

<p>July 1, 2010</p>	<p align="center">SANTA ROSA FIRE DEPARTMENT FIRE PREVENTION BUREAU STANDARD</p>
	<p align="center">FIRE ALARM SYSTEM INSTALLATION</p>

PURPOSE

This standard outlines the general requirements for the installation and maintenance of all Fire Alarm Systems other than those intended solely for Waterflow Monitoring (Sprinkler Supervision) or Manual Pull Stations for Residential Care Facilities. Information contained herein applies to typical instances and may not address all circumstances.

CODE REFERENCES

- 2007 California Fire Code (CFC)
- 2007 California Building Code (CBC)
- SRFD Fire Prevention Bureau Standards
- NFPA 70: National Electric Code, Article 760 – Fire Alarm Systems
- 2007 NFPA 72: National Fire Alarm Code
- Buildings over 55’ in height – reference the individual standard

PERMIT(S) REQUIRED

A Fire Alarm System Installation permit is required. Categories and fee amounts are found at: <http://ci.santa-rosa.ca.us/doclib/Documents/IB%20018.pdf>

Required Inspections

- 1) Fire Alarm Rough-In (wiring) Inspection
- 2) Fire Alarm Initial Acceptance Testing - NFPA 72, Chapter 10.
- 3) Fire Alarm Final

Inspections shall be scheduled a minimum of 48 hours in advance. Directions for scheduling are found at: <http://ci.santa-rosa.ca.us/news/Pages/AutomatedFireInspectionRequestSystem.aspx>

PERMIT INFORMATION

Fire Alarm Installation permit applications shall be in accordance with 2007 CFC Section 907.

Working plans shall be submitted for approval to the Santa Rosa Fire Department before any equipment is installed. A completed Permit and Plan Review Application Form and fee shall be submitted along with not less than three (3) sets of plans, equipment data sheets, and calculations as required. A Santa Rosa Business Tax Certificate, current appropriate contractor's license and proof of worker's compensation insurance shall be provided or shall be on file at the time of application.

All plans shall be stamped by a qualified registered professional engineer or a C-10 Fire Alarm Contractor. Plans shall include the information specified below; failure to provide all of the required information may result in the plans being rejected. Rejected plans will be returned with a Plan Review Correction Form. Review the form and make the required additions/ changes which shall be clouded for identification. Provide a legend to describe the addition or change. Allow ten (10) working days for review of submitted plans.

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Working plans shall be drawn to an indicated scale, on sheets of uniform size, with a plan of each floor (including Room Names and Uses) and shall show the following data:

- Project street address and CBC Occupancy Type
- Installing Contractor's name, address, telephone and license number
- Alarm Service company's name, address, telephone and license number
- Alarm Monitoring Company's name, address, telephone and license number
- Type of System (eg: protected premises, central station)
- Sequence of operations matrix, including annunciation zones (if applicable)
- Symbol List and quantity of each device or system component
- Location of each device, control panel, power boosters, terminal cabinets
- Mounting heights of initiation and notification devices
- Manufacturer's data sheets and CSFM listing for each device or system component
- Type and size of wire, cable and conduit, and conduit fill ratios
- Point-to-point wiring plan including Class and Style of circuits
- Single line diagram with devices addressed by circuit
- Detail of primary power connection
- Details of rated wall assembly penetrations
- Voltage drop calculations
- Standby battery calculations for notification appliance circuits

SYSTEM REQUIREMENTS - GENERAL

All Fire Alarm Systems – including those installed at Owner's or Tenant's option and not required by Building, Fire, or Life Safety Codes - shall be designed and installed in accordance with 2007 NFPA 72, and shall be reviewed and approved by the SRFD Plans Review office prior to installation.

Fire Alarm systems shall be designated on the plans as Protected Premises (local alarm only), Central Station, Remote Supervising Station, or Proprietary Supervising Station systems. SRFD does not regulate Household (single family or duplex) fire alarm systems. Central Station monitoring companies shall include their Listing information on the plans. Central Station and Remote Supervising Station systems shall be served by two separate telephone services upstream of any private telephone switch. Connection of the DACT to multiple lines within a single private network is not acceptable.

The Sequence of Operations Matrix shall indicate all detection devices and relays from suppression systems on one axis, and their associated notification function on the other axis. Pull stations, area smoke or heat detectors, flame detectors, and all suppression systems shall initiate an alarm signal at the FACU, off-site monitoring station (if applicable), and all audible and visible notification devices. Duct detectors shall shut-down the unit and initiate a

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Supervisory signal, except in State Fire Marshal regulated occupancies, where they shall initiate an alarm signal. Off-normal movement of suppression system valves, water level sensors, and water temperature sensors shall initiate a Supervisory signal at the FACU and off-site monitoring station. Power loss, ground faults, or breaks in the fire alarm system or one of its components shall initiate a Trouble signal at the FACU and off-site monitoring station.

The Fire Alarm Control Unit (FACU) shall be installed in a readily accessible location, easily identified by responding emergency personnel, or a Remote Annunciator (RA) shall be provided adjacent to the building's main entrance. Door to closet or room containing FACU shall be signed "Fire Alarm Control Unit Inside." FACU shall be painted red and shall be kept locked. A map of the device locations shall be posted at the annunciator in a protected frame.

A dedicated branch circuit shall be provided for Fire Alarm equipment. This circuit shall be energized from the common use panel and shall have no other outlets. Circuit disconnecting means shall be in a separate, locked cabinet, accessible only to authorized personnel, painted red, and clearly identified as "Fire Alarm Circuit Control." The location of the circuit disconnecting means shall be permanently identified at the Fire Alarm Control Unit.

The Fire Alarm over-current protection (circuit breaker) shall be secured from unauthorized access. Circuit breaker locks are not an approved method. In buildings with multiple metering, the circuit shall be energized from the emergency panel board or house panel when no emergency board is provided. When a separate source of power (emergency generator) is required, the fire alarm circuit shall be energized from the emergency panel.

Manual pull stations shall double action and be mounted 42 to 48 inches above finished floor. In manual systems required by the Fire Code, pull stations shall be located adjacent to (within 5 feet of) every exit, from every level, with a maximum of 200 feet between pull stations. Every fire alarm system shall have at least one manual pull station.

Automatic heat and smoke detectors shall be installed according to their listings. Automatic smoke detectors are required in the supply duct of all mechanical air supply systems providing more than 2,000 cfm to a space; such detectors shall be listed for their application conditions and shall be monitored by the Fire Alarm system. The room or closet containing the FACU shall be protected by a smoke detector.

Fire Alarm audible notification devices shall sound throughout each occupancy, providing a sound pressure level at least 15 dBA above average ambient noise levels. Minimum sound pressure levels shall be 75 dBA in Residential Occupancies, 90 dBA in hospitals, and 75 dBA in other occupancies. Devices shall be located at least 90 inches above finished floor and at least 6 inches below finished ceiling, if conditions allow. Audible notification shall be a three-pulse temporal "evacuation" pattern. In R-1 and R-4 occupancies, at least one mini-horn shall be installed within each dwelling unit.

Fire Alarm visual notification devices shall be provided in all Public and Common Use areas, including (but not limited to) restrooms, corridors, gymnasiums, classrooms, lobbies, occupational shops, and meeting rooms. Devices shall be spaced per CBC Section 907, NFPA 72 as adopted by the State of CA, Section 7.5 or located so as to provide 0.375 cd to all occupiable spaces. Visual notification devices in corridors may be up to 100 feet apart, shall be located within 15 feet of the corridor ends, and shall be synchronized if more than one device is visible from any one location. Visual notification devices shall be mounted at least 96 inches above finished floor. Visual notification devices in sleeping areas for the hearing impaired shall be 110 cd if mounted 24 inches or more below the ceiling, 170 cd if mounted less than 24 inches below the ceiling.

Alarm system conductors (cable or wiring) shall be listed for their intended use and location: FPL, FPLR for risers, FPLP in plenums, THHN in conduit. FPL may not be used unprotected in underground installations (direct burial). Conductors shall be protected from physical damage (walls, conduit or raceway) for 7 feet above finished floor. Alarm wiring shall not be run in the same conduit with power or lighting circuits. Maximum conduit fill is 40% of cross-sectional area. Fire alarm system wiring is governed by NFPA 70 (National Electric Code).

The point-to-point wiring plan and the single-line diagram shall be coordinated so that devices have the same circuit address on each diagram.

Voltage drop calculations (to verify that notification devices will function at their required levels) shall include the full circuit length (two times the one-way distance), with device current requirements taken from manufacturer's data. Wire losses shall reflect the gauge of conductors shown on plans as well as the highest anticipated temperature of the location where they are to be installed. A 10% drop in voltage is permitted.

All fire alarm systems shall have two reliable sources of power: public electric service (primary) and either storage batteries or generator (secondary). Secondary power service shall be sized to run the system for 24 hours of monitoring + 5 minutes of alarm. Voice evacuation systems shall operate at full capacity for 15 minutes after 24 hours of monitoring. When a generator is to be used for secondary power, it shall include on-site fuel storage for at least 12 hours of operation, and shall be supplemented by storage batteries sufficient to operate the fire alarm system for four hours. Storage batteries shall be sized to provide at least 20% reserve capacity above the calculated operational minimum, to account for battery degradation over time.

In occupancies equipped with an elevator, smoke detection is required at the elevator lobbies, hoistways and machine rooms. If unsprinklered, the smoke detector in the hoistway may be omitted. Devices shall be connected to the FACP, shall initiate an alarm and initiate elevator recall. Devices shall be equipped with separate outputs to interface with Phase I and Phase II Emergency Recall Operation of ASME A17.1. If sprinklered, a heat detector is required to activate the elevator power shunt-trip. Mounting locations for the heat detector are relative to the fire sprinkler.

SPECIAL REQUIREMENTS BY OCCUPANCY. SEE CBC CHAPTER 9 FOR ALL REQUIREMENTS.

- A Occupancies:** A manual fire alarm system shall be installed in Assembly Occupancies having an occupant load of 300 or more, except where the building is sprinklered throughout and has alarm notification appliances activated by the sprinkler system. Assembly Occupancies greater than 1,000 persons shall have an emergency voice and alarm communication system with an approved emergency power source.
- B Occupancies:** A manual fire alarm system shall be installed in Business Occupancies having an occupant load of 500 or more, or when more than 100 persons are located above or below the ground floor, except where the building is sprinklered throughout and has alarm notification appliances activated by the sprinkler system.
- E Occupancies:** A manual and automatic fire alarm system shall be installed in Educational Occupancies having an occupant load of 50 or more, or containing more than one classroom. Manual pull stations are not required where the building is sprinklered throughout and has alarm notification appliances activated by the sprinkler system.
- F Occupancies:** A manual fire alarm system shall be installed in Factory Industrial Occupancies having an occupant load of 500 or more above or below the ground floor, except where the building is sprinklered throughout and has alarm notification appliances activated by the sprinkler system.
- H Occupancies:** A manual fire alarm system shall be installed in H-5 Hazardous Use Occupancies and occupancies used for the manufacture of organic coatings. Automatic smoke detection shall be installed for highly toxic gases, organic peroxides and oxidizers per the CFC.
- I Occupancies:** A manual fire alarm system shall be installed in all Institutional Occupancies, except Large Family Daycare facilities. An automatic smoke detection system shall be installed throughout buildings that are not protected with an automatic fire sprinkler system. "Private mode" chime alarms are permitted in patient areas of hospitals, nursing homes, and supervised residential care facilities. Smoke detectors with notification at the related nurse's station shall be installed in patient and client sleeping rooms.

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- M Occupancies:** A manual fire alarm system shall be installed in covered malls and in Mercantile Occupancies having an occupant load of 500 or more, or when more than 100 persons are located above or below the ground floor, except where the building is sprinklered throughout and has alarm notification appliances activated by the sprinkler system.
- R Occupancies:** Single or multiple-station smoke alarms shall be installed in sleeping areas, rooms giving access to sleeping areas, and in each story within a dwelling unit in all residential occupancies. In addition, a manual fire alarm system shall be installed in R-1 (motel), R-4 (residential care/assisted living facilities with more than six ambulatory clients) and in R-2 (apartment) buildings more than two stories in height or containing more than 16 dwelling units, except where the building is sprinklered throughout and has alarm notification appliances activated by the sprinkler system. An automatic fire alarm system shall be installed throughout all interior corridors serving sleeping units of R-1 and R-4 occupancies.

PARTIAL FIRE ALARM SYSTEMS

In occupancies where complete automatic detection systems are not required, owners or tenants may install automatic detection systems (smoke, heat, or flame detectors), within a portion of the building or facility. Such systems provide complete automatic detection within a given compartment (an area of the building separated from the rest of the building by automatic-closing fire or smoke doors). Detection systems shall be designed and installed per NFPA 72 and the listings of their components. Such systems shall provide notification to all occupants of that tenant space; partial notification systems are not permitted.