ILLINOIS IBEW RENEWABLE ENERGY FUND

Preparing for Battery Energy Storage Systems Codes and Standards

Metropolitan Mayors Caucus Environment and Energy Committee
October 27, 2026

Presenter Bio

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NABCEP Vice Chair, Board of Directors
NFPA 855 Technical Committee, Principal
NFPA 800 Technical Committee, Principal
NFPA 88A Technical Committee, Principal
UL Technical Committees 2703, 3700, 3703, 7103, 9540
City of Chicago Supervising Electrician
IREC Certified Master Trainer™ PVIP
NABCEP Certified® PVIP, PVTS, PVSI
Electrical Training Alliance EVITP, PV, and BESS Curriculum Developer and Master Trainer
Over 25 years in the solar, energy storage, and electric vehicle charging industries

How can municipalities prepare for BESS?

- Adopt current Building Codes and Standards that address modern BESS.
- Update permitting, plan review, and inspection procedures to include all provisions for BESS installations.
- Coordinate with the local Fire Department on emergency response and hazard awareness.

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BESS in the current Building Codes

- NFPA 70: National Electrical Code, Articles 706 & 480
  - NFPA 70B: Standard for Electrical Equipment Maintenance, Chapter 32
  - NFPA 70E: Electrical Safety in the Workplace, Article 360
- International Building Code, Section 430
- International Residential Code, Section R330
- International Fire Code, Section 1207

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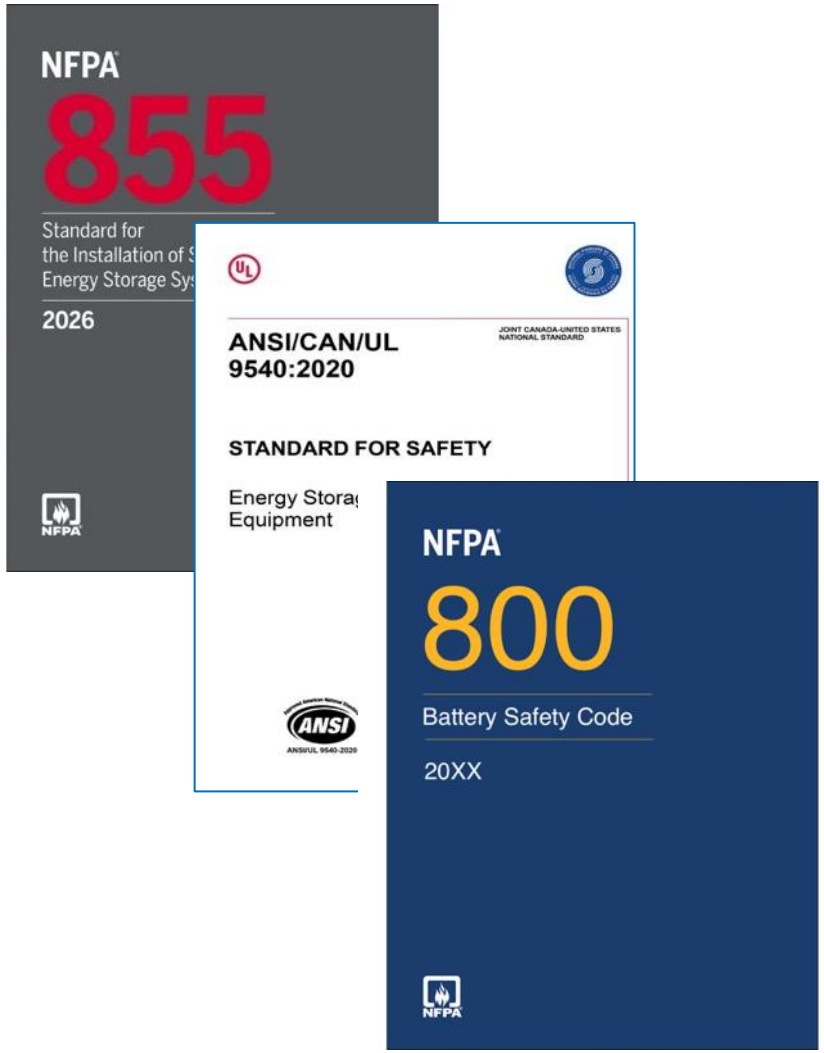
ESS Standards

- **NFPA 855: Standard for the Installation of Stationary Energy Storage Systems**
- UL 9540: Standard for Safety Energy Storage Systems and Equipment
- UL 9540A: Test Method for Evaluating Thermal Runaway Fire Propagation in Battery Energy Storage Systems
- Other equivalent fire testing
- NFPA 800(PS): Battery Safety Code



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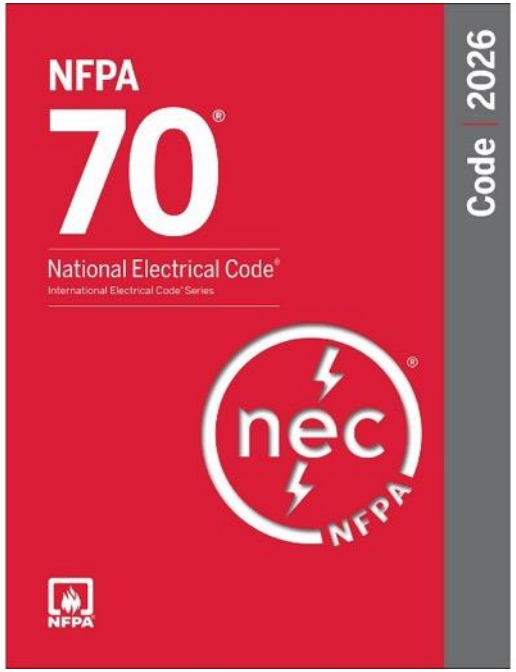
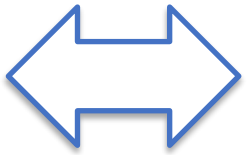
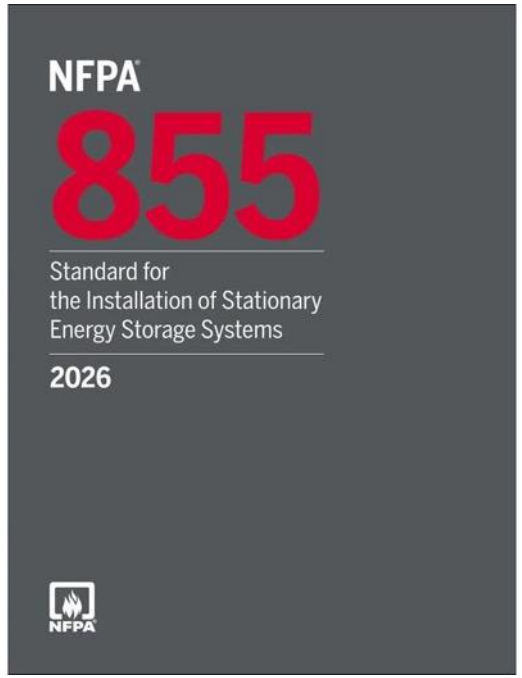
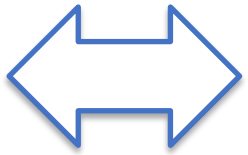
Why do we need NFPA 855?

National Electrical Code









NFPA Standards

I-Codes

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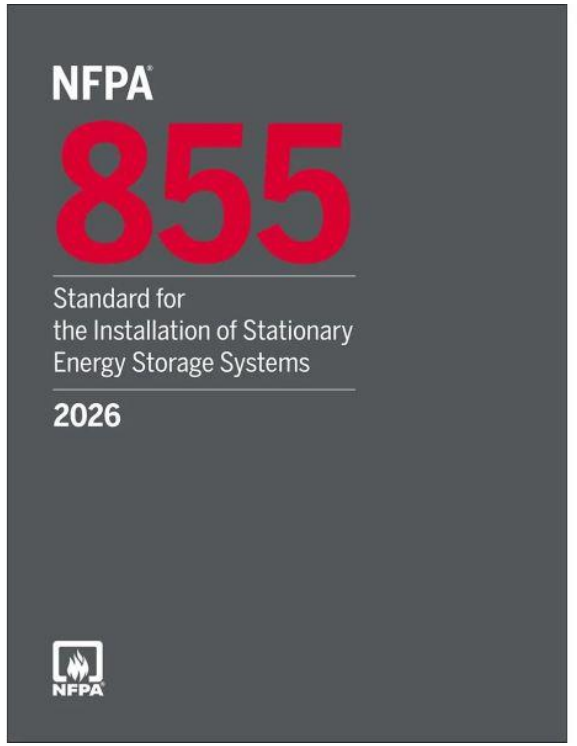
What does NFPA 855 cover?

- Article 1.1 Scope. This standard applies to the design, construction, installation, commissioning, operation, maintenance, and decommissioning of stationary energy storage systems (ESS), including mobile and portable ESS installed in a stationary situation, and the storage of lithium metal and lithium-ion batteries.
    - ESS over 1 kWh in capacity installed indoors and outdoors
    - Hazard Mitigation Analysis (HMA)
    - Fire/explosion testing requirements
    - Interconnection, commissioning, and decommissioning ESS
    - Chemistry and technology specific requirements
    - Storage of Lithium Metal and Lithium-Ion batteries
    - Residential installations
    - Informational Annexes

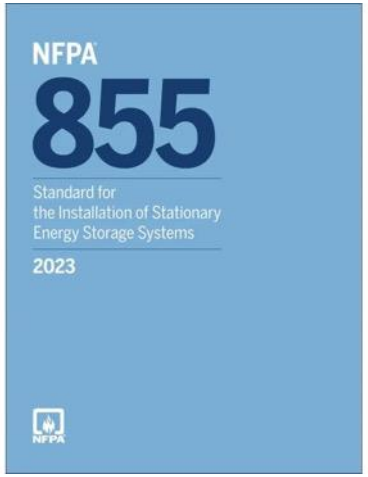


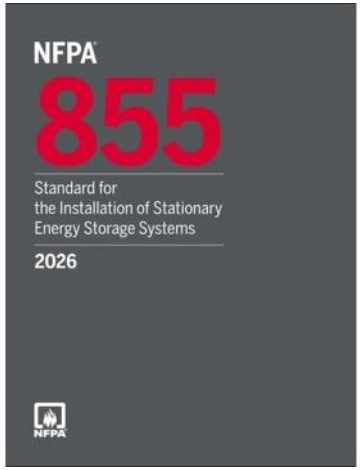
Residential BESS Locations Not Permitted by Code

- National Electrical Code
  - kitchens
  - bathrooms
  - clothes closets
- Fire Codes
  - sleeping rooms
  - hallways leading into sleeping rooms
- NFPA 855
  - any occupied space
  - when installed outdoors, within 3 feet of doors or windows leading into the occupied space

What Codes are enforced in your area?

2026 NFPA 855 Changes for Residential Systems





Area	Maximum Stored Energy
Utility closets, storage or utility spaces	40 kWh
Garages and detached structures	80 kWh
Exterior walls	80kWh
Outdoor installations	80kWh

2026 NFPA 855 Table 15.5.2	
Area	**Maximum Stored Energy**
Utility closets, storage, utility spaces	40 kWk
Attached garages	100 kWh
On or within 3' of exterior walls of dwellings	200 kWh
Outdoors on the ground	200 kWh
In detached garages and structures	200 kWh
In detached garages and structures at least 10' from property lines or dwellings	600 kWh
Outdoors on the ground at least 10' from property lines or dwellings	600 kWh

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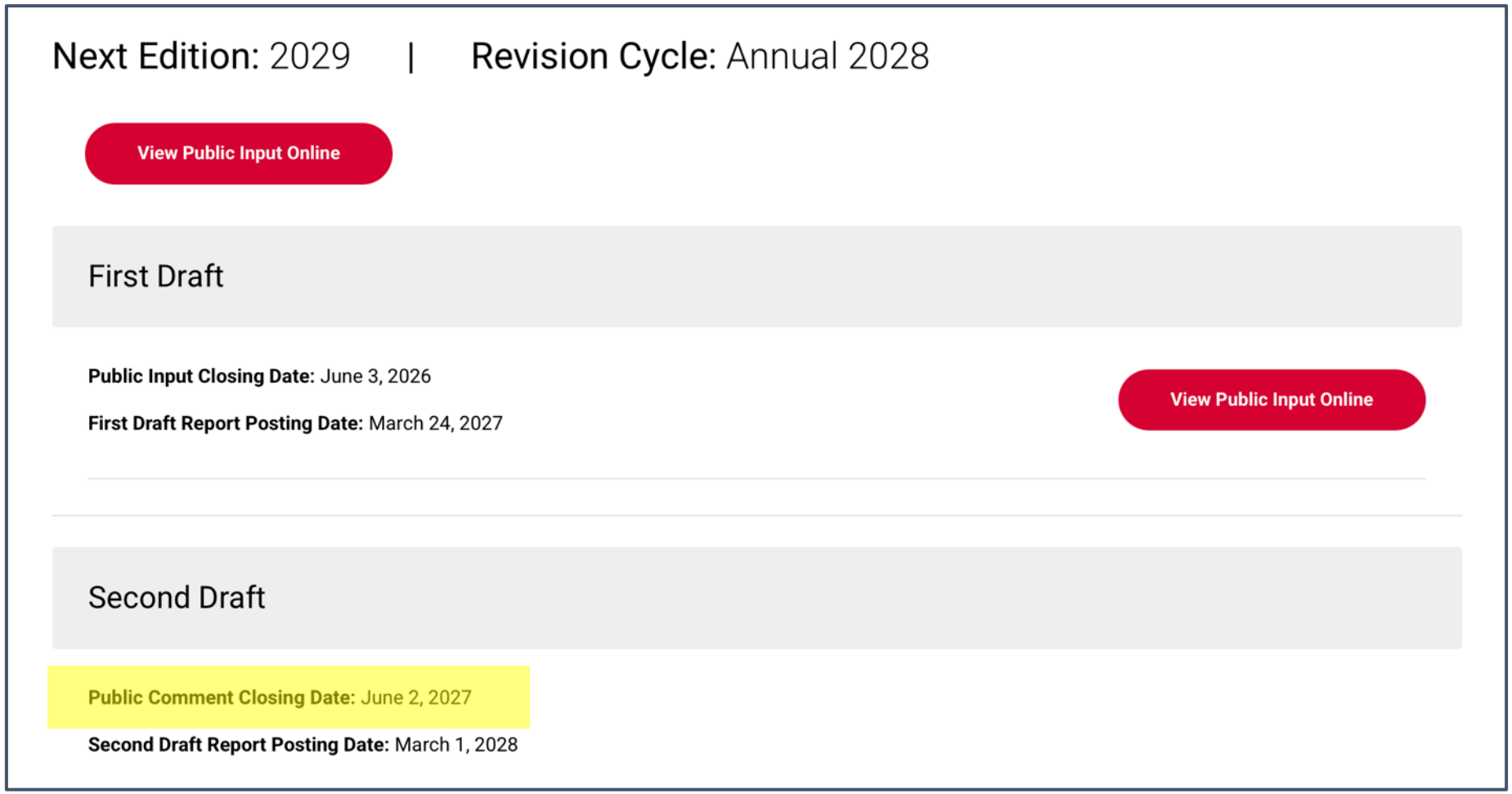
2029 NFPA 855 Development



https://www.nfpa.org/codes-and-standards/nfpa-855-standard-development/855

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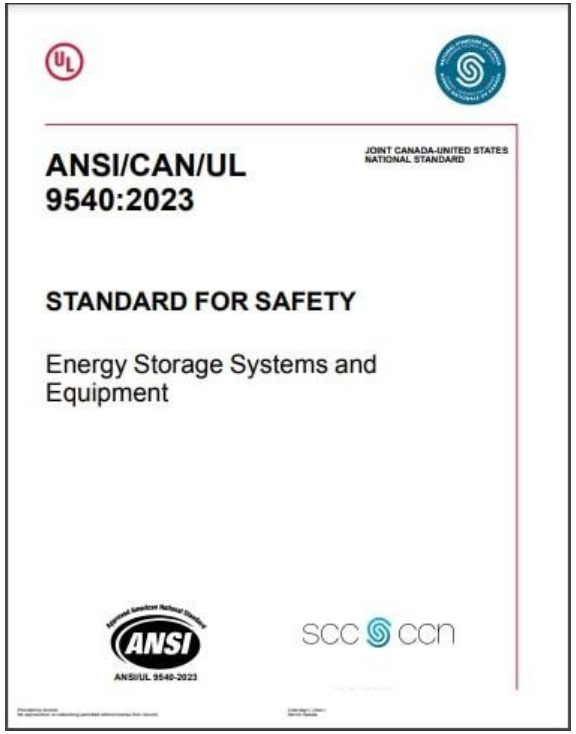
UL 9540: Energy Storage Systems and Equipment

- System-Level Certification
  - BESS include several components, each with an applicable UL Standard, that are assemble together as one system.
- Comprehensive Hazard Evaluation
  - Systems are tested for electrical functions, mechanical integrity, environmental cycling, and seismic considerations, and more.
- Required Certification per Building Codes
  - Only BESS that have passed all UL 9540 tests will be certified or “listed”. The NEC, IFC, IBC, IRC, and NFPA 855 require compliance.
- Required Certification for Utility Interconnection
  - Utilities mandate compliance for systems that will interact with the electrical grid, charging and discharging, to ensure safety.



UL9540

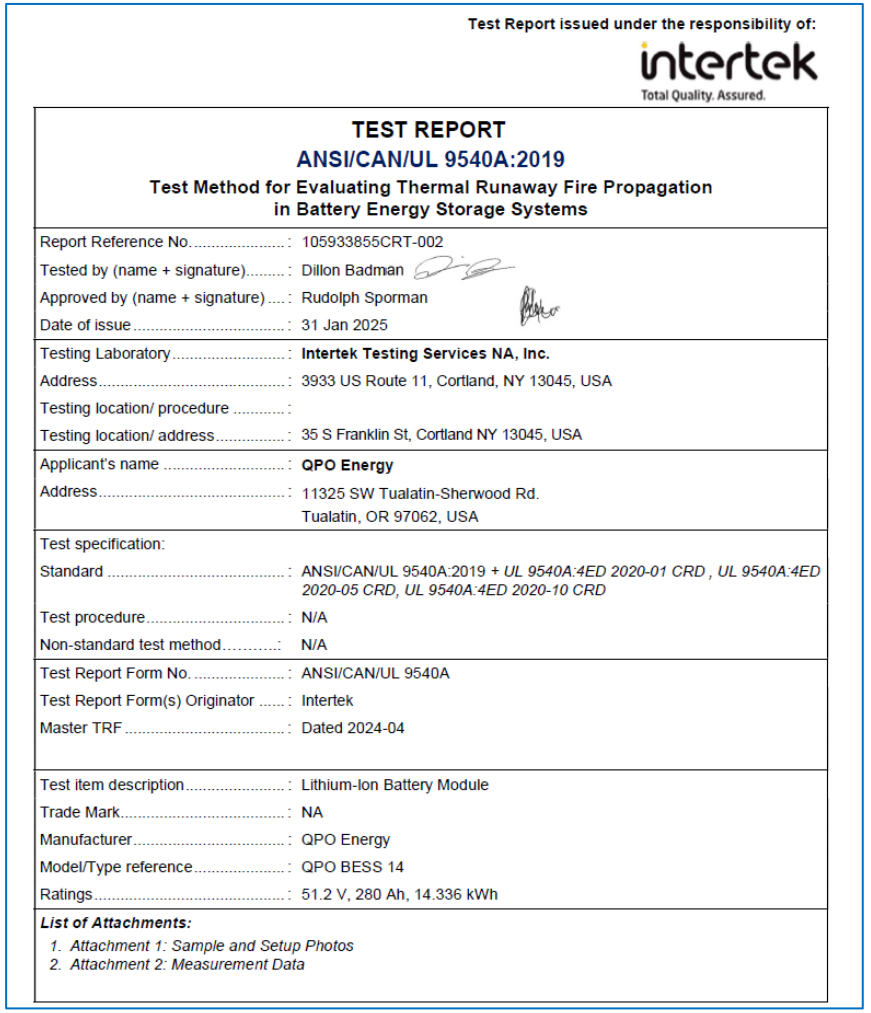
CERTIFIED TO UL 9540 Intertek

UL 9540A Test Method for Thermal Runaway

- Cell Level Test
  - Whether cell can exhibit thermal runaway
  - Thermal runaway characteristics
  - Vent gas composition (flammability)
- Module Level Test
  - Propensity of propagation
  - Heat and gas release (severity and duration)
  - Flaming and deflagration hazards
- Unit Level Test
  - Evaluation of fire spread
  - Heat and gas release (severity and duration)
  - Flaming and deflagration hazards
  - Reignition hazard
- Installation Level Test
  - Effectiveness of fire protection
  - Heat and gas release (severity and duration)
  - Flaming and deflagration hazards
  - Reignition hazard

UL 9540A Test Report Example

- UL 9540A Test reports DO NOT generate a listing or certification label to be verified in the field.
- The reports are provided by installation contractors to be referenced by AHJs to determine unit to unit spacing and/or installation locations permitted.
- The test reports are the result of a thermal runaway events triggered by the lab by heating cells beyond the temperature rating.
- Key information includes: cell chemistry, stored energy capacity, whether a thermal runaway occurs, volume and composition of gasses released during event, and propagation to adjacent systems or equipment.



Test Report issued under the responsibility of:

intertek
Total Quality. Assured.

TEST REPORT
ANSI/CAN/UL 9540A:2019
Test Method for Evaluating Thermal Runaway Fire Propagation in Battery Energy Storage Systems

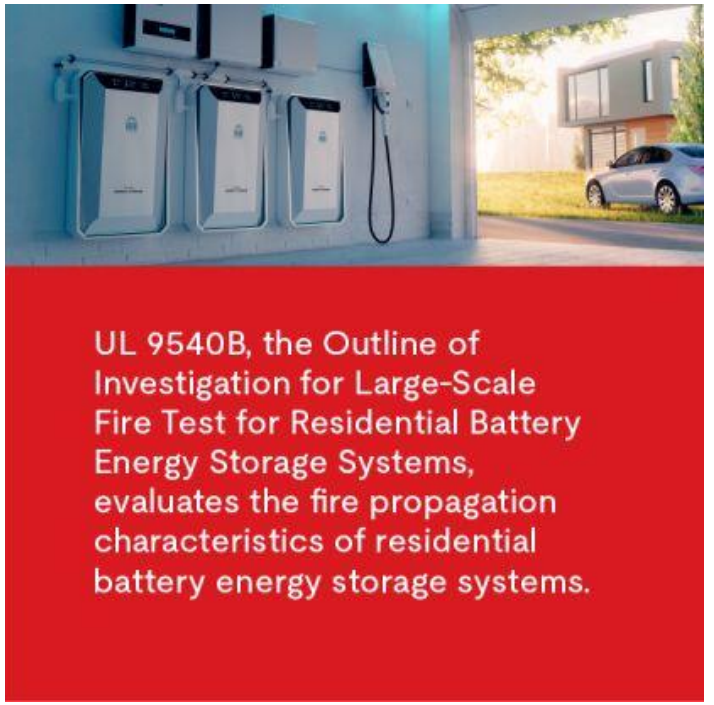
Report Reference No.	105933855CRT-002
Tested by (name + signature)	Dillon Badman
Approved by (name + signature)	Rudolph Sporman
Date of issue	31 Jan 2025
Testing Laboratory	**Intertek Testing Services NA, Inc.**
Address	3933 US Route 11, Cortland, NY 13045, USA
Testing location/ procedure	
Testing location/ address	35 S Franklin St, Cortland NY 13045, USA
Applicant's name	**QPO Energy**
Address	11325 SW Tualatin-Sherwood Rd. Tualatin, OR 97062, USA
Test specification:	
Standard	ANSI/CAN/UL 9540A:2019 + *UL 9540A:4ED 2020-01 CRD , UL 9540A:4ED 2020-05 CRD, UL 9540A:4ED 2020-10 CRD*
Test procedure	N/A
Non-standard test method	N/A
Test Report Form No.	ANSI/CAN/UL 9540A
Test Report Form(s) Originator	Intertek
Master TRF	Dated 2024-04
Test item description	Lithium-Ion Battery Module
Trade Mark	NA
Manufacturer	QPO Energy
Model/Type reference	QPO BESS 14
Ratings	51.2 V, 280 Ah, 14.336 kWh

List of Attachments:

1. *Attachment 1: Sample and Setup Photos*
2. *Attachment 2: Measurement Data*

UL 9540B: Large Scale Fire Test for Residential ESS

- UL 9540B specifically addresses residential energy storage systems that are 20 kilowatt hours or less.
- UL 9540B differs from UL 9540A by narrowing the scope. Rather than conducting four tests (cell, module, unit, installation) under UL 9540A, UL 9540B requires only two tests (cell test and fire propagation test).
- A key difference between the UL 9540A and UL 9540B is that UL 9540B includes the purposeful ignition of vented gases during a thermal runaway propagation event.
- This large-scale fire test report can be used to assess whether the residential battery energy storage systems can be installed as indicated in the manufacturer's installation instructions or if they must be installed in accordance with NFPA 855 and the International Residential Code (IRC) separation requirements.



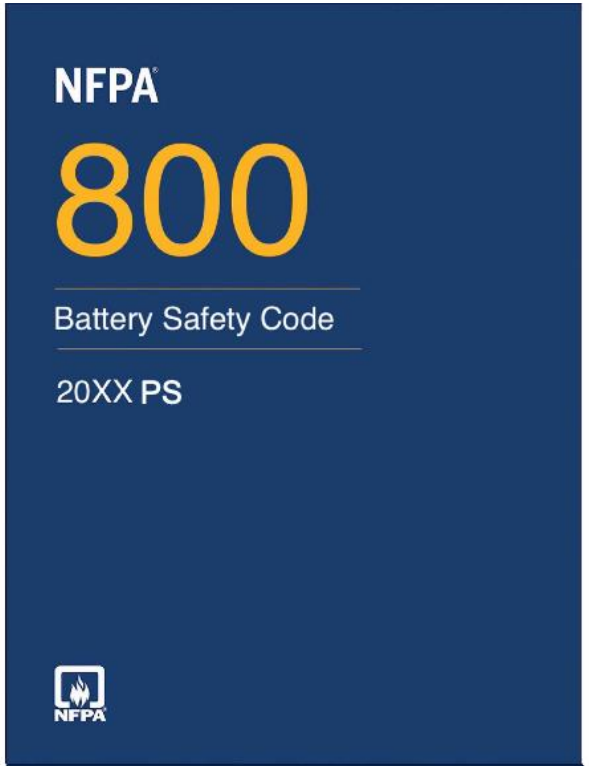
CSA TS-800: Large-scale Fire Test Procedure

CSA C800-2025 evaluates ESS performance under:

- Large-scale fire testing: Assessing thermal runaway propagation and fire containment for installations.
- Environmental stress testing: Validating performance in extreme temperatures, flooding, and ice exposure.
- Mechanical impact scenarios: Simulating vehicular collisions, structural damage, and other physical stresses.
- Ballistics exposure testing: Validating resilience to unexpected external forces.
- With a standardized framework for these tests, CSA C800-2025 provides regulators and insurers with verifiable data to assess installation safety, operational reliability, and long-term durability.

NFPA 800(PS): Battery Safety Code

- While the formal scope is currently in development, the intention is to cover the entire lifecycle of electrochemical batteries from manufacture to end of life.
- Use cases include: manufacturing, storage, UPS, datacenters, portable BESS, e-mobility devices, battery powered equipment, etc.
- In other words, this Code will apply to all battery-based equipment and systems not covered by NFPA 855.
- After publication, it is expected that NFPA 800 will include the requirements for storage of lithium metal and lithium-ion batteries currently in NFPA 855.



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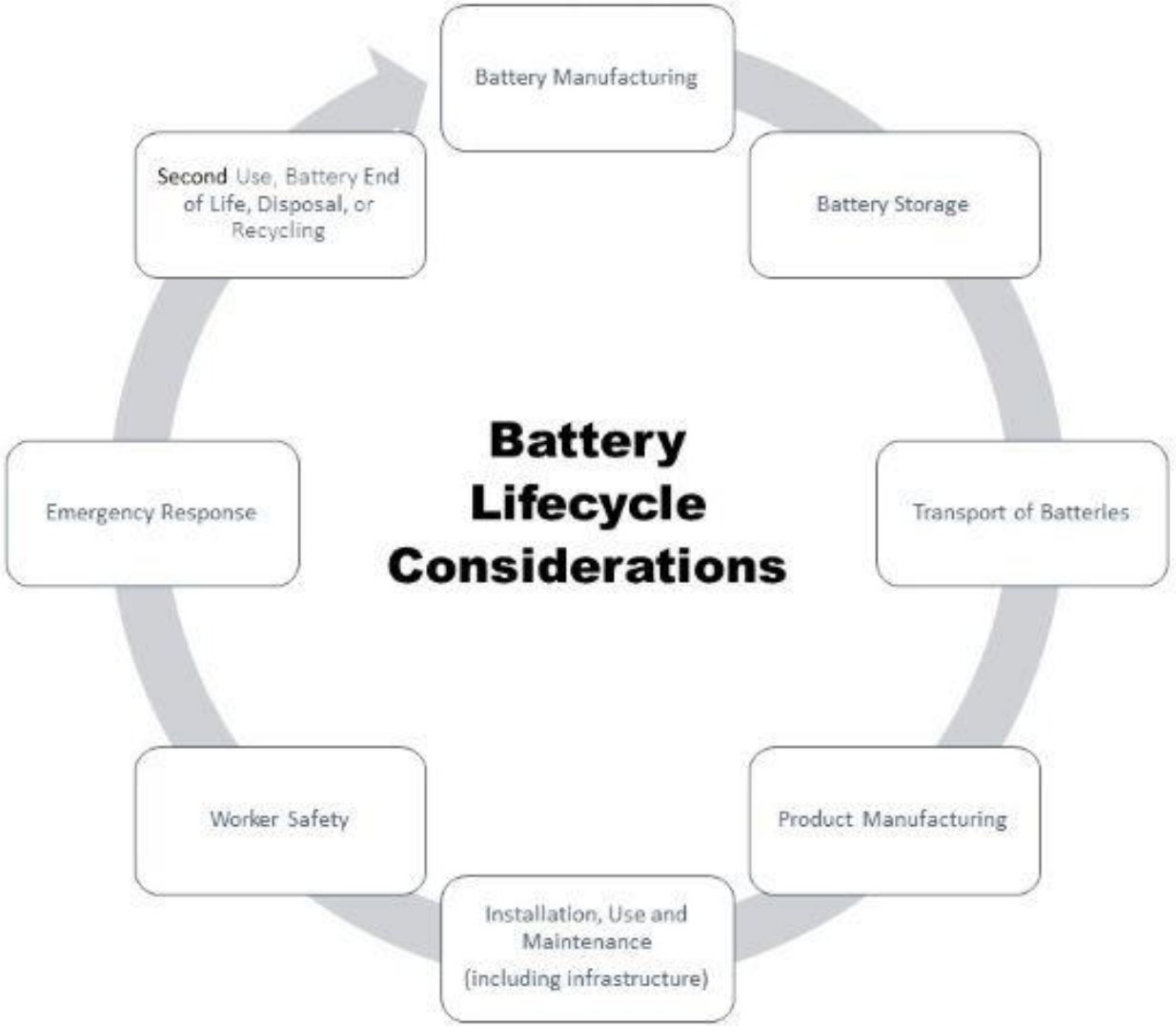
NFPA 800: Battery Safety Code



20XX NFPA 800(PS) Development

Next Edition: TBD | **Revision Cycle:** Custom NFPA 800

First Draft

Public Input Closing Date: January 29, 2026

First Draft Report Posting Date:

Second Draft

Public Comment Closing Date:

Second Draft Report Posting Date:

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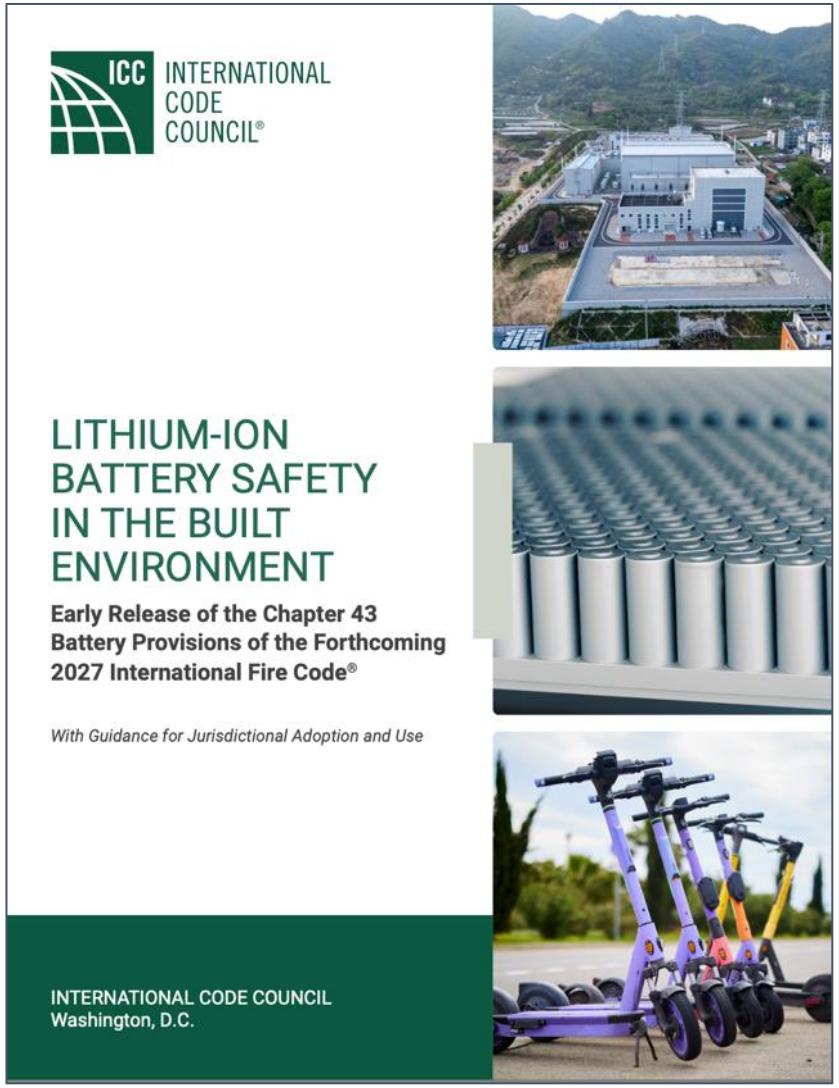
www.nfpa.org/codes-and-standards/nfpa-800-standard-development/800

2027 IFC New Chapter 43

- Chapter 43: Batteries and Battery Powered Equipment
  - Storage of batteries
  - Repair location restrictions
  - Disposal and Recycling containers
  - Battery Powered Equipment
  - Battery Powered Industrial Equipment
  - Micromobility Devices
  - Portable Power Packs



Next steps in preparing for BESS in your community?

1. Identify gaps in Code adoption and enforcement.
2. Consider adopting current Codes, especially NFPA 855.
3. Schedule training for plans reviewers and inspectors on current BESS technologies and requirements.
4. Revise building and electrical permitting policies to include BESS specific requirements.
5. Train firefighters and other first responders on the hazards associated.
6. Work with area Fire Department or District to coordinate inclusion of BESS systems in the Computer-Aided Dispatch (CAD) System.
7. Require Drill Training for Fire Departments for BESS installations.
8. Get involved with BESS Codes and Standards Development.

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NW BOCA Fall School

IBEW Day: Codes and Standards for Energy Storage Systems

Friday October 30th,2026

8am to 4pm

SOLD OUT

Prairie Center for the Arts

201 Schaumburg Ct.

Schaumburg, IL 60193

nwboca35.org/fall-school

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Additional Training Available

Electrical/Building Inspector Training

- Inspecting Residential Solar Electric Systems
- Inspecting Commercial Solar Electric Systems
- Inspecting Residential Multimode Systems
- Qualified Persons Requirements for Emerging Technologies
- NFPA 855 and UL 9540A Large-scale Fire Testing

Fire Inspector Training

- Solar Plan Review Based on Building, Fire, and Electrical Codes

Fire Department Training

- Fire Safety and Photovoltaic Systems
- Fire Safety and Battery Energy Storage Systems
- Fire Safety and Electric Vehicle Emergencies

Fire Investigator Training

- Investigating Solar, Electric Vehicle, and Energy Storage Fires

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100 %

ALLIED PROFESSIONAL TRAINING PROGRAM

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Thank you

Bob Hattier
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