STANDARD DETAILS & SPECIFICATIONS SUBJECT: Fire Alarm	Spec No C-5 Review Date 12.19.24 Revis. Date ##.##.## Eff. Date 05.13.19 Approved By HRE Page 1 of 11

SCOPE

This standard applies to the design and installation of fire alarm systems, emergency voice/alarm communications systems, and dedicated function fire alarm systems.

AUTHORITY

California Building Code (CBC), 2022 edition, California Fire Code (CFC), 2022 edition, California Electrical Code (CEC), 2022 edition, NFPA 72, 2022 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.

The standards are applicable for the identified code cycle; however, where code language and intent has not changed in subsequent code cycles, the following standards are applicable.

DEFINITIONS

Fire Alarm System: 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 supervisory 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.

REQUIREMENTS

I. General

The installation and design of the fire alarm system shall comply with NFPA 72 CFC amendments and the above-referenced codes and standards.

II. Permits

A. Permits are required for any work to install or modify a fire alarm system, per CFC 105.6.6, specifically including the demolition of any part of a system, change of communicator/supervising station, and fire alarm panel replacement.

1. For replacement of an existing fire alarm system, submittal shall include a copy of previously approved system installation plans for reference.

2. Each application shall provide a clear scope of work to distinguish between new/modified system, panel replacement, system replacement, or system upgrade, including how the system will or will not be modified.

III. Plans

A. The shop drawings and submittal documents shall be prepared in accordance with and include all information specified by NFPA 72, 7.2.1 and CFC 907.1.2.

B. 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 designer's full name.

C. When proposing 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.

IV. Title Sheet

A. The front sheet shall contain the following information:

1. Business name, address, and California Contractor's license class/number of the installing contractor. The following shall be clearly noted on the plans:

a. DESIGNED BY: followed by the designer of record's business name, address, full name, license/certification number, 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 Fire Protection Engineer (FPE) or Electrical Engineer (EE). All such designs shall bear the stamp and seal of the responsible engineer.

b. Projects having life safety complexity beyond that of traditional fire alarm design scope (e.g. smoke control, staged evacuation, control system integration, high consequence occupancy, networked systems, etc.) or that require building life safety analysis for a complete design, shall be prepared or certified by a qualified Fire Protection Engineer or other duly qualified and licensed design professional.

2. The type of supervising station alarm system: central station service, proprietary, remote station.

3. The supervising station facility information and UL number if applicable.

4. Scope of work and why the system is being installed/modified (e.g. required by the CBC or CFC, required due to an approved alternative per CFC 104.10, or voluntary, etc.). If the scope of work includes demolition of an existing fire alarm system or portion thereof, code justification for proposed removal shall be provided.

5. Building information including construction type, occupancy classification, occupant load, number of stories, and whether the building is protected by a fire sprinkler system.

6. Description of the annunciation zone assignments. For addressable devices, provide a complete list of device addresses and FACU text identification.

7. Reference to all applicable codes and standards, including edition year.

8. A key plan of the building and/or complex showing the nearest street, the area of work within the building and location of the FACU.

V. Floor Plan

A. The following shall be clearly indicated:

1. 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 is **not** acceptable.

2. The location of all walls, partitions, doors, windows and system furniture shall be clearly identified. All fire rated walls shall be specifically identified by unique drawing identification. Clearly identify all ceiling elevations and heights of partial height walls. The location of all equipment, devices, and appliances (including fire sprinkler control and test valves, fire/smoke dampers, air handling units, magnetic door holders, etc.) and end-of-line devices.

3. Drawings for modifications of existing system(s) shall include the entire floor plan with the area of work clearly identified. The location of the FACU, annunciator, and routing of all control and device circuitry, associated with the modification, shall be identified on the floor plan.

VI. Calculations

A. Battery load and voltage drop calculations shall be prepared for the system and included in the project drawings.

B. Where applicable, include current boost in battery calculations to account for the difference in panel voltage vs backup battery (e.g. panels that increase voltage to 29V).

VII. Attachments

A. Technical data sheets for system equipment shall include sufficient information and level of detail to validate installation in accordance with manufacturer's requirements. Equipment "sales sheets" are typically insufficient for this purpose.

B. Provide California State Fire Marshal (CSFM) listing sheets for all equipment and devices requiring listing per CFC 907.1.3. Ref NFPA 72, 10.3.5

VIII. Design and Installation

A. There shall be no more than one fire alarm system in a building. Multiple buildings sharing common walls may have individual fire alarm systems if the buildings are fully separated by party walls meeting CBC 706.1.1, having no openings. 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 FACU.

1. Fire alarm control units serving multi-tenant buildings shall be located in a room accessible from the building exterior, without entering any tenant space. Each tenant space containing fire alarm devices shall be equipped with a remote annunciator displaying status only (not capable of silence/restore). A sign and site map shall be installed at each annunciator to clearly identify the FACU location.

2. Where approved for campus/network FACU's, each protected building shall be separately zoned and provided with a remote annunciator.

B. When auxiliary fire suppression systems (pre-action, clean agent, dry chemical, etc.) are installed that require a listed releasing panel, it is preferred that the building fire alarm function as the releasing panel. Should an auxiliary releasing panel be proposed and acceptable to SCCFD, it shall be installed adjacent to the FACU, unless a remote annunciator is provided at the FACU. Each suppression system releasing panel shall be supervised by the building FACU for alarm, supervisory and trouble conditions. All communication to the supervising station shall be via the building FACU. The releasing panel shall be located outside of the area protected by the auxiliary suppression system.

C. Combination fire/burglar alarm systems shall not be permitted.

D. System status communications to the supervising station shall comply with NFPA 72, 26.6.

E. One of the following communications options shall be shown on plan per NFPA 26.6.2:

1. 26.6.3 Performance-based Technologies:

   a. Signal transmission via single device with a single communications path (e.g. one cellular communicator) may be permitted with prior approval from SCCFD. The designer shall supply documentation sufficient to demonstrate infeasibility of redundant paths, compliance with the requirements of NFPA 72 26.6.3.3, and demonstrated reliability of the proposed transmission means at the project site.

   b. Programmable communications settings shall be secured by a system level password to prevent change by unauthorized personnel.

   c. A single communicator that includes multiple communications paths may be used, provided it meets the requirements of NFPA 72, 26.6.3.4 (e.g. a communicator with multiple SIM cards).

   d. IP signal transmission, via shared communications equipment, is <u>not</u> permitted by SCCFD, excepting where extenuating circumstances exist and project specific approval is granted by the SCCFD.

e. If a radio system is proposed as one of two communications paths per NFPA 72, 26.6.3.4, technical review of the entire radio system is not required as specified below.

2. 26.6.4 Digital Communicator Systems

   a. A Digital Alarm Communicator Transmitter (DACT) is acceptable as a signaling interface per NFPA 26.6.4.1.1

3. 26.6.5 Radio System

   a. Radio systems proposed for single technology fire alarm signal transmission, shall be validated by a third-party engineering analysis, to include all aspects of the system infrastructure between the protected premise and the supervising station. The engineering analysis shall be prepared by a qualified engineer (e.g. Fire Protection Engineer and shall specifically address how any change in communication type between the protection premise and supervising station complies with applicable requirement of NFPA 72, and the equipment manufacturers.

F. Addressable fire alarm systems shall transmit alarm signals to the supervising station by addressable device or zone identification ("contact ID"), including device address, type, floor level and location per NFPA 72, 26.2.3. Existing panels shall be allowed to retain existing communications protocols, unless existing panel is replaced or upgraded.

G. In order to verify that alarm audibility requirements are met, plans shall clearly indicate anticipated ambient sound pressure level, and the minimum/maximum alarm sound pressure level required at each room. Alarm audibility design assumptions will be verified by plan review. However, compliance shall be confirmed at time of field inspection, and may result in the removal or addition of notification devices. See inspections section XI for audibility test requirement.

H. Dedicated function fire alarm systems (e.g. sprinkler waterflow and supervisory systems, elevator recall control and supervisory control systems) are not required to monitor duct detectors for air handler shutdown, or alternative automatic fire-extinguishing suppression systems, but may be used for this purpose when approved by SCCFD.

I. Where required to have a single manual fire alarm box per CFC 907.2, it shall be installed next to the FACU.

J. Where a fire alarm system is required in a building, building areas that are "shelled", for future buildout and to remain unoccupied, shall not require complete

alarm notification. A single audible notification device shall be provided in the shelled space(s). Visual notification shall be installed in public or common use areas (corridors, restrooms, etc.) of the otherwise shelled space.

K. Where an alarm communicator is located in a different room than the FACU, the FACU shall monitor all trouble and fault conditions of the communicator.

L. Duct smoke detectors shall transmit a supervisory signal to the supervising station, except where otherwise required as part of a smoke control system.

M. If carbon monoxide (CO) detection is included as part of the fire alarm system, CO device activation shall cause the following:

1. Activate temporal-4 audible signal throughout the occupancy per NFPA 720-15 5.8.6.5.

2. Activate visual notification appliances throughout occupancy.

3. Transmit “carbon monoxide alarm” signal to the supervising station and dispatch of Fire Department as “carbon monoxide alarm” (not fire alarm or supervisory).

N. For emergency/voice alarm communication systems, live voice instructions shall stop the recorded voice message per NFPA 72 24.4.5.7

O. All buildings equipped with emergency/voice alarm communication systems shall be configured with paging zones, in accordance with CFC 907.5.2.2, including unique zones for elevator groups, interior exit stairways, each floor and areas of refuge.

P. For emergency/voice alarm communication systems, live voice instructions shall activate visible/audible notification in the paged zone per NFPA 72 10.11.2

Q. Where required by CFC 907.5.2.3.3 (R-2 Occupancy) an acceptable method for the capability for future visible alarm notification appliances shall be demonstrated on plan. The future configuration shall be shown for reference.

1. Dwelling unit bathrooms are not required to be covered by future visible alarm notification appliances as they are not considered habitable space (CFC 907.5.2.3.2).

2. Depending on the method chosen to provide future visible alarm notification appliances, rough wiring inspection may be required, per Section XI.D.

R. Where present, emergency responder communication coverage system (ERCCS) shall be supervised by a listed FACU per CFC 510.4.2.5

S. Circuit pathways for two-way emergency communications systems for rescue assistance, per CFC 1009.8, shall be monitored for integrity. The building fire alarm, fire sprinkler monitoring, elevator recall control, or supervisory control unit, may be used for this purpose, but is not required to monitor such systems.

T. If building alterations such as tenant improvements or change in occupancy/use create a condition in CFC 907.2 that requires a fire alarm system; or if a building alteration requires that the FACU be replaced/upgraded to accommodate new initiating devices, visual notification shall be made compliant within the building permit scope of work. The building owner shall commit, in writing, to upgrade alarm notification outside the present scope of work during future building alterations. Ref CFC 907.5.2.3.

U. When a FACU and/or initiating/notification devices from a previously approved installation are replaced due to obsolescence. All equipment locations shall maintain compliance with the previously approved locations. A copy of the originally approved installation drawings shall be included in the plan submittal for reference.

V. When voluntary alarm notification upgrades are proposed for an existing, approved fire alarm system or fire sprinkler monitoring system, the upgrades shall meet current CFC and NFPA 72 requirements applicable throughout the proposed area of work. Building areas and equipment affected by, but outside the area of work may require upgrade for responsible coverage – as determined by plan review.

W. For plans whose only scope is to change/modify the means of communication to the supervising station, complete system drawings need not be prepared. However, a copy of the previously approved plans and a complete list of existing initiating device zones/points and sequence of operations is required to facilitate reacceptance testing.

IX. Fire Pumps

When a fire pump is installed, all alarm/supervisory/trouble signals required by NFPA 20 to be remotely monitored shall be accomplished by the building fire alarm system or fire sprinkler monitoring system. All fire pump signals shall result in a supervisory condition and each signal shall be distinctly annunciated.

X. Emergency Generators

If a generator is supervised by the FACU, all generator signals shall activate a supervisory condition, and include all required control panel or monitoring station visual conditions per 2019 NFPA 110, Table 5.6.5.2.

XI. Inspections

A. Prior to final acceptance testing with SCCFD, the installing contractor shall conduct a pre-test of 100% of system functions. The pre-test shall verify proper function of all applicable elements of NFPA 72, Table 14.4.3.2. Any system discrepancies noted during the pre-test shall be corrected prior to SCCFD inspection. Written record of the pretest, including verification of all signal transmission to the supervising station, and a points list shall be available for review at time of scheduled inspection.

B. Prior to final inspection, contractor shall perform, and record the results of, audibility testing of both ambient and alarm sound pressure levels throughout the project area. Test equipment shall be calibrated and measurements shall be taken using the A-weighted scale. All ambient and alarm sound pressure levels shall be recorded on the floor plans in the area observed and included on as-built drawings for reference/approval. As-built drawings shall be available for reference at time of field inspection.

C. All fire alarm systems shall be subject to a functional test of all signal initiating devices and output functions, to be witnessed by SCCFD Fire Prevention staff. Field inspections shall be scheduled only after a permit has been issued.

D. Rough wire inspection is only required when specifically noted on fire permit/conditions of approval.

E. Battery tests are required as noted on the fire permit/conditions of approval. When required, the FACU and all power supplies shall have A/C power removed and time-recorded 24 hours prior to the scheduled test/inspection.

    1. For fire alarm modifications, battery testing will only be required for the affected power supply as determined by SCCFD.

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

G. A copy of the completed “Record of Completion” shall be provided at the time of final acceptance test using the forms in NFPA 72, Fig. 7.8.1(a) through (f).

H. 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. As-built plans shall include field recorded ambient and alarm sound pressure levels.

I. All previous records of inspections shall be available on site for review by the Inspector.

J. There shall be a **minimum of two alarm technicians present at the time of inspection**. One technician shall be stationed at the FACU 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.

K. 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.).

L. All fire alarm systems transmitting data to the supervising station via performance-based technologies (NFPA 72, 26.6.3) shall be field demonstrated to meet all applicable performance criteria.

1. Field technician shall demonstrate that the maximum duration between the initiation of an alarm signal at the protected premises, transmission of the signal, and subsequent display and recording of the alarm signal at the supervising station shall not exceed 90 seconds per NFPA 72 26.6.3.8.

2. Field technician shall pretest and record the exact time for every hour/6 hours, or as required, of scheduled test to happen with the supervising station and demonstrate during inspection window by removing power sources to trigger the supervision signal. This supervisory signal is distinct from communication failure between FACP and scheduled maintenance test from supervising station (commonly known as timer test).

M. Installation of listed fire alarm cables and other listed/approved conductors (e.g. THHN, THWN, etc.) in a raceway shall confirm to the requirements of California Electrical Code (Title 24, part 3). The following wiring practices may be subject to field verification.

1. All fire alarm circuits shall be installed in a neat workmanlike manner, in accordance with CEC 760.24.

2. Fire alarm cables/raceways shall be supported by straps, staples, cable ties, hangers, or similar fittings designed and installed so as not to damage the cable. firmly secured in place, adequately supported, and permanent. Fire

alarm cables shall not be secured to fire sprinkler pipes or draped on top of suspended ceilings.

3. Each fire alarm circuit shall be identified with a legible tag/label at the FACU, terminal cabinet or junction box. The labeling method shall be legible and durable (CEC 760.30).

4. Where work includes scope to modify or demolish all or portions of a fire alarm system, the accessible portion of abandoned fire alarm cables shall be removed. Where cables are identified for future use with a tag, the tag shall be of sufficient durability to withstand the environment involved (CEC 760.130).

5. Cables shall be installed in metal raceway or rigid nonmetallic conduit where passing through a floor or wall to a height of 2.1 m (7 ft) above the floor, unless adequate protection can be afforded by building construction (CEC 760.130).