

# **SAN DIEGO COUNTY FIRE PROTECTION DISTRICT**

## **INTERIM FIRE PROTECTION GUIDELINES FOR BESS FACILITIES**



**PUBLIC SAFETY GROUP**

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## **I. PURPOSE**

The San Diego County Fire Protection District (SDCFPD) is committed to ensuring the safety of Battery Energy Storage System (BESS) facilities through the application of a comprehensive framework of local, state, and national codes and standards. These regulations are designed to mitigate the risks associated with fire, explosion, and toxic hazards, thereby safeguarding public health and safety. As BESS technologies evolve, existing codes are being adapted to address the emerging and unique risks posed by these systems. Furthermore, the SDCFPD Fire Chief is vested with the authority to amend or modify the Fire Code, as necessary, to address new safety concerns and technological advancements. The regulations in this document are specific to the SDCFPD but may be adopted by other fire protection and municipal water districts in San Diego County.

## **II. BACKGROUND**

The San Diego County Fire Protection District (SDCFPD) currently employs a mix of local, state, and national codes and standards to review Battery Energy Storage System (BESS) facilities, with the goal of mitigating fire and explosion risks and ensuring public safety. Chapter 1207 of the California Fire Code (CFC) is a set of regulations that addresses the installation, operation, maintenance, repair, retrofitting, testing, commissioning, and decommissioning of energy systems used for generating or storing electricity, including BESS. However, existing regulations, including the California Fire Code (CFC) and the County of San Diego's Consolidated Fire Code, may not fully address the unique hazards posed by modern BESS technologies. However, the National Fire Protection Association (NFPA) establishes a nationally recognized set of standards for BESS called NFPA 855. the NFPA standards, and specifically NFPA 855 are developed by firefighters, fire protection professionals, and safety experts, and provide the most comprehensive requirements and guidance on the design, installation, and operation of energy storage facilities for all site and community contexts, including both containerized and non- containerized facilities, including potential hazards associated with lithium-ion batteries. NFPA 855 is updated annually. NFPA 855 is the standard by which state and municipal fire codes are then updated, usually adopting NFPA 855 in its entirety. However, the process of adopting NFPA 855 into the CFC and Consolidated Fire Code can take a year or more. It is SDCFPD's intention to employ NFPA 855 as soon as it is adopted by NFPA.

In 2024, SDCFPD introduced a requirement for a technical study, which now mandates that BESS facilities conduct comprehensive risk assessments and hazard mitigation plans. These studies are intended to address safety gaps and ensure compliance with fire codes. Under the 2022 California Fire Code, the Fire Chief has the authority to authorize changes to existing fire codes when new risks are identified, especially when dealing with emerging technologies like BESS. This gives the Fire Chief the discretion to adapt safety regulations based on evolving industry standards.

### III. CODES AND STANDARDS

The following codes and standards were used in preparation of these guidelines.

- 2022 California Fire Code (CFC): The CFC is based on the 2021 International Fire Code (IFC) and is the prevailing set of regulations for fire safety and fire prevention in California. The CFC is part of the California Code of Regulations, Title 24 which is developed by the State Fire Marshal in partnership with local government, fire officials, building officials and the private sector. The 2022 Edition was released on July 1, 2022, with an errata released on January 1, 2023 and a supplement released on July 1, 2024. These guidelines build off the base requirements of the CFC as the prevailing code with additional requirements and clarifications based on more recent best practices.
- 2023 Consolidated Fire Code for the Fire Protection Districts in San Diego County: The 2023 Consolidated Fire Code contains the county level amendments to the CFC. The Consolidated Code is used by twelve Fire Protection Districts in San Diego County.
- 2022 California Electrical Code (CEC): The CEC is based on the 2020 Edition of NFPA 70 and is the prevailing set of regulations for electrical installations in California. BESS installations must comply with the applicable requirements of the CEC but are not covered in detail by these guidelines. Emergency power supplies for BESS safety systems must comply with the requirements of the CEC, as required by CFC Section 1203.1.3.
- NFPA 13, *Standard for the Installation of Sprinkler Systems*, 2022 Edition: NFPA 13 is the industry benchmark for design and installation of automatic fire sprinkler systems. Although NFPA 13 does not specifically address BESS as a hazard, it still provides the applicable design and installation requirements and is referenced by the CFC and NFPA 855. Design criteria for BESS is determined based on fire testing.
- NFPA 68, *Standard on Explosion Protection by Deflagration Venting*, 2023 Edition: NFPA 68 applies to the design, location, installation, maintenance and use of systems that vent combustible gases resulting from a deflagration so that damage is minimized. NFPA 68 was not specifically written to address the deflagration hazards present in BESS. Deflagration venting is a passive method with minimal maintenance which relies on properly designed vents to relieve pressure.
- NFPA 69, *Standard on Explosion Prevention Systems*, 2024 Edition: NFPA 69 provides requirements for systems designed to prevent and control explosions of flammable gas, vapor, mist, dust or hybrid mixtures. NFPA 69 was also not specifically written to address ESS. The method found in Chapter 8 “Deflagration Prevention by Combustible Concentration Reduction” is commonly used for BESS and relies on the removal of flammable gases to maintain the global concentration of the gas mixture well below the point where an explosion could occur.
- NFPA 72, *National Fire Alarm and Signaling Code*, 2022 Edition: NFPA 72 provides the design and installation requirements for fire detection, signaling, and emergency communications demands. Detection and alarm systems installed as part of BESS facilities are required to comply with NFPA 72.
- NFPA 110, *Standard for Emergency and Standby Power Systems*, 2016 Edition: NFPA 110 covers performance requirements for emergency and standby power systems which provide an alternate source of power when the normal power source fails. NFPA 110 is referenced by CFC Section 1203.1.3 as an installation standard.
- NFPA 111, *Standard for Stored Electrical Energy Emergency and Standby Power Systems*, 2016 Edition: NFPA 11 also provides requirements for emergency and standby power systems but specifically focuses on stored energy systems. NFPA 11 is referenced by CFC Section 1203.1.3.

- National Fire Protection Association (NFPA) 855, *Standard for the Installation of Energy Storage Systems*, 2023 Edition: NFPA 855 is a standard providing the minimum requirements for mitigating the hazards associated with energy storage systems (ESS). This edition was released on August 12, 2022, which is more recent than the 2021 IFC/2022 CFC. NFPA 855 is not currently referenced by the CFC, however, many CFC requirements are based on those found in NFPA 855. NFPA 855 is on a 3-year revision cycle with input from a robust Technical Committee that is formed by engineers, consultants, manufacturers, and fire service members. The standard covers many types of ESS, including electrochemical energy storage systems which include batteries. The body of the standard includes requirements for listings, setbacks, fire suppression, explosion control, and many other topics. The appendices of NFPA 855 also offer a wealth of recommendations beyond those in the body of the standard and provide further understanding of the associated hazards and prevention strategies.
- NFPA 855, *Standard for the Installation of Energy Storage Systems*, 2026 Edition Draft: The 2026 Edition of NFPA 855 is expected to be released later in 2025 and will incorporate significant changes to the standard based on lessons learned over the past 3 years. While this edition is not finalized, draft language has been available online and some of the major expected changes and additions are referenced within this document in an effort to provide guidelines that will not change significantly upon the release of the updated standard. These proposed changes include the requirement for a large-scale fire test (LSFT) to address fire propagation, the removal of NFPA 68 as a primary explosion control method, the removal of non-water-based fire suppression as a primary suppression method, and changes to the hazard mitigation analysis (HMA) requirements.
- NFPA 1142, *Standard on Water Supplies for Suburban and Rural Firefighting*, 2022 Edition: NFPA 1142 identifies methods for determining the minimum water supply necessary for structural fire-fighting purposes where there is no or inadequate water for firefighting. The fire code official is authorized but not obligated to utilize NFPA 1142 as stated in CFC Section B103.3.

*References to NFPA 855 throughout this document are to the 2023 Edition unless noted otherwise.*

#### **IV. LARGE SCALE FIRE TESTING**

Fire and explosion testing is a key part of the process of obtaining information to design the safety systems for a battery energy storage system (BESS) installation. UL 9540A has been the main fire and explosion test protocol used for BESS since it was released in 2017. Many codes, including the California Fire Code, the International Fire Code, and previous editions of NFPA 855 have referred to UL 9540A as a “large-scale fire test” and have required UL 9540A to justify certain BESS installations. One of the key safety strategies used to protect BESS installations is the limitation of fire spread. While the UL 9540A test procedure provides a lot of valuable information, the test procedure currently does not require that a fire condition is created. Because of this, many professionals, manufacturers, and jurisdictions have argued that UL 9540A is not a large-scale fire test and proposed that a more challenging fire test should be required in addition to UL 9540A. This additional test would provide a better understanding of the minimum space that is needed between BESS units to prevent fire spread. The large-scale fire test procedure requires that a simulated installation is set up using an “initiating BESS” and “target BESS”. The initiating BESS unit is ignited using a burner or other similar method. A test is considered successful if the fire does not propagate to target BESS (among other performance requirements). The data that is gathered in this test as well as the simulated spacing of BESS units is reflected in the installation design to better ensure that if a fire does occur, it will be contained to the unit of origin. It is expected that this additional fire test procedure will be required by the 2026 Edition of NFPA 855 which will be released in 2025.

## V. PROTECTION GUIDELINES FOR LITHIUM-ION BESS FACILITIES

This protection guideline applies to all facilities utilizing lithium-ion batteries in an energy storage system (ESS) where the nominal capacity exceeds 600 kWh. References to NFPA 855 are to the 2023 Edition unless noted otherwise.

### Submittal Package

The following must be submitted for review:

1. Location and layout diagram of the room or area in which the ESS is to be installed (CFC Section 1207.1.3).
2. Details on the hourly fire-resistance ratings of assemblies enclosing the ESS (CFC Section 1207.1.3).
3. The quantities and types of ESS to be installed (CFC 1207.1.3). ESS Capacities must be the total energy capable of being stored (nameplate rating), not the usable energy. (CFC Table 1207.1.1 Footnote a)
4. Manufacturer's specifications, ratings, and listings of each ESS.
5. Description of energy storage management systems and their operation (CFC Section 1207.1.3)
6. Location and content of required signage (CFC Section 1207.1.3)
7. Details on fire suppression, smoke or fire detection, thermal management, and explosion control system (CFC Section 1207.1.3 – modified text in BOLD to clarify explosion control requirement – exhaust ventilation is not required for lithium-ion systems).
  - a. A report must be provided for all explosion control systems documenting compliance with appropriate standards (see next section).
8. Support arrangement associated with the installation, including any required seismic restraint (CFC Section 1207.1.3).
9. A commissioning plan complying with CFC Section 1207.2.1 (CFC Section 1207.1.3).
10. A decommissioning plan complying with CFC Section 1207.2.3 (CFC Section 1207.1.3).
11. Site plan including the following information (SDCFPD specific requirement). Site plan must include the following information:
  - a. Layout of buildings containing ESS or ESS enclosures including separation distances between buildings/enclosures and from exposures.
  - b. Fire department access roads including dimensions for width, turning radius, dead ends, and information on any objects obstructing vertical clearance.
  - c. Fire hydrant locations.
  - d. Locations of fire department connections (FDC), if any.
  - e. Emergency stop locations.
  - f. Site signage locations (does not need to include signage that is required on enclosures)
  - g. Water supply and quantity (not required for sites on municipal water).
12. Plume Modeling Report (SDCFPD specific requirement). See following section for requirements.
13. Hazard mitigation analysis (CFC Section 1207.1.4). Required for all facility locations, including remote outdoor facilities and dedicated use buildings.
14. Documentation for any additional protection measures that are required by the hazard mitigation analysis (CFC Section 1207.1.4.3).
15. Large-scale fire test report (CFC Section 1207.1.5). The test report must be accompanied by a supplemental report that provides interpretation of test data in relation to installation requirements (NFPA 855 Section 9.1.5.2.2). UL 9540A is required for all projects. See the next section for requirements for projects that do not have large-scale fire testing.

16. Report outlining Fire Code compliance and compliance with these interim guidelines. Any of the above documentation may be included as part of this report. For example, this may be combined with hazard mitigation analysis. (SDCFPD specific requirement).
17. Emergency preparedness plans (SDCFPD specific requirement, also required by 2024 International Fire Code and NFPA 855):
  - a. Fire Safety and Evacuation Plan prepared in accordance with CFC Section 404.
  - b. Emergency Operations Plan prepared in accordance with NFPA 855 Section 4.3.2.1.
  - c. Emergency Response Plan. See NFPA 855 Appendix G for guidance.
18. Maintenance plan outlining testing and inspection requirements and intervals for all safety systems that are referenced in HMA report (SDCFPD specific requirement).
19. The following documents that were listed above must be prepared by a qualified Fire Protection Engineer on the San Diego County Fire Protection District California Environment Quality Act Consultant List. Reports may be combined as desired by the applicant:
  - a. Report to demonstrate compliance with applicable requirements of the California Fire Code, with these guidelines, and applicable codes and standards. Site specific information may be contained in a separate report from any pre-engineered system documentation if desired by the applicant.
  - b. Site specific hazard mitigation analysis.
  - c. Plume modeling report.
  - d. Emergency preparedness plans.
  - e. \* Explosion control system calculation report.
  - f. \* Fire alarm design documents for parts of the system that are not included in a pre-engineered system's listing documents.
  - g. \* Fire protection design documents for parts of the system that are not included in a pre-engineered system's listing documents.

\* These items are not required to be prepared by the qualified Fire Protection Engineer on the County of San Diego Environment Quality Act Consultant List, however these documents must be reviewed for conformance with the California Fire Code, with these guidelines, applicable codes and standards, and any project specific requirements. A "review by stamp", review letter documenting acceptance, or similar document indicating review and acceptance is required.

## VI. PERFORMANCE CRITERIA

The following requirements must be demonstrated as being met by the documents required above, and any additional documents as needed. This list is not intended to be inclusive, and all requirements of CFC Section 1207 must be met:

1. ESS and major components must be appropriately listed:
  - a. Listings must be by an Occupational Health and Safety Administration (OSHA) Nationally Recognized Testing Laboratory (NRTL). The NRTL must be recognized for the specific standard and performed by a laboratory listed on OSHA's website. This list is updated regularly and can be found at: <https://www.osha.gov/nationally-recognized-testing-laboratory-program/current-list-of-nrtls>
  - b. UL 9540 listing must be Edition 2 or more recent. (CFC Section 1207.3.1 and Chapter 80 "Referenced Standards")

- c. Battery management system (BMS) or thermal runaway protection system must be included in UL 1973 or UL 9540 listing. (CFC Section 1207.6.5 and NFPA 855 Section 9.6.5.5)
  - d. Power conversion systems (PCS) must be listed in accordance with UL 1741 and compatible with the battery system or included in UL 9540 listing. (CFC Section 1207.3.3).
  - e. Fire alarm, detection, and suppression devices must be provided with appropriate UL listings.
2. Large-scale fire testing is required for all installations subject to these interim guidelines.
- a. CFC currently accepts UL 9540A tests as a “large-scale fire test” (CFC Section 1207.1.5). However, for projects covered by these guidelines, the proposed 2026 NFPA 855 requirements will apply. This includes the following:
    - i. Testing in accordance with UL 9540A, and an additional large-scale fire test.
    - ii. UL 9540A testing must be a minimum of cell, module, and unit level testing. Installation level testing must be provided when utilizing alternative fire suppression systems (see below) or when performance criteria for unit level test was not met.
    - iii. In addition to UL 9540A, an additional unit-level (“large-scale fire test”) test shall be conducted involving intentional ignition of the vent gases to assess the fire propagation hazard. This test must demonstrate that a fire involving one ESS unit will not propagate to an adjacent unit at the proposed spacing.
  - b. At this time, the additional unit level test with intentional ignition is not required to meet a specific test standard and will be evaluated for each project. CSA TS-800 may be used but is not required.
  - c. Testing shall be conducted by an approved testing laboratory (must be a NRTL or others approved on case-by-case basis). The laboratory must provide a report characterizing the composition of the gases generated and show that a fire involving one ESS unit will not propagate to an adjacent unit.
  - d. All testing must be provided with a supplemental report that provides interpretation of test data in relation to installation requirements (NFPA 855 Section 9.1.5.2.2). For outdoor ESS enclosures, this report or an additional report must validate that complete combustion of one enclosure will not propagate to an adjacent enclosure. The report must use anticipated wind conditions at the site and information from large-scale fire testing. This requirement may be combined with other reports if sufficient detail is provided.
  - e. All test reports and supplemental reports shall be submitted for review.
  - f. Proposed projects utilizing BESS units with only UL 9540A testing will be considered when justified with additional protection measures including but not limited to robust water supply on site, fire modeling, increased separation distances to lot lines and from exposures, and/or additional fire protection measures such as fire barriers. If pursuing this exception, please contact the Fire Protection District early to discuss an acceptable approach to prevent project delays.
3. Fire suppression is not required for outdoor enclosures that are not walk-in units (CFC Section 1207.5.5). Fire suppression is required for buildings, unless permitted to be omitted in accordance with CFC Table 1207.7 Note C. When fire suppression is provided as a required or optional system, the following requirements apply:



- a. Installation of automatic sprinkler systems shall be in accordance with CFC Section 903.1.1. Sprinkler system density shall be in accordance with NFPA 855 Section 4.9.2. Where ESS groups exceed 50 kWh and testing is not available to determine a sprinkler system density, the sprinkler density shall be based on an engineering analysis provided for review.
  - b. Where fire suppression is required (either by UL 9540 listing or by CFC), installation of water spray or water mist suppression systems shall be based on installation-level UL 9540A or equivalent testing. Where an optional fire suppression system is provided (i.e. in an enclosure that did not require installation-level testing), testing is not required but is recommended.
  - c. Installation of alternative fire suppression systems that are not water-based is not recommended for the suppression of a fire involving the battery system. Installation of these systems will be approved only on a case-by-case basis as an optional system when shown to not have negative interaction with other safety systems (such as an NFPA 69 explosion control system). Where fire suppression is required, a water-based suppression system shall also be provided, as recommended by NFPA 855 Appendix G.
- 4. Fire detection systems shall be provided for all facilities and transmit alarm signals in accordance with CFC Section 1207.5.4. For outdoor installations where detection systems are not provided in the enclosures, a fire detection system must be installed outside of the enclosures.
  - a. Fire detection systems must comply with CFC Section 907.2 and NFPA 72.
  - b. Fire detection systems must activate a fire alarm system with occupant notification where ESS are installed in a building with other occupancies.
  - c. Sites with multiple fire alarm panels must be aggregated to a master panel at an approved location. This location must be included in the emergency response plan and evaluated in the hazard mitigation analysis (NFPA 855 Section 4.8.2.2 and A.4.8.2.2).
- 5. Explosion control is required to be provided for all rooms, areas, ESS cabinets, or ESS walk-in units (CFC Section 1207.6.3 – ESS cabinets added for clarification based on 2024 International Fire Code and NFPA 855). Explosion control systems must be designed, installed and maintained in accordance with the following:
  - a. Explosion control must be in accordance with NFPA 69. ESS enclosures may also meet NFPA 855 Section 9.6.5.6.4 in lieu of providing an NFPA 69 system.
  - b. NFPA 69 is preferred to NFPA 68, which, if approved, will be removed as a primary explosion control system in the 2026 Edition of NFPA 855. Proposed projects utilizing BESS units with only NFPA 68 explosion control systems should contact the SDCFPD to discuss viability of this approach. If accepted, the report provided for an NFPA 68 system must include fireball size which must be incorporated into the site layout and emergency planning.
  - c. All requirements of NFPA 855 Section 9.6.5.6 as applicable to the selected system.
  - d. A report must be provided documenting the approach and compliance with the entirety of applicable standards.

- e. Gas detection systems that are used to initiate an explosion control system must meet the requirements of NFPA 72. The gas detection equipment shall be listed in accordance with applicable standards such as UL 1484 or UL 2075 for the specific gas or vapor it is intended to detect.
6. A hazard mitigation analysis is required for all facilities subject to these interim guidelines.
- a. The hazard mitigation analysis must address the fault conditions indicated in CFC Section 1207.1.4.1. The failure of each safety system during a thermal runaway event must be evaluated. The failure of multiple safety systems at the same time is not required to be evaluated.
  - b. Other credible failure scenarios must be evaluated as appropriate, including but not limited to the following:
    - i. Seismic events.
    - ii. Flame impingement due to a wildfire or from other fire hazards on site (such as transformers).
    - iii. Thermal runaway conditions beyond the requirements of CFC Section 1207.1.4.1. This includes failure that could result in a partial volume deflagration and a failure of all cells.
  - c. Mitigation strategies must consider site specific limitations, such as those outlined in NFPA 855 Appendix G.3.3. This may include but is not limited to lack of or minimal water supply, delayed response time due to site location, configuration of site layout impact on fire department response, and presence of personnel on site to assist in early-stage emergency operations.
  - d. Where 100-foot setback from lot lines is not required, the HMA must address the appropriate minimum distance of enclosures from lot lines needed to achieve the analysis approval criteria or confirm that code required minimums are sufficient.
  - e. Analysis approval is as outlined in NFPA 855 Section 4.4.3.
  - f. Additional mitigation measures must be clearly identified in the HMA and addressed by project documentation.
7. All safety systems that rely on power must be provided with a reliable emergency power supply system (EPSS) in accordance with CFC Section 1203.
- a. The EPSS installation must comply with these requirements, CFC Section 1203, NFPA 110, NFPA 111, and the California Electrical Code (CEC).
  - b. Transfer must occur within 10 seconds after primary power is lost. The transfer time is permitted to be increased if evaluated as part of the HMA. Transfer time may also be met by the combination of multiple systems (such as a UPS and a generator).
  - c. The load requirements shall be determined by a registered design professional with an EPSS design background. The duration is determined as part of the HMA and shall include a 48-hour period of standby time (prior to a failure) and an active duration of at least the expected event duration of one BESS in failure and an additional BESS unit as a safety margin (modified from 2026 NFPA 855 draft language).
  - d. The EPS must be located such that a failure event of the BESS does not compromise the operation of the system.

- e. Acceptable means of emergency power supply can be determined based on CEC Section 700.12. Stored energy systems are considered ESS and must also meet the requirements of the CFC/these guidelines as applicable.
  - f. Systems that are provided with backup power from a fire alarm system are not required to be included in loads for the EPSS when the fire alarm system is sized for the minimum load durations as determined above.
  - g. The safety systems that may require power from the EPSS include but are not limited to the following:
    - i. Smoke detection
    - ii. Fire detection
    - iii. Fire suppression
    - iv. Explosion control
    - v. Gas detection
8. Plume modeling must be provided meeting the following:
- a. The following software list is recommended. Others may be approved on a case-by-case basis:
    - i. AERMOD
    - ii. Fire Dynamics Simulator (FDS)
    - iii. Process Hazard Analysis Software (PHAST)
    - iv. SCICHEM
  - b. The following baseline meteorological conditions must be assessed:
    - i. Wind speed of 1.5 meters per second (3.4 miles per hour)
    - ii. Ambient temperature of 77 °F.
    - iii. Atmospheric stability class D, E, and F.
  - c. A parametric study must also be performed evaluating wind speed sensitivity. Local meteorological conditions found at the site must be modeled.
  - d. Expected gases and/or particulates to be modeled must be documented and justified based on available testing or other credible sources. A minimum of two release profiles must be modeled accounting for both a release that is denser than air and one that is less dense than air at ambient temperatures unless justification is provided showing one of these types of releases is not credible.
  - e. Acute Exposure Guideline Level 1 (AEGL-1) must be used. The exposure time must be documented and justified. The threshold data for AEGLs in ppm for various toxic gases is available for a range of exposure durations (10 minutes, 30 minutes, 1 hour, 4 hours, and 8 hours).
  - f. The report must identify mitigation measures to be taken to protect nearby people if found to be necessary based on modeling efforts.
9. 100-foot setbacks are required from lot lines where residential, educational, or institutional occupancies are located. The 100-foot setback is applicable to battery systems, other ESS/utility components may be located within 100 feet of lot lines. Separation distances to other exposures and from lot lines to other occupancies are based on current code required minimums, or as documented in the HMA.
10. Separation distances between BESS enclosures are required to be as follows:
- a. Distances based on testing which intentionally initiates a fire in an ESS enclosure to evaluate propagation to adjacent enclosures. UL 9540A (4<sup>th</sup> ed.) testing does not include

this test procedure and is not considered to meet this requirement. Refer to Item 2 for additional information.

11. When an exception is granted to waive large-scale fire testing involving the intentional ignition of vent gases, alternative justifications such as the fire rating of enclosures or a fire exposure analysis may be considered. These justifications must be submitted in the form of a report or as part of a report that is prepared by a fire protection engineer from the County of San Diego's approved BESS consultant qualification list.
12. Emergency preparedness plans are required for all facilities as follows:
  - a. Fire Safety and Evacuation Plan in accordance with CFC Section 404. May be omitted when approved by the SDCFPD
  - b. for sites that are not regularly occupied, including by maintenance and operations personnel.
  - c. Emergency Operations Plan complying with NFPA 855 Section 4.3.2.1. Emergency operations plan must address any response from on-site personnel that is included as a mitigation strategy in the HMA.
  - d. Emergency Response Plan. See NFPA 855 Appendix G.1 for guidance. Emergency response plan must address any expected response from the fire department that is included as a mitigation strategy in the HMA.
13. Fire apparatus access roads are required for all facilities and must meet the requirements of CFC Section 503 and the SD County Consolidated Fire Code. The following specific considerations are noted:
  - a. Roads must extend within 150 feet of all portions of the facility, which includes BESS units.
  - b. Location of the road with respect to BESS enclosures that may make access difficult or impossible during an incident must be considered (for example, a road that is in the direction of a deflagration vent within the calculated fireball distance).
  - c. The fire code official has the authority to make additional requirements where necessary in accordance with CFC Section 503.2.2.
  - d. Any impacts due to modifications to fire apparatus access roads that are granted must be documented in the HMA and emergency response plan.
14. Water supply is required for all facilities in accordance with CFC Section 507.
  - a. Where fire sprinkler systems are provided, fire flow shall be the greater of the fire sprinkler system demand including hose stream allowance or the calculated fire flow.
  - b. For sites with ancillary buildings that do not contain ESS, the requirements of CFC Appendix B or the Insurance Service Office "Guide for Determination of Fire Flow" are applicable. Where located in rural or suburban areas where an adequate and reliable water supply is not available, NFPA 1142 may be used.
  - c. Fire flow rate for buildings containing ESS shall be calculated as stated in Item 13b, with a duration of 2 hours. SDCFPD will establish a plan to supply additional water utilizing this 2-hour window.
  - d. The fire flow for ESS enclosures shall be calculated as follows:
    - i. The fire flow rate must be a minimum of 250 GPM.
    - ii. The duration is 2 hours. SDCFPD will establish a plan to supply additional water utilizing this 2-hour window.

- e. Fire flow needed to control spread of fire from other equipment located on site, such as transformers, shall be based on an engineering analysis that is provided for review.
  - f. The fire flow for the site shall be based on the greatest calculated fire flow from the methods above as applicable. For example, for a site consisting of outdoor ESS enclosures and an ancillary building, the fire flow is the greater of that calculated for the building and that calculated for the ESS enclosures.
  - g. Fire hydrant systems must meet the requirements of CFC Section 507.5 and CFC Appendix C. Additional fire hydrants may be requested as needed to assist in fire department response efforts.
  - h. Where an adequate and reliable water supply system for firefighting purposes does not otherwise exist, NFPA 1142 may be used. However, the minimum water supply quantity must still be based on the methods outlined above. NFPA 1142 water supply quantity is based on structural protection and does not contain guidance for special fire protection hazards.
15. Use of any protection technology that is not required or addressed by current codes or standards may be approved on a case-by-case basis. Approval will be based on the following:
- a. Testing and/or analysis by a reputable third party demonstrating the effectiveness of the technology when used in lieu of providing a code required protection system (i.e. an emerging suppression system being utilized in lieu of a code required sprinkler system).
  - b. Testing and/or analysis by a reputable third party demonstrates that the technology will not have negative interactions with other safety systems.
  - c. Thermal Runaway Propagation Prevention (TRPP) Protection Systems (based on 2026 NFPA 855 DRAFT language):
    - i. Definition: An active means to mitigate thermal runaway propagation. As an example, some TRPP systems sense the venting of gases or elevated cell temperatures and release an agent to absorb sufficient heat such that thermal runaway will not propagate to adjacent cells.
    - ii. Fluid based supplemental systems shall be compliant with applicable parts of ASME B31.1 or B31.3. Compliance shall be documented as part of UL 9540 listing.
    - iii. The control system shall be a fire alarm control unit specifically listed for releasing service.
    - iv. The system must comply with Emergency Power Supply requirements (see Item 7 of these guidelines).
    - v. The system effectiveness must be evaluated as part of the required fire testing.
    - vi. The system must comply with the commissioning requirements below.
    - vii. The system must be inspected and tested at least annually.

## **VII. EXISTING FACILITIES**

Existing facilities must provide the following documentation:

1. HMA where the facility utilizes equipment that is not UL 9540 listed.
2. All emergency planning documents that are required for new facilities:
  - a. Fire Safety and Evacuation Plan in accordance with CFC Section 404. May be omitted when approved by SDCFPD for sites that are not regularly occupied, including by maintenance and operations personnel.
  - b. Emergency Operations Plan complying with NFPA 855 Section 4.3.2.1.
  - c. Emergency Response Plan. See NFPA 855 Appendix G.1 for guidance.

## **VIII. REQUIRED COMMISSIONING, INSPECTIONS, TESTING & MAINTENANCE**

Commissioning and Maintenance plans must address the following, at a minimum:

1. Manufacturer's specified commissioning and maintenance procedures.
2. Periodic inspection and testing intervals and procedures must be noted in the maintenance plans and performed in accordance with manufacturer's recommendations, any deviations noted in the HMA, and in accordance with applicable codes and standards such as NFPA 13, NPFA 72, and NFPA 69. The maintenance plan must be submitted as part of the permit documents and is subject to approval.
3. Systems that are designed in accordance with NFPA 69 must initially be inspected and tested at 3-month intervals. This duration may be increased or decreased based on a hazard analysis and based on performance after multiple inspection intervals.
4. Where two or more integrated critical safety systems are present, the systems shall be tested in accordance with NFPA 4. Testing shall be conducted prior to certificate of occupancy and at 5-year intervals during the operation of the facility.
5. Records of completed testing are required to be kept on site in hard copy form and be available to San Diego County Fire Protection District upon request.

## **IX. COST RECOVERY**

Facility owners must reimburse emergency services for response costs, ensuring sustainability of public safety operations. This ensures that the financial burden of emergency response services, such as personnel, equipment, logistics, and other resources, is reimbursed by BESS facility owners or responsible parties. This approach promotes financial sustainability for emergency services while prioritizing public safety and environmental protection. Additionally, these requirements will be periodically reviewed and updated to current operational costs.

## **X. CAUSE AND ORIGIN**

As a part of cause and origin for fires in BESS facilities root cause analysis shall be conducted by the Fire Chief, their designee, or the fire chief may direct the owner to hire an approved third-party. Any associated costs to conduct the analysis shall be borne by BESS facilities owners or responsible parties.