Santa Clara Fire Department

Stationary Storage Battery Systems

PURPOSE

The intent of this guideline is to outline the requirements and regulations for stationary storage battery systems, including batteries for cellular sites and indoor storage of electric carts or cars. The following "Submittal Requirements" as outlined below provide the minimum information required for plan review as set forth by the 2010 California Fire Code (CFC) Chapter 6, as locally amended, and Table 508.2 of the 2010 California Building Code (CBC).

SCOPE

This guideline applies to all new installations and/or alterations to existing stationary storage battery systems, including flooded lead acid, nickel cadmium, valve regulated lead acid and lithium ion battery systems within the jurisdiction of the Santa Clara Fire Department (SCFD).

The following definitions are provided to facilitate the consistent application of this guideline.

Battery System, Stationary Lead Acid – A system that consists of three interconnected subsystems:

1. A lead acid battery.
2. A battery charger.
3. A collection of rectifiers, inverters, converters, and associated electrical equipment as required for a particular application.

Nickel cadmium, (NiCd) Battery – An alkaline storage battery in which the positive active material is nickel oxide, the negative contains cadmium and the electrolyte is potassium hydroxide.

Non-recombinant Battery – A storage battery in which, under conditions of normal use, hydrogen and oxygen gases created by electrolysis are vented into the air outside of the battery.

Recombinant Battery – A storage battery in which, under conditions of normal use, hydrogen and oxygen gases created by electrolysis are converted back into water inside the battery instead of venting into the air outside of the battery.

Stationary Storage Battery – A group of electrochemical cells interconnected to supply a nominal voltage of DC power to a suitably connected electrical load, designed for service in a permanent location.

Valve Regulated Lead Acid (VRLA) Battery – A lead acid battery consisting of sealed cells furnished with a valve that opens to vent the battery whenever the internal pressure of the battery exceeds the ambient pressure by a set amount. The liquid electrolyte in the cells is immobilized in an absorptive glass mat (AGM cells or batteries) or by the addition of a gelling agent.

Vented (Flooded) Lead Acid Battery – A lead acid battery consisting of cells that have electrodes immersed in liquid electrolyte. Flooded lead acid batteries have a provision for the user to add water to the cell and are equipped with a flame arresting vent which permits the escape of hydrogen and oxygen gas from the cell in a diffused manner such that a spark, or other ignition source, outside the cell will not ignite the gases inside the cell.

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Hazardous Materials Division ▪ Tel: (408) 615-4960 ▪ Fax: (408) 241-3006

SUBMITTAL REQUIREMENTS

1. **GENERAL:**

   A. Plans for all battery systems shall be submitted to SCFD for review.

   B. Provide a minimum of three copies of the plans and the manufacturer's data sheets for the batteries. All data sheets shall be current and complete.

   C. Plans shall be legible, scaled to nationally recognized standards, and blue or black lined.

   D. Contractor requirements specify that a Class C-10 contractor can design the Stationary Storage Battery System, as long as they perform the entire installation without subcontracting any portion of the work out. A California licensed Electrical Engineer shall design, stamp and sign all drawings that are installed by a C-10 contractor who did not design the system. However, an Electrical Engineer can review plans designed by others and take responsible charge of them by stamping and signing the drawings.

   E. Submit a completed SCFD Permit Application, which can be obtained at the Fire Marshal's Officer which is located at 1675 Lincoln Street, Santa Clara of on the City of Santa Clara website at www.santaclaraca.gov.

   F. Submit appropriate fees: Please reference SCFD Plan Check Fees document.

   G. Submittals may be mailed or hand delivered to Santa Clara Fire Department, Division of Fire Prevention at 1675 Lincoln Street, Santa Clara, CA 95050. All fees must be paid at the time of plan submittal.

   H. Plans not conforming to these minimum requirements will be returned as incomplete.

2. **PROVIDE THE FOLLOWING INFORMATION ON THE TITLE PAGE:**

   A. The building construction type and occupancy classification(s) as defined by the California Building Code (CBC).

   B. Applicable codes and standards used for the system's design (e.g., 2010 CFC, 2010 CBC, etc.).

   C. Project location, including the legal address of the facility, and building number(s), if applicable.

   D. The contractor's name, telephone number, address, and California State Contractor's License number.

   E. If the building contains automatic fire sprinklers, note this and identify the sprinkler density (e.g., 0.33/3000).

   F. Identify the total number of batteries.

      i. Lead Acid, Nickel Cadmium, and VRLA Batteries:

         a. Identify the total quantity of electrolyte per battery in gallons (e.g. 3.8 gallons per battery).

         b. Identify the *concentration* of each chemical in the electrolyte (e.g., 12.5% sulfuric acid).

         c. Provide a copy of the battery manufacturer's hydrogen evolution table based on the intended use.

         d. Identify the total amount of electrolyte per system. If there are multiple systems, identify the total electrolyte for all systems that are not separated

by a minimum of a one-hour fire barrier. If a one-hour fire barrier separates battery systems, provide the total electrolyte for each/all system(s) on each side of the one-hour fire barrier.

ii. Lithium Ion Batteries:
   a. Identify the total weight of lithium ion batteries.

G. Provide a building floor plan identifying the location of each battery system.

3. DETERMINATION OF REQUIREMENTS:

The questionnaire below will assist in determining if CFC Chapter 6 applies. If you answer "yes" to *any* of the questions, the plans shall contain the additional information identified in Section 4 and 5.

Condition	Decision	Applicable Fire Code Chapter
More than 50 gallons of electrolyte in system	☐ Yes ☐ No	Chapter 6 (All Provisions) Chapter 27 (General Provisions including SCFD amendments)
More than 5,000 pounds of lithium-ion	☐ Yes ☐ No	Chapter 6 (All Provisions) Chapter 27 (General Provisions including SCFD amendments)

4. REQUIRED INFORMATION IF CHAPTER 27 APPLIES:

A. Spill containment or means to render a spill harmless to people or property shall be provided.

B. Safeguards shall be provided to minimize the risk of and limit damage from a fire or explosion involving hazardous materials.

C. Hazardous materials warning signs are required for lead acid battery systems with quantities of electrolyte that exceed the permit amounts. For electrolyte with a percentage of over 12% of Sulfuric Acid, the sign shall state the following:

CORROSIVE LIQUID
WATER REACTIVE 1 LIQUID
TOXIC LIQUID

All lettering shall be capital letters on a contrasting background. Letters shall be a minimum of 1" in height. Provide specific details as to the sign design (refer to SCFD Fire and Life Safety Standard #2). CFC 608.7.1 & 2703.5

D. Electrical wiring and equipment shall be installed and maintained in accordance with the California Electrical Code. CFC 2703.9.4

5. REQUIRED INFORMATION IF CHAPTER 6 APPLIES:

A. Room design and construction:
   i. For battery systems with a liquid capacity of more than 50 gallons, the battery system must be in a room that is separated from other portions of the building by a minimum of a one-hour fire barrier in other than Groups A, E, I and R Occupancies.
   ii. In Groups A, E, I, and R Occupancies, the battery system shall be located in a room separated from other portions of the building by a minimum of a two-hour fire barrier. CBC Table 508.2
   iii. When stationary batteries are installed in a separate equipment room accessible only to authorized personnel, they are permitted to be installed on an open rack for ease of maintenance. CFC 608.4.1

iv. When a system of VRLA, lithium ion or other type of sealed, non-venting batteries is situated in an occupied work center, it may be housed in a noncombustible cabinet or other enclosure to prevent access by unauthorized personnel. CFC 608.4.2

v. When stationary batteries are contained in cabinets in occupied work centers, the cabinet enclosures shall be located within 10 feet of the equipment they support. CFC 608.4.3

B. Safety caps:

i. Vented lead acid, nickel cadmium or other types of non-recombinant batteries shall be provided with safety venting caps. CFC 608.2.1

ii. VRLA batteries shall be equipped with self-resealing flame-arresting safety vents. CFC 608.2.2

C. Thermal runaway:

i. VRLA battery systems shall be provided with a listed device or other approved method to preclude, detect and control thermal runaway. CFC 608.3

D. Spill control and neutralization:

i. Show that an approved method exists for the control and neutralization of an unintentional release (spill) of electrolyte in areas containing lead acid, nickel cadmium or other types of batteries with free flowing liquid electrolyte. This does not include VRLA, lithium ion or other types of sealed batteries with immobilized electrolyte. CFC 608.5

ii. For battery systems containing lead acid, nickel cadmium or other types of batteries with free flowing liquid electrolyte, the method and materials shall be capable of neutralizing a spill from the largest lead acid battery to a pH between 7.0 and 9.0. CFC 608.5.1

iii. For VRLA or other types of sealed batteries with immobilized electrolyte, the method and material shall be capable of neutralizing a spill of 3% of the capacity of the largest VRLA cell or block in the room to a pH between 7.0 and 9.0. Lithium ion batteries do not require neutralization. CFC 608.5.2

E. Room ventilation:

i. Show the required ventilation by one of the two methods stated below:

a. For flooded lead acid, flooded nickel cadmium, and VRLA batteries, the ventilation system shall be designed to limit the maximum concentration of hydrogen to 1 % of the total volume of the room, or

b. Continuous ventilation shall be provided at a rate of one cubic foot per minute per square foot of floor area of the room. Lithium ion batteries do not require ventilation. CFC 608.6.1

F. Cabinet ventilation:

i. Show that when VRLA batteries are installed inside a cabinet, the cabinet shall be approved for use in occupied spaces and shall be mechanically or naturally vented by one of the following methods:

a. The cabinet ventilation shall limit the maximum concentration of hydrogen to 1% or the total volume of the cabinet during the worst case event of simultaneous “boost” charging or all the batteries in the cabinet, or

b. When calculations are not available to substantiate the ventilation rate, continuous ventilation shall be provided at a rate of not less than 1 cubic foot per minute per square foot of floor area covered by the cabinet. The room containing the cabinet must also be ventilated as required as shown under E. i. above. CFC 608.6.2

G. Specify on the plan that the doors to the battery room shall be provided with signs with the following information:
   i. The room contains energized battery systems.
   ii. The room contains energized electrical circuits.
   iii. Sulfuric Acid: Corrosive, Water Reactive 1, Toxic Liquid (for lead acid batteries)

   All lettering shall be capital letters on a contrasting background. Letters shall be a minimum of 1" in height. Provide specific details as to the sign design (refer to SCFD Fire and Life Safety Standard #2). CFC 608.7.1

H. Specify on the plan that cabinets have exterior labels identifying the manufacturer and model number of the system and electrical rating (voltage and current) of the contained battery system. There shall also be signs within the cabinet to indicate the relevant electrical, chemical and fire hazards. CFC 608.7.2

I. Provide details showing the battery system is seismically braced according to the CBC. CFC 608.8

J. Demonstrate that an approved automatic smoke detection system is provided in all areas that contain a stationary battery system. CFC 608.9

SCHEDULING INSPECTIONS

1. Inspection appointments can only be made by the permit applicant or listed contractor.
2. It is the responsibility of the permit applicant or listed contractor to have a representative on the job site during the inspection with a set of approved plans. Failure to do so will result in the cancellation of the inspection and a re-inspection fee will be assessed.
3. Call (408) 615-4970 at least one business day prior to the desired date of the inspection. Inspections are assigned on a first come first served basis. The inspection request line is open Monday through Friday between 8:00 a.m. and 5:00 p.m.

SMART PERMIT INFORMATION SYSTEM

The City of Santa Clara offers you the opportunity to check the status of you fire permits on-line. To access the Smart Permit Information System please log onto the system at:

http://santaclaraca.gov/community/smt_permit_information.html

You can search the system using your Case Number (Permit number: fir2011-00001), Project Name, Applicant Name or the address of the project.

SANTA CLARA FIRE DEPARTMENT - NOTES

Provide the following notes, verbatim, on the plan under "FIRE AUTHORITY NOTES":

1) SCFD final inspection required. For inspection appointments call (408) 615-4970.
2) Stationary battery systems shall be in compliance with 2010 CFC Chapter 6, as amended.
3) An annual permit to operate stationary battery systems is required. An SCFD inspector will issue the permit following the final inspection.
4) A smoke detection system shall be installed in the battery room in compliance with 2010 CFC and 2010 NFPA 72. A separate plan submittal is required for the smoke detection system. Smoke detection system is required to be monitored by a central, proprietary, or remote station (as defined by NFPA 72), or a local alarm that will give an audible signal at a constantly attended location.
5) An approved method to neutralize spilled electrolyte shall be provided and maintained in the battery room.
6) Batteries shall be provided with safety venting caps.
7) Locations and classifications of extinguishers shall be in accordance with the CFC and NFPA 10, and the placement is subject to the approval of the fire inspector.
8) Storage, dispensing, or use of any flammable and combustible liquids, flammable and compressed gases, and other hazardous materials shall comply with CFC regulations.
9) Modifications to existing fire detection or alarm system(s) shall be approved by the SCFD prior to the installation. A separate plan submittal is required.