TIA): No. 1486, Reference:4.11.2.1, 4.11.2.1.1, A.4.11.2.1.1, comment closing date: March 12, 2020

To Whom it may concern,

Has fire testing performed by FM Global been included in the development of this statement and others under consideration for inclusion or modification to the NFPA 855 document. There are clearly different fire risk levels based on type of lithium chemistry used in a cabinetized or ESS system.

Research testing, performed by FM Global in conjunction with the Property Insurance Research Group (PIRG) and in partnership with the Fire Protection Research Foundation (FPRF) (**RESEARCH TECHNICAL REPORT:** ***Development of Sprinkler Protection Guidance for Lithium Ion Based Energy Storage Systems*** **)** All test evaluations were conducted by FM Global at the FM Global Research Campus in Rhode Island, USA.

In the Executive Summary, FM Global states:
The ESS available for this project phase were donated by a single integrator and were based on either LFP or NMC battery chemistry. Both systems were similar in construction with solid metal side and back wall, an open front, and contained 16 modules arranged in eight levels of two modules. At all test scales, which ranged from a single battery module to full ESS racks containing 16 modules each, the ESS system comprised of LFP batteries exhibited a lower overall hazard. This was most notably observed in the sprinklered tests where a single sprinkler operation was sufficient to control the fire to the rack of origin, with no significant involvement of the modules in an adjacent rack. Under the same conditions the fire did spread to an adjacent rack in the test involving a system comprised of NMC batteries, and the number of sprinkler operations represented a demand area greater than 230 m2 (2,500 ft2).

While the design of the racks effectively shields the fire from sprinkler water, under the conditions of the tests, the sprinklers delayed or outright prevented fire spread to adjacent racks. Coupled with adequate space separation from nearby combustibles and the addition of thermal barriers between racks, the hazard can be further decreased. However, lacking a protection system that can suppress the fire in the early stages, prolonged fire duration, high water demand, and damage to the surroundings is likely. Protection guidance coupling sprinkler system design and ESS installation guidance, e.g., separation distance, is thus recommended to manage the hazard within acceptable levels.

There is a significant amount of information on the tests performed, data collected, and conclusions in the 116 page report listed above. With a generalized requirement in 855 based on the worst offender puts the other safer chemistries at a cost disadvantage in the market. Differences if fire risk/safety need to be broken out by chemistry.

Regards,

Tom Lynn
CMO/Technical Director
LiiON, LLC

Comment No. 2
OPPOSE
Page 1 of 1

From:	Carey, Kelly
To:	Carey, Kelly
Subject:	Comment on Proposed TIA 1486 on NFPA 855
Date:	Wednesday, March 11, 2020 10:22:44 AM

From: Gary Balash
Sent: Tuesday, March 10, 2020 3:00 PM
To: Shared TIAs
Subject: Comment on Proposed TIA 1486 on NFPA 855

I would like to comment regarding TIA#1486 as written and submitted.

In general terms the TIA is not of an emergency nature, so it should be rejected. There are concerns that the minimum sprinkler density of .3gpm/sq. ft. would not be efficient for some lithium technologies regardless of size.

The TIA is very broad and includes all technologies, not specifically for the concern of lithium, which the TIA is based on large scale fire testing of lithium.

4.11.2.1

States ESS units of 50Kwh shall be designed using minimum density of .3gpm/ sq.ft. Smaller density sprinklers require UL9540A large scale fire test per Installation level test, which would be quite expensive to conduct. But it does not state that lithium could require large density than the minimum .3gpm/sq.ft. by conducting UL9540A large scale fire test at the Installation level test.

4.11.2.1.1

ESS units exceeding 50Kwh shall use a density based on UL9540A large scale fire test per Installation level test. This is very broad, so it basically states all technologies are required UL9540A large scale fire test at the Installation level test to determine density. When again, this was submitted solely based on lithium fire testing.

A4.11.2.1.1

This wording is obviously different, but still is stating you need to conduct UL9540A large scale fire test at the Installation level test for all technologies.

This is too broad of a proposal and should be rejected. Even though there are some exemptions for certain applications which are stated in the "Substantiation" such as, Telecom and UPS. But these are not all inclusive, only Telecom <60vdc and UPS's labeled in accordance with UL1778.

Not all UPS systems are UL1778, due to systems put together using different vendors for inverters, batteries, and cabinets or racks.

These UPS systems are not like all inclusive cabinetized UPS from 1 single vendor. These systems would be out of scope and require UL9540A large scale fire testing at the installation level test. This could include many different configurations and would require each installation level test, based on how it is proposed. And who would have the burden to do the test and more importantly the cost that would be inquired?

There is no emergency in nature and there should be more dialogue and to be submitted into the next edition of the standard.

Thank you,

Gary M. Balash
Senior Product Manager
Reserve Power Sales

East Penn Manufacturing Co.