

PROPOSAL TO THE 8th EDITION OF FLORIDA FIRE PREVENTION CODE

PART I

TRANSMIT TO:

Division of State Fire Marshal
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DSFM USE ONLY

Log # P1-002

Date Rec'd 09/17/2021

NOTE: If you need further information on this process, please contact the Fire Prevention Bureau at 850/413-3736.

Please review the evaluation criteria (Part II) and Fiscal Impact Statement before completing this proposal. A separate submittal is required for each proposed amendment.

Type or print legibly in black ink.

Date 9-14-2021 Proponent: Scott Lang Tel. No. 630-762-5257

E-Mail scott.lang@honeywell.com

Company Honeywell

Street Address 3825 Ohio Ave

City St. Charles State IL Zip 60174

Organization Represented (if any) _____

Local Ordinance No. _____ Jurisdiction _____ Section/Paragraph _____

NFPA Standard No. and edition year NFPA 1 2021 Section/Paragraph 52.5

Indicate One (Designate by "X" at the end of the line):

1. Revise section to read: _____
2. Add new section to read: X _____
3. Delete section without substitution: _____
4. Delete section and substitute the following: _____

Proposal (underline proposed new wording or strike-through the wording to be deleted):

52.5.1 Lithium-ion based electrochemical energy storage systems shall be provided with a system to detect the initial venting of flammable electrolyte vapors produced by a cell undergoing an abuse condition prior to thermal runaway.

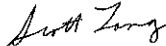
52.5.1.1 The sensing of vented electrolyte vapors shall trigger the electrical isolation of the ESS.

52.5.1.2 The control unit of the electrolyte vapor sensing system shall signal a constantly attended on-site location or an off-site monitoring location in accordance with NFPA 72.

Statement of Problem and Substantiation for Proposal (Note: State the problem that will be resolved by your recommendation; give the specific reason for your comment including copies of tests, research papers, fire experience, etc. If more than 200 words provide an abstract and describe the source document.) (Must be filled in to be considered):

Lithium-ion batteries are becoming the preferred technology for electrochemical energy storage systems because of their energy density, among other favorable properties. However, when li-ion cells undergo an abuse condition such as overheating, overcharging, or mechanical damage, they can undergo thermal runaway that cascades from cell to cell leading to a large scale problem. NFPA 855 (referenced by NFPA 1) does not currently adequately address the potential failure of these systems.

Fortunately, li-ion cells will release a trace amount of flammable electrolyte vapors during an initial venting phase prior to thermal runaway. If these gases are detected, actions can be taken that will prevent thermal runaway and cascading thermal event. There are multiple, commercially available systems that are capable of detecting this initial gas venting event. However, traditional gas sensors that are designed to detect flammable gases at much higher levels such as the lower flammable limit are not capable of detecting these trace levels of electrolyte vapors.



Signature (Required)

Scott Lang

Printed Name

To be considered, proposals must be received by September 30, 2021

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PART II

FLORIDA FIRE PREVENTION CODE	EVALUATION CRITERIA
	LOG NUMBER

The base codes for the Florida Fire Prevention Code shall be **NFPA-1, 2021** and **NFPA-101, 2021**

IMPACT (select one)	STATEWIDE: X	COUNTY:	CITY:
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Describe the geographical area of impact:
Impact is statewide wherever energy storage systems may be deployed.

1. The proposal shall identify the code section or local ordinance to be modified.
2. The proposal (Part I and Part II) along with Financial Impact Statement may be submitted electronically; however, a hard copy is required as follow-up.

Submit this evaluation with each proposed amendment.

1. How does the proposal strengthen the base code to enhance safety in Florida?

The proposal requires a greater level of protection than is currently afforded by the model fire code. NFPA 1 refers to NFPA 855. However, NFPA 855 only has a vague requirement to "preclude, detect, and minimize" the impact of thermal runaway in section 9.3. The standard further allows for the battery management system to provide this protection, without any prescriptive requirements on how to do that. By detecting the initial cell venting and taking appropriate action, thermal runaway can be prevented because that initial venting occurs several minutes before thermal runaway.

2. Is the proposal easy to understand and how does it contribute to a user-friendly code?

The proposal uses standard terminology from energy storage system testing conducted by Underwriters Laboratories related to UL 9540A.

3. Document the proposal's technical merit and how it is supported by a scientific basis?

UL's report, UL 9540A Installation Level Tests with Outdoor Lithium-ion Energy Storage System Mockups (April 2021) provides data from several large scale tests of battery systems. During these tests, the sequence of events that takes place when a cell is undergoing abuse is clearly shown. That is, there is an initial cell venting of a trace amount of electrolyte several minutes before transitioning to full thermal runaway. This is the critical time that allows for action to be taken prior to thermal runaway.

4. Describe how will the proposal be enforceable?

The proposal will be enforceable by simply making sure that a system for the detection of electrolyte vapors from a cell venting is in place and installed according to manufacturer's instructions.

5. How does the proposal affect Florida's diverse conditions such as climate, construction and population?

This proposal will mesh well with Florida's renewable energy targets. As more renewable energy is used, energy storage is required. The preferred chemistry for energy storage is lithium-ion because of its energy density and long life. Energy storage systems are frequently sited near population centers and the technology described in this proposal can allow them to operate safely.

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Fiscal Impact Statement

Provide the estimated cost of the proposed amendment to the Florida Fire Prevention Code for each of the following questions. Cost data should be accompanied by a list of assumptions and support documentation.

1. Will the proposed amendment have an impact on the local entity relative to the implementation and enforcement of the proposed amendment?

None

Minimal, Provide a brief explanation: Implementation and enforcement will add minimal time to verify the installation of the detection equipment. This verification is already done for existing gas and fire detection requirements.

Other, Provide an explanation for estimate and methodology used:

2. Will the proposed amendment have an impact on the business/property owner relative to the cost of compliance with the proposed amendment?

None

Minimal, Provide a brief explanation: The cost to the owner will be similar to the cost that is required for fire detection systems. There will be cost avoidance by preventing large scale disasters such as the one in Surprise, Arizona that resulted in several injuries among the responding fire service personnel.

Other, Provide an explanation for estimate and methodology used:

3. Will the proposed amendment have an impact on small counties or small cities?

(A "small city" is defined by section 120.52, F.S., as any municipality that has an un-incarcerated population of 10,000 or less according to the most recent decennial census. A "small county" is defined by section 120.52, F.S., as any county that has an un-incarcerated population of 75,000 or less according to the most recent decennial census.)

No adverse impact on small cities or small counties

Minimal, Provide a brief explanation:

Other, Provide an explanation for estimate and methodology used:

Provide a good faith estimate of the number and types of affected persons/entities:

- (1) The number of individuals and entities likely to be required to comply with the rule: This number depends on the number of entities that are contemplating installation li-ion based energy storage systems that exceed the capacity defined in NFPA 855.
- (2) A general description of the types of individuals likely to be affected by the rule: Owners/operators of₃ Electrochemical Energy Storage Systems based on lithium-ion technology.