



# SANTA CLARA COUNTY FIRE DEPARTMENT

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## STANDARD DETAILS & SPECIFICATIONS

SUBJECT: Fire Alarm

Spec No	C-5
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Approved By	
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## SCOPE

To provide designers and installers with guidance on fire department policies and procedures for the design and installation of fire alarm systems; include dedicated function fire alarm control units.

## DEFINITIONS

**Fire Alarm:** A system or portion of a combination system that consists of components and circuits arranged to monitor and annunciate the status of a fire alarm or supervisor signal-initiating devices and to initiate the appropriate response to those signals.

**Device:** For purposes of evaluating permit fees, a device shall include all field installed components, remote from the fire alarm control unit (FACU), that receive or transmit signals to or from the FACU, including; alarm, supervisory, trouble initiation, addressable interface modules, remote signal transmission unit, remote power supply, remote network FACU, and other similar components. The primary FACU and modular components integral thereto shall be considered a part of the FACU covered by the base permit fee.

## AUTHORITY

California Building Code (CBC), 2019 edition, California Fire Code (CFC), 2019 edition, California Electrical Code (CEC), 2017 edition, NFPA 72, 2016 edition, Santa Clara County Fire Department Standards and all other local and national applicable codes and standards. All code references herein are to code/standard editions above.

## REQUIREMENTS

### I. GENERAL REQUIREMENTS:

The installation and design of the fire alarm system shall comply with Chapter 9 of the CBC and the above-referenced codes and standards.

### II. PERMITS:

- A. Permits are required for any of the following work:
  - 1. Installation of a new fire alarm system.
  - 2. Any alteration to an existing fire alarm system, including modifications, repairs and/or replacement.
  - 3. Addition to an existing fire alarm system.
  - 4. Demolition of any part of a fire alarm system.
- B. A minimum of three sets of shop quality (min, size = 24' x 36") plans and submittal packets are required for the proposed fire alarm system. One set of plans shall be retained by the Santa Clara County Fire Department.
- C. The permit applicant shall be the installing contractor. All installing contractors shall have a California Electrical (C-10) Contractor's License, a valid worker's compensation certificate, and a city business license. When the system design is prepared by a party other than the installing contractor, the designer shall be under the responsible charge of a duly qualified, California licensed, Electrical Engineer (EE) or Fire Protection Engineer (FPE). All such designs shall bear the stamp and seal of the responsible engineer.
- D. Installation, alteration, or demolition of a system shall not commence prior to the approval of plans and the issuance of a permit.
- E. When fire alarm work is proposed in an occupied building, the installing contractor shall prepare an impairment plan in coordination with the building owner. The system impairment plan shall be in accordance with CFC 901.7. Where the system impairment will occur during times of building occupancy, fire watch provisions shall be implemented.

### **III. PLANS:**

- A. The shop drawings and submittal documents shall be prepared in accordance with and include all information specified by NFPA 72, Chapter 7.4 and CFC 907.1.2.
- B. Plans and attachments shall be clearly labeled and legible.
- C. Plans and all revisions to the plans shall be dated. If utilizing existing drawings or portion of a drawing, the area of work shall be highlighted and clouded with an appropriate symbol (delta). Provide a revision list with a symbol, date, description, and initials.
- D. When making alterations, additions, or deletions to an existing system, all existing devices and equipment shall be shown and properly identified on the floor plan and system riser (single-line) diagram.
- E. Plans shall include:
  - 1. Title sheet
  - 2. Equipment list

3. Written sequence of operation or functional matrix
  4. Floor plan
  5. System riser diagram
  6. Secondary power and voltage drop calculations
- F. Attachments shall include the manufacturer's specification sheets and California State Fire Marshal (CSFM) listing sheets for all equipment and devices requiring listing.

**Note: Failure to provide any of the required information will result in the plans being disapproved.**

#### IV. TITLE SHEET:

- A. The front sheet shall contain the following information:
1. Project name and address of the project.
  2. The designer's full name (no initials, pseudonyms, acronyms, or aliases) and signature. The designer of record shall be responsible for the entire system being worked on.
  3. Business name, address, and California Contractor's license number of the installing contractor. If the designer of the fire alarm system is not an employee of the installing contractor, the following shall be clearly indicated/printed on the plans:
    - a. DESIGNED BY: followed by the designer's business name, address, designer of record's full name and signature. When the system design is prepared by a party other than the installing contractor, the design shall be under the responsible charge of a duly qualified California licensed Electrical Engineer (EE) or a Fire Protection Engineer (FPE). All such designs shall bear the stamp and seal of the responsible engineer.
    - b. INSTALLING CONTRACTOR: followed by the installing contractor's business name, address and California Contractor's License number.
  4. Type of NFPA 72 system provided, i.e. local, auxiliary, remote station, proprietary, or central station service.
  5. The supervising station facility and UL number.
  6. Occupancy classification(s) of building or area as defined by the CBC. Provide the number of stories, building height, and construction type.
  7. Scope of work and why the system is being installed/modified (e.g. required by the CBC or CFC, required due to a variance, or voluntary, etc.). If the scope of the work is the demolition of an existing fire alarm system or portion thereof, code justification for proposed removal shall be provided.

8. Description of the annunciation zone assignments. For addressable devices, provide device addresses.
9. Indicate if the building is protected by an automatic fire sprinkler system.
10. A note stating that the design and installation complies with NFA 72 (2016 edition), the California Electrical Code (2017 edition), the California Fire Code (2019 edition), the California Building Code (2019 edition).
11. All other pertinent notes.
12. A key plan of the building and/or complex indicating the street location and the area of work within the building shall be provided.
13. Use of performance-based design for smoke/heat installation shall be prepared in accordance with NFPA 72 section 17.3.

**V. EQUIPMENT LIST:**

- A. The cover sheet shall include a materials list and device legend to include: part name, model number, manufacturer's name, description, quantity, CSFM listing number, and associated drawing symbol (legend) for each device, equipment, and conductors proposed for installation.

**Note:** The SCCFD reserves the right to disallow any listed product due to past performance.

- B. All drawing symbols shall match the legend. Delete or strike out all "typical" symbols not included in the design. Symbols shall be per NFPA 170, unless specifically approved otherwise.

**VI. SEQUENCE OF OPERATION:**

Every fire alarm submittal shall include a written operational sequence to clearly define the system response (output) to each input (alarm, supervisory, trouble, ancillary). The operational sequence shall include details relating to detection, annunciation, remote signaling, and activation of control functions, as applicable. A general description of the system programming required to accommodate the scope of work shall be provided.

**VII. FLOOR PLAN:**

The following shall be clearly indicated:

- A. An architect scale shall be used and a graphical representation thereof. Plans shall use a drawing scale no smaller than  $3/32" = 1'-0"$ . Metric scale shall not be accepted.
- B. The locations of partitions, non-rated walls, and rated walls; If not full height, indicate the heights of the wall and the ceiling.

- C. The location of all equipment, devices, and appliances (including fire sprinkler control and test valves, fire smoke dampers, air handler units, magnetic door holders, etc.) and end-of-line devices.
- D. The candela rating of each strobe.
- E. Use of each room or space.
- F. Type of ceiling or roof construction, i.e., smooth, solid joist construction, beam construction, and/or sloped ceiling.
- G. A scaled cross-section or elevation-plan if automatic detectors are to be installed.
- H. Drawings for modifications of existing system(s) shall include the entire floor plan with the area of work clearly identified. The location and routing of all control equipment and circuitry, associated with the modification, shall be identified on the floor plan.

#### **VIII. SYSTEM RISER DIAGRAM**

- A. Single-line wiring diagram (riser diagram) that shows the interconnection of each device and equipment of the whole system.
- B. Candela rating of each strobe.
- C. Number of conductors in each wiring segment and the type and size of wire conductor to be used.
- D. The class for initiating, signaling line and notification device circuits as well as circuit number or identification.

#### **IX. CALCULATIONS**

- A. Secondary power calculation – Provide calculations to validate standby battery for 24 hours and 5 minutes of alarm (15 minutes if emergency voice alarm communication).
- B. Voltage drop calculation – Provide calculations sufficient to validate minimum required operational voltage is supplied to all alarm notification devices. The minimum voltage shall be within operational range of the specified notification device(s). A calculation shall be provided for each notification circuit.

#### **X. ATTACHMENTS**

- A. Provide manufacturer's specification (cut) sheets for all equipment and materials to be used, including the transponder to the supervising station. All cut sheets shall provide sufficient engineering/installation data to evaluate the equipment suitability to the proposed use. Highlight on the cut sheet each specific device model, the listing information, and the application per listing.

- B. Submit copies of the CSFM listing number sheets for all devices and equipment requiring listing (CFC 907.1.3).

## XI. DESIGN AND INSTALLATION

- A. Fire alarm detection/evacuation system shall be designed and installed in accordance with CFC, CEC, CBC, NFPA 72, and the SCCFD, and other standards also containing design/installation criteria for specific life safety related equipment. These other standards are referred to in NFPA 72.
- B. Refer to the CFC and CBC for the determination of the required fire alarm systems and features.
- C. An approved central, proprietary, or remote station alarm system, which gives audible and visual signals at a constantly attended location, shall be considered a monitored fire alarm system.
- D. There shall be no more than one fire alarm system in a building. Likewise, there shall be no more than one supervising station providing service to a building. Each building, requiring a fire alarm system, shall be equipped with a dedicated fire alarm panel, unless otherwise approved for campus/network fire alarm control units. Where networked systems are approved, each protected building shall be separately zoned and provided with a remote annunciator.
- E. When auxiliary fire suppression systems (pre-action, clean agent, dry chemical, etc.) are installed that require a listed releasing panel, it is preferable that the building fire alarm panel be used. Should an auxiliary releasing panel be proposed and acceptable to SCCFD, it must be installed adjacent to and supervised by the building fire alarm panel. Auxiliary suppression panels may only be located remote from the building FACP if a remote annunciator is provided at the FACP.
- F. Combination fire/burglar systems shall not be allowed.
- G. System communications to the supervising station shall comply with NFPA 72, 2016 edition Section 26.6.4.1.4.

Fire alarm systems transmitting signals via a Digital Alarm Communicator Transmitter (DACT), shall comply with NFPA 72 §26.6.4.1.3 and 26.6.4.1.5.

§26.6.4.1.4 – **Transmission Channels.** A system employing a DACT shall **employ one telephone line (number) as the primary.** In addition, one of the following transmission means shall be employed:

1. One-way private radio alarm system.
2. Two-way RF multiplex system.
3. Transmission means complying with §26.6.3.

- H. Central Station Service shall provide all the services and comply with all the requirements delineated in chapter 26 of NFPA 72, 2016 edition.

## **XII. FIRE PUMPS**

A. When fire pumps are installed, the fire alarm system shall monitor the required fire pump status signals. At a minimum, the following pump status signals shall be monitored by the fire alarm system. All fire pump signals shall result in a supervisory condition at the fire alarm system:

### **1. Electrically-driven pumps:**

- a. Controller has operated into a motor running condition (separate signal).
- b. Loss of any phase on the line side of the motor contractor (separate signal).
- c. Phase reversal on line side of motor starter (separate signal).

### **2. Engine-driven pumps:**

- a. Engine running (separate signal).
- b. The controller main switch has been turned to “off” or “manual” position (separate signal).
- c. General trouble condition at the fire pump controller, including low fuel, low battery, etc. (separate or common signal).

## **XIII. EMERGENCY GENERATORS**

When a generator supplies emergency power to a fire and life safety system(s) audible and visual supervisory signals shall be provided at a constantly attended space. These alarms shall indicate the following:

1. Engine running (separate signal).
2. The controller main switch has been turned to “off” or “manual” position (separate signal).
3. Trouble on the controller or engine and low fuel (separate or general signal).

## **XIV. INSPECTIONS**

A. All fire alarm systems shall be subject to a complete functional test witnessed by SCCFD Fire Prevention staff. Field inspections shall be scheduled only after a permit has been issued.

**B. Call for rough wire inspection when required and noted on fire permit.**

C. Inspections shall be scheduled by the installing contractor only. When scheduling for inspection, request for sufficient time to complete a thorough inspection of the work performed. Travel time is included in the inspection time.

D. The installing contractor shall conduct a complete pre-test of the system prior to the final acceptance test. The system pre-test shall verify proper function of all applicable elements of NFPA 72, Table 14.4.3.2. The pretest shall be conducted within 48-hours of the final acceptance test and documentation of such shall be made available to the

Inspector at the time of inspection. The pretest shall include a 24-hour battery test, unless special arrangements have been made with SCCFD staff.

- E. A copy of the completed "Record of Completion" shall be provided at the time of final acceptance test NFPA 72, Fig. 7.8.2(a).
- F. Three copies of the as-built plans, if installation deviates from the approved plan, shall be submitted to SCCFD office for review and approval, prior to sign-off of the fire permit.
- G. All previous records of inspections shall be available on site for review by the Inspector.
- H. There shall be a **minimum of two alarm technicians present at the time of inspection**. One technician shall be stationed at the fire alarm control panel while the other tests devices. Two-way radios shall be provided for the technicians to communicate all initiated fire alarm signals (type, zone, address, etc.) to the Inspector.
- I. Necessary coordination shall be made such that representatives of other contractors whose equipment are involved in the testing are present (i.e., fire/smoke damper, air handlers, elevator, sprinklers, fire pumps, emergency generators, etc.).

#### **XV. OWNER DOCUMENTATION**

After completion and final acceptance of the project, the contractor shall provide the following documentation to the owner:

1. All literature and instructions provided by the manufacturers describing proper operation and maintenance of all devices and equipment.
2. A copy of the approved plan and as-built plan shall be placed in the documentation cabinet located in control room (NFPA 72 7.7.2.1).
3. A copy of the Certificate of Completion and the fire alarm permit with the final signature.
4. Copy of site-specific programming file.