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MEMORANDUM

TO: Technical Committee on Energy Storage Systems

FROM: Sarah Caldwell, *Technical Committee Administrator*

DATE: March 9, 2020

SUBJECT: NFPA 855 Proposed TIA No. 1486 **PRELIMINARY TC BALLOT RESULTS**

According to 5.6(a) in the NFPA *Regs*, the preliminary results show this TIA **HAS** achieved the ¾ majority vote needed on both Ballot Item No. 1 (**Technical Merit**) and Ballot Item No. 2 (**Emergency Nature**).

40 **Eligible to Vote**
9 **Not Returned** (*Barrett, Chatwin, Ginder, Knedlhans, Krcmar, Mikolajczak, Orvedal, Ruetenik, Warner*)

Technical Merit:
0 Abstentions
26 Agree (w/comment: *Bartling, Beach, Biggins, Blum, Florence, Fok, Gerczynski, Gromadzki, Mirek, Rogers, Schlueck, Towski*)
5 Disagree (*Cantor, Houston, Perry, Schubert, Woodfin*)

Emergency Nature:
1 Abstentions *(Mirek)*
25 Agree (w/comment: *Beach, Biggins, Conover, Florence, Fok, Gerczynski, Grahor, Kennedy, McKinch, Rogers, Towski*)
5 Disagree (*Cantor, Houston, Perry, Schubert, Woodfin*)

There are two criteria necessary to pass ballot [(1) simple majority (2) affirmative ¾ vote]. Both questions must pass ballot in order to recommend that the Standards Council issue this TIA.

(1) In all cases, an affirmative vote of at least a simple majority of the total membership eligible to vote is required.

[40 eligible ÷ 2 = 20 + 1 = **(21)**]

(2) The number of affirmative votes needed to satisfy the ¾ requirement is:
Technical Merit: (40 eligible to vote - 9 not returned - 0 abstentions = 31 × 0.75 = 23.25 = **24**)
Emergency Nature: (40 eligible to vote - 9 not returned - 1 abstentions = 30 × 0.75 = 22.5 = **23**)

Ballot comments are attached for your review.

This proposed TIA has been published for public comment in the March 2020 issue of *NFPA News* with a Public Comment Closing Date of March 12, 2020. Any public comments received will be circulated to the committee. The Standards Council will consider the issuance of this TIA.

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.

A. The standard contains an error or an omission that was overlooked during the regular revision process.

B. The NFPA Standard contains a conflict within the NFPA Standard or with another NFPA Standard.

C. The proposed TIA intends to correct a previously unknown existing hazard.

D. The proposed TIA intends to offer to the public a benefit that would lessen a recognized (known) hazard or ameliorate a continuing dangerous condition or situation.

E. The proposed TIA intends to accomplish a recognition of an advance in the art of safeguarding property or life where an alternative method is not in current use or is unavailable to the public.

F. The proposed TIA intends to correct a circumstance in which the revised NFPA Standard has resulted in an adverse impact on a product or method that was inadvertently overlooked in the total revision process or was without adequate technical (safety) justification for the action.

NFPA 855 TIA 1486 Preliminary Ballot Results
Election:855_A2022_ESS_AAA_Log1486_tiaballot
Results by Revision

QUESTION NO. 1: I AGREE with the TECHNICAL MERITS of the NFPA 855 Proposed TIA Log No. 1486 to Revise sections 4.11.2.1, 4.11.2.1.1, and

Eligible to Vote: 40

Not Returned : 9

David B. Ginder,Nick Warner,Cliff Orvedal,Troy Chatwin,Angela Krcmar,Jim P. Barrett,George Andrew Ruetenik,Jason Knedlhans,Celina Mikolajczak

Vote Selection	Votes	Comments
Agree	26	
Stephen W. Douglas		A
Scot Pruett		Agree
James B. Biggins		The proposed change is needed to clarify that any installation over 50 kWh requires sprinkler protection based on fire testing rather than just defaulting to the 0.30 referenced in the document. This was the intent of the TC and present wording could create confusion and misapplication of protection. It is important to note the TIA does not effect those installations (lead acid battery systems in telecom, electric utility and UPS applications) that are presented with exemptions from sprinkler protection in other sections of the standard.
Chris Towski		Thanks Paul for your work on this.
Andrew Blum		The proposed changes are needed to clarify that installations over 50 kWh requires sprinkler protection based on fire testing rather than just defaulting to the 0.30 referenced in the document.

Laurie B. Florence	We agree with the technical merits of the TIA and think it includes requirements that are better than the existing standard language. However, we feel that additional clarification is needed during the next standard's development cycle to clarify that, even if favorable UL 9540A unit level or installation level test results are obtained, that a minimum 0.1 gpm/ft2 design density is needed in the room or area. This is because the sprinkler system serves two purposes, to protect exposures from a fire originating within the ESS, and to protect ESS from an external exposure fire.
Terrance L. McKinch	Agree
Paul G. Rogers	This will help to make sure proper fire suppression is installed for systems above 50 kWH . UL 9540 A data will help drive the water density and is needed to help prove that the water density for systems are proper for the ESS installation.
Denise Beach	I agree with the technical merits of the TIA.
Chad Kennedy	Agree
Jonathan G. Ingram	Agree
Kevin Fok	Agree based on National Fire Research Foundation and FM Global testing results.
Lou Grahor	Agree
Paul Kozak	Agree
Nicholas Guzman	Agree
Mark Christopher Mirek	I agree with the suggested revisions based upon the current large scale test results.
David Richard Conover	Agree.

John A. Hillaert	Agree
Jan Gromadzki	Agree - this now bases sprinkler density requirements on full scale testing results
Richard Karl Schlueck	Agree, however they prescriptive requirements of 0.3gpm/ft2 might not be sufficient protection for certain technologies. Due to the lack of testing, this design density could be sufficient for less volatile chemistries but could be insufficient for more energy-dense Lithium Ion tech. Unfortunately, with lack of testing, it is difficult to determine that this would be sufficient.
Brandon Bartling	I agree that this is necessary due to the recent information. There is concern that everything will eventually be pushed to UL9540 testing and that the only way systems will be installed is if they do the testing.
Jody Leber	Agree
Brad Kell	Agree
Andrzej Skoskiewicz	Agree.
Kara Gerczynski	Fire officials will now have design guidance based on recent fire research and testing to protect the hazard.
Roger Lin	Agree
Disagree	5
Ronald W. Woodfin	The referenced FM / Fire Protection Research Foundation report contained results for testing of two types of lithium ion batteries. The proposed changes would affect all battery chemistries, not just the lithium ion batteries that were tested. Changes to fire protection requirements for all other chemistries lack technical substantiation and should not be included in this TIA.

Justin A. Perry	The substantiation provided for this TIA is from testing conducted on lithium ion technology, but the proposed change will affect legacy battery technology (lead acid / nickel cadmium) without any technical justification. The NFPA 855 committee needs to recognize the difference in hazards posed by an individual battery technology, instead of requiring all technologies to install mitigations required for the increased hazard posed by lithium ion. I support changing the fire suppression requirements for lithium ion, but the TIA should be written specifically for that technology. This issue was raised by a number of committee members when a similar TIA was circulated in October
James Houston	Lead acid batteries do not pose the same fire hazard as Lithium Ion batteries and should not treated the same. A TIA that limits the suppression requirements to Lithium Ion technology would be appropriate.
William P. Cantor	The change requires all battery systems over 50 kWh to undergo a UL 9540a test in order to determine the sprinkler system density. This is too broad, and the change is only based on fire testing of Li Ion batteries. It is estimated that there are over 100,000 lead-acid battery installations that do not meet one of the exemptions in section 4.11. It is estimated that there will be thousands of additional lead-acid sites installed every year that also do not meet these exemptions. To date, no lead-acid battery has completed a UL 9540a test and there has yet to be an agreed upon method in UL 9540a to induce thermal runaway in lead-acid batteries. This new restriction will create an unnecessary burden on the lead-acid industry with no improvement in safety.

Randy H. Schubert		I agree with technical merits requiring adequate suppression rates, however, the substantiation is using test results for only lithium battery technologies and applying to all energy storage technologies and chemistries. It is recommended to either limit the technical revision to fire suppression of lithium-ion battery ESS or expand on the justification with additional test data or concerns which support the need to revise the fire suppression approaches for other ESS chemistries and types.
Abstain	0	

QUESTION NO. 2: I AGREE that the subject is of an EMERGENCY NATURE for one or more of the reasons noted in the Instructions box.

Eligible to Vote: 40

Not Returned : 9

David B. Ginder,Nick Warner,Cliff Orvedal,Troy Chatwin,Angela Krcmar,Jim P. Barrett,George Andrew Ruetenik,Jason Knedlhans,Celina Mikolajczak

Vote Selection	**Votes**	**Comments**
Agree	25	
Stephen W. Douglas		A
Scot Pruett		A
James B. Biggins		The TIA is necessary to correct a potential mis-interpretation of sprinkler protection requirements in the standard.

Chris Towski	C. Certainly agree that this should be implemented, if it can prevent an immediate or imminent danger, seeing the apparent research was not in place prior to the printing of 855. Not sure if this could or should wait for further discussion or at least in my case further learning. I do suppose this will come up at the next committee meeting. This truly has me wondering if it is even enough based on how much we still may not know in this area about ESS.
Andrew Blum	C
Laurie B. Florence	we think that this proposal meets criteria (D.) The proposed TIA intends to offer to the public a benefit that would lessen a recognized (known) hazard or ameliorate a continuing dangerous condition or situation.
Terrance L. McKinch	The proposed TIA intends to correct a circumstance in which the revised NFPA Standard has resulted in an adverse impact on a product or method that was inadvertently overlooked in the total revision process or was without adequate technical (safety) justification for the action.
Paul G. Rogers	This is very important and needs to addressed forthwith.
Denise Beach	I agree that the TIA meets the threshold for emergency nature.
Chad Kennedy	A. The standard contains an error or an omission that was overlooked during the regular revision process.
Jonathan G. Ingram	Agree
Kevin Fok	D. Based on National Fire Research Foundation and FM Global testing results
Lou Grahor	The proposed TIA intends to correct a previously unknown existing hazard.
Paul Kozak	E

Nicholas Guzman	Agree
David Richard Conover	The proposed TIA intends to offer a benefit that would lessen a recognized (known) hazard and also accomplishes a recognition of an advance in the state of the art in protection of property by citing an alternative method for fire protection.
John A. Hillaert	C. The proposed TIA intends to correct a previously unknown existing hazard.
Jan Gromadzki	C
Richard Karl Schlueck	C
Brandon Bartling	C. The proposed TIA intends to correct a previously unknown existing hazard.
Jody Leber	C
Brad Kell	C. The proposed TIA intends to correct a previously unknown existing hazard.
Andrzej Skoskiewicz	D.
Kara Gerczynski	Fire Officials are using densities that may not be correct for the hazard being protected. The standard is being used to design these systems now and this TIA will guide code officials on design requirements based on fire research and testing.
Roger Lin	Agree

Disagree	5
Ronald W. Woodfin	The referenced FM / Fire Protection Research Foundation report contained results for testing of two types of lithium ion batteries. The proposed changes would affect all battery chemistries, not just the lithium ion batteries that were tested. Changes to fire protection requirements for all other chemistries lack technical substantiation and should not be included in this TIA.
Justin A. Perry	See comments regarding technical merit
James Houston	Lead acid batteries have been in service for over 100 years with the same hazards then as now.
William P. Cantor	The TIA is too broad and needs to be rewritten
Randy H. Schubert	While further work to protect lithium ion installations is required, the fire risks and suppression was well known during the recent completion of the 2020 edition of the code. Recommend a detailed section in the next draft utilizing existing and new test data.
Abstain	1
Mark Christopher Mirek	Large scale testing on this technology will continue in the near and long term. We cannot create an emergency situation each time new, and possibly negative fire test results are published.