

**FINAL EXPRESS TERMS
FOR
PROPOSED BUILDING STANDARDS
OF THE
OFFICE OF THE STATE FIRE MARSHAL
REGARDING THE 2013 CALIFORNIA FIRE CODE,
CALIFORNIA CODE OF REGULATIONS, TITLE 24, PART 9
2013 INTERIM RULEMAKING CYCLE**

The Office of the State Fire Marshal (OSFM) proposes to make necessary changes to the 2013 edition of the California Fire Code (CFC), based on the 2012 International Fire Code (IFC) model code. The OSFM further proposes to:

- Adopt necessary amendments to the model code;
 - Repeal amendments to the model code that are no longer necessary.
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Legend for Express Terms:

1. **Existing California regulation or amendment brought forward without modification:** *All such language appears in Italics.*
 2. **Existing California regulation or amendment brought forward with modification:** *All such language appears in Italics, modified language is underlined.*
 3. **IBC language with new California amendment:** California amendments to IFC text appear underlined and in italics.
 4. **New California regulation or amendment:** California language appears underlined and in Italics.
 5. **Repealed text:** Shown as ~~Strikeout~~.
 6. **New California amendments that remove text:** Shown as ~~Strikeout~~.
 7. **Notation:** Authority and Reference citations are provided at the end of each chapter.
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[Item 1. Incorporation and correlation of NFPA 2 Hydrogen Technologies Code into the California Codes.]

SECTION 202

DEFINITIONS

GASEOUS HYDROGEN SYSTEM. *An assembly of piping, devices and apparatus designed to generate, store, contain, distribute or transport a nontoxic, gaseous hydrogen containing mixture having at least 95- percent hydrogen gas by volume and not more than 1-percent oxygen by volume. Gaseous hydrogen systems consist of items such as compressed gas containers, reactors and appurtenances, including pressure regulators, pressure relief devices, manifolds, pumps, compressors and interconnecting piping and tubing and controls.*

HYDROGEN GAS ROOM. *A room or space that is intended exclusively to house a gaseous hydrogen system.*

2309.3.1.1 Outdoors. Generation, compression, or storage equipment shall be allowed outdoors in accordance with Chapter 58 *and NFPA 2.*

2309.3.1.2 Indoors. Generation, compression, storage and dispensing equipment shall be located in indoor rooms or areas constructed in accordance with the requirements of the *California Building Code, California Mechanical Code and one of the following:-NFPA 2.*

- ~~1. Inside a building in a hydrogen cutoff room designed and constructed in accordance with Section 421 of the California Building Code.~~
- ~~2. Inside a building not in a hydrogen cutoff room where the gaseous hydrogen system is listed and labeled for indoor installation and installed in accordance with the manufacturer's installation instructions.~~
- ~~3. Inside a building in a dedicated hydrogen fuel dispensing area having an aggregate hydrogen delivery capacity no greater than 12 standard cubic feet per minute (SCFM) and designed and constructed in accordance with Section 703.1 of the California Mechanical Code.~~

**Chapter 80
REFERENCED STANDARDS**

NFPA National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02269-9101

Standard reference number	Title	Referenced in code section number
<u>2-11</u>	<u>Hydrogen Technologies Code</u>	<u>2309.3.1.1, 309.3.1.2</u>

2309.4.1 Dispensing Systems. Dispensing systems shall be equipped with an overpressure protection device set at *not greater than* 140 percent of the service pressure of the fueling nozzle it supplies.

~~**2311.8-2309.6 Defueling of hydrogen from motor vehicle fuel storage containers.** The discharge or defueling of hydrogen from motor vehicle fuel storage tanks for the purpose of maintenance, cylinder certification, calibration of dispensers or other activities shall be in accordance with Sections 2311.8.1-2309.6.1 through 2311.8.1.2.4-2309.6.1.2.4.~~

~~**2311.8.1-2309.6.1 Methods of discharge.** The discharge of hydrogen from motor vehicle fuel storage tanks shall be accomplished through a closed transfer system in accordance with Section 2311.8.1.1-2309.6.1.1 or an approved method of atmospheric venting in accordance with Section 2311.8.1.2-2309.6.1.2.~~

~~**2311.8.1.1-2309.6.1.1 Closed transfer system.** (No change to current text)~~

~~**2311.8.1.2-2309.6.1.2 Atmospheric venting of hydrogen from motor vehicle fuel storage containers.** When atmospheric venting is used for the discharge of hydrogen from motor vehicle fuel storage tanks, such venting shall be in accordance with Sections 2311.8.1.2.1-2309.6.1.2.1 through 2311.8.1.2.4-2309.6.1.2.4.~~

~~**2311.8.1.2.1-2309.6.1.2.1 Defueling equipment required at vehicle maintenance and repair facilities.** All facilities for repairing hydrogen systems on hydrogen fueled vehicles shall have equipment to defuel vehicle storage tanks. Equipment used for defueling shall be listed and labeled *or approved* for the intended use.~~

~~2311.8.1.2.1.1~~ ~~2309.6.1.2.1.1~~ **Manufacturer's equipment required.** Equipment supplied by the vehicle manufacturer shall be used to connect the vehicle storage tanks to be defueled to the vent pipe system.

~~2311.8.1.2.1.2~~ ~~2309.6.1.2.1.2~~ **Vent pipe maximum diameter.** (No change to current text)

~~2311.8.1.2.1.3~~ ~~2309.6.1.2.1.3~~ **Maximum flow rate.** (No change to current text)

~~2311.8.1.2.1.4~~ ~~2309.6.1.2.1.4~~ **Isolated use.** (No change to current text)

~~2311.8.1.2.2~~ ~~2309.6.1.2.2~~ **Construction documents.** (No change to current text)

~~2311.8.1.2.3~~ ~~2309.6.1.2.3~~ **Stability of cylinders, containers and tanks.** (No change to current text)

~~2311.8.1.2.4~~ ~~2309.6.1.2.4~~ **Grounding and bonding.** (No change to current text)

~~2311.8.2~~ ~~2309.6.2~~ **Repair of hydrogen piping.** Piping systems containing hydrogen shall not be opened to the atmosphere for repair without first purging the piping with an inert gas to achieve 1 percent hydrogen or less by volume. Defueling operations and exiting purge flow shall be vented in accordance with Section ~~2311.8.1.2~~ ~~2309.6.1.2~~.

~~2311.8.3~~ ~~2309.6.3~~ **Purging.** (No change to current text)

~~2311.8.3.1~~ ~~2309.6.3.1~~ **System purge required.** (No change to current text)

SECTION 2311 REPAIR GARAGES

2311.5 Preparation of vehicles for repair. For vehicles powered by gaseous fuels, the fuel shutoff valves shall be closed prior to repairing any portion of the vehicle fuel system.

Vehicles powered by gaseous fuels in which the fuel system has been damaged shall be inspected and evaluated for fuel system integrity prior to being brought into the repair garage. The inspection shall include testing of the entire fuel delivery system for leakage.

2311.8 Defueling equipment required at vehicle maintenance and repair facilities. *Facilities for repairing hydrogen fuel systems on hydrogen-fueled vehicles shall have equipment to defuel vehicle storage tanks. Where work must be performed on a vehicle's fuel storage tank for the purpose of maintenance, repair or cylinder certification, defueling and purging shall be conducted in accordance with Section 2309.6.*

5301.1 Scope. Storage, use and handling of compressed gases in compressed gas containers, cylinders, tanks and systems shall comply with this chapter, including those gases regulated elsewhere in this code. Partially full compressed gas containers, cylinders or tanks containing residual gases shall be considered as full for the purposes of the controls required.

Exceptions:

1. Gases used as refrigerants in refrigeration systems (see Section 606).
2. Compressed natural gas (CNG) for use as a vehicular fuel shall comply with Chapter 23, NFPA 52 and the *California Mechanical Code*.

Compressed hydrogen (CH₂) for use as a vehicular fuel shall also comply with Chapters 23 and 58 of this code, the California Mechanical Code and NFPA 2.

5305.7 Transfer. Transfer of gases between containers, cylinders and tanks shall be performed by qualified personnel using equipment and operating procedures in accordance with CGA P-1.

Exception: *The fueling of vehicles with compressed natural gas (CNG) or compressed hydrogen gas, that is being conducted in accordance with Chapter 23.*

5801.1 Scope. The storage and use of flammable gases and flammable cryogenic fluids shall be in accordance with this chapter and NFPA 55. Compressed gases shall also comply with Chapter 53 and cryogenic fluids shall also comply with Chapter 55. Flammable cryogenic fluids shall comply with Section 5806. Hydrogen motor fuel-dispensing stations and repair garages and their associated above-ground hydrogen storage systems shall also be designed, ~~and~~ constructed and maintained in accordance with Chapter 23 and NFPA 2.

Exceptions:

1. Gases used as refrigerants in refrigeration systems (see Section 606).
2. Liquefied petroleum gases and natural gases regulated by Chapter 61.
3. Fuel-gas systems and appliances regulated under the California Mechanical Code other than gaseous hydrogen systems and appliances.
4. Pyrophoric gases in accordance with Chapter 64.

5802.1 Definitions. The following terms are defined in Chapter 2:

FLAMMABLE GAS.

FLAMMABLE LIQUEFIED GAS.

GASEOUS HYDROGEN SYSTEM.

HYDROGEN GAS ROOM.

METAL HYDRIDE.

METAL HYDRIDE STORAGE SYSTEM.

5803.1.1 Special limitations for indoor storage and use. Flammable gases shall not be stored or used in Group A, E, I or R occupancies or in offices in Group B occupancies.

Exceptions:

1. Cylinders of nonliquefied compressed gases not exceeding a capacity of 250 cubic feet (7.08 m³) or liquefied gases not exceeding a capacity of 40 pounds (18 kg) each at normal temperature and pressure (NTP) used for maintenance purposes, patient care or operation of equipment.
2. Food service operations in accordance with Section 6103.2.1.7.
3. Hydrogen gas systems located in a hydrogen cutoff room constructed in accordance with Section 421 of the California Building Code.

SECTION 5808

HYDROGEN FUEL GAS ROOMS

5808.1 General. *Where required by the California Fire Code, hydrogen gas rooms shall be designed and constructed in accordance with Sections 5808.1 through 5808.7 and the California Building Code.*

5808.2 Location. *Hydrogen gas rooms shall not be located below grade.*

5808.3 Design and construction. *Hydrogen gas rooms not exceeding the maximum allowable quantities in Table 5003.1.1(1) shall be separated from other areas of the building in accordance with Section 509.1 of the California Building Code.*

5808.3.1 Pressure control. *Hydrogen gas rooms shall be provided with a ventilation system designed to maintain the room at a negative pressure in relation to surrounding rooms and spaces.*

5808.3.2 Windows. *Operable windows in interior walls shall not be permitted. Fixed windows shall be permitted where in accordance with Section 716 of the California Building Code.*

5808.4 Exhaust Ventilation. *Gas rooms shall be provided with mechanical exhaust ventilation in accordance with the applicable provisions of the California Mechanical Code.*

5808.5 Gas detection system. *Hydrogen gas rooms shall be provided with an approved flammable gas detection system in accordance with Sections 5808.5.1 through 5808.5.4.*

5808.5.1 System design. The flammable gas detection system shall be listed for use with hydrogen and any other flammable gases used in the room. The gas detection system shall be designed to activate when the level of flammable gas exceeds 25 percent of the lower flammability limit (LFL) for the gas or mixtures present at their anticipated temperature and pressure.

5808.5.2 Gas detection system components. Gas detection system control units shall be listed and labeled in accordance with UL 864 or UL 2017. Gas detectors shall be listed and labeled in accordance with UL 2075 for use with the gases and vapors being detected.

5808.5.3 Operation. Activation of the gas detection system shall result in all of the following:

1. Initiation of distinct audible and visual alarm signals both inside and outside of the gas room.
2. Activation of the mechanical exhaust ventilation system.

5808.5.4 Failure of the gas detection system. Failure of the gas detection system shall result in activation of the mechanical exhaust ventilation system, cessation of hydrogen generation and the sounding of a trouble signal in an approved location.

5808.6 Explosion control. Explosion control shall be provided where required by Section 911.

5808.7 Standby power. Mechanical ventilation and gas detection systems shall be connected to a standby power system in accordance with Chapter 6.

Notation:

Authority: Health and Safety Code Sections 13108, 13110, 13143, 13146, 13210, 13211, 17921, 18949.2,

References: Health and Safety Code Sections 13110, 13143, 18949.2

[Item 2. Emergency voice/alarm communication system correction.]

907.2.3.3 Notification. The fire alarm system notification shall comply with the requirements of Section 907.5.

~~**Exception:** Emergency voice/alarm communication system is not required when existing facilities have other two way communication, such as between classroom and administration office, when the communication system is approved by the authority have jurisdiction.~~

Notation:

Authority: Health and Safety Code Sections 13108, 13108.5, 13114, 13143, 13146, 13210, 13211, 18949.2, Public Education Code 17010, through 17079

References: Health and Safety Code Sections 13143, 13211, 18949.2, Public Education Code 17010, through 17079

[Item 3. Correlation of regulations regarding smoke alarms and statutory changes made by SB 1394 (2012) and SB 745 (2013)]

907.2.11.1 Group R-1. Single- or multiple-station smoke alarms shall be installed in all of the following locations in Group R-1:

1. In sleeping areas.
2. In every room in the path of the means of egress from the sleeping area to the door leading from the sleeping unit.
3. In each story within the sleeping unit, including basements. For sleeping units with split levels and without an intervening door between the adjacent levels, a smoke alarm installed on the upper level shall suffice for the adjacent lower level provided that the lower level is less than one full story below the upper level.

See Section ~~907.2.11.5~~907.2.11.4 for specific location requirements.

907.2.11.2 Groups R-2, R-2.1, R-3, R-3.1 and R-4. Single- or multiple-station smoke alarms shall be installed and maintained in Groups R-2, R-2.1, R-3, R-3.1 and R-4 regardless of occupant load at all of the following locations:

1. On the ceiling or wall outside of each separate sleeping area in the immediate vicinity of bedrooms.
2. In each room used for sleeping purposes.

Exception: Single- or multiple-station smoke alarms in Group ~~I-4~~ R-2.1 shall not be required where smoke detectors are provided in the sleeping rooms as part of an automatic smoke detection system.

3. In each story within a dwelling unit, including basements but not including crawl spaces and uninhabitable attics. In dwellings or dwelling units with split levels and without an intervening door between the adjacent levels, a smoke alarm installed on the upper level shall suffice for the adjacent lower level provided that the lower level is less than one full story below the upper level.

4. In a Group R-3.1 occupancies, in addition to the above, smoke alarms shall be provided throughout the habitable areas of the dwelling unit except kitchens.

See Section ~~907.2.11.5~~907.2.11.4 for specific location requirements.

907.2.11.2.3 Smoke alarms. *Smoke alarms shall be tested and maintained in accordance with the manufacturer's instructions. Smoke alarms that no longer function shall be replaced. ~~Smoke alarms installed in one- and two-family dwellings shall be replaced after 10 years from the date of manufacture marked on the unit, or if the date of manufacture cannot be determined.~~*

907.2.11.2.4 Conventional ionization smoke alarms. ~~Conventional ionization smoke alarms that are solely battery powered shall be equipped with a ten-year battery and have a silence feature.~~

~~Conventional ionization smoke alarm for the purposes of this section is a smoke alarm, listed as complying with ANSI/UL 217, in which the only sensing element is an ionization sensor. The output signal from the ionization sensor must exceed a factory set alarm threshold, without the use discriminating algorithms, to determine when an alarm signal is warranted.~~

907.2.11.5907.2.11.4 **Specific location requirements.**

[remainder of text not changed]

Notation:

Authority: Health and Safety Code Sections 1250, 1569.72, 1569.78, 1568.02, 1502, 1597.44, 1597.65, 13108, 13143, 13143.9, 13146, 13210, 13211, 17921, 18949.2, Public Education Code 17074.50

References: Health and Safety Code Sections 13143, 13211, 18949.2

[Item 4. Clarification of Group I-2.1 occupancy provisions and editorial corrections.]

TABLE 803.3

INTERIOR WALL AND CEILING FINISH REQUIREMENTS BY OCCUPANCY^k

(Table not shown)

For SI: 1 inch = 25.4 mm, 1 square foot = 0.0929m².

NP = Not permitted [SFM]

- a. Class C interior finish materials shall be allowed for wainscoting or paneling of not more than 1,000 square feet of applied surface area in the grade lobby where applied directly to a noncombustible base or over furring strips applied to a noncombustible base and fireblocked as required by Section 803.11 of the *California Building Code*.
- b. ~~In exit enclosures of buildings less than three stories in height of other than Group I-3, Class B interior finish for~~

~~nonsprinklered buildings and Class C for sprinklered buildings shall be permitted.~~

- b. In other than Group I-2 and I-2.1 occupancies in buildings less than three stories above grade plane of other than Group I-3, Class B interior finish for nonsprinklered buildings and Class C interior finish for sprinklered buildings shall be permitted in interior exit stairways and ramps.
- c. Requirements for rooms and enclosed spaces shall be based upon spaces enclosed by partitions. Where a fire-resistance rating is required for structural elements, the enclosing partitions shall extend from the floor to the ceiling. Partitions that do not comply with this shall be considered enclosing spaces and the rooms or spaces on both sides shall be considered one. In determining the applicable requirements for rooms and enclosed spaces, the specific occupancy thereof shall be the governing factor regardless of the group classification of the building or structure.
- d. Lobby areas in Group A-1, A-2 and A-3 occupancies shall not be less than Class B materials.
- e. Class C interior finish materials shall be allowed in Group A occupancies with an occupant load of 300 persons or less.
- f. In places of religious worship, wood used for ornamental purposes, trusses, paneling or chancel furnishing shall be allowed.
- g. Class B material is required where the building exceeds two stories.
- h. Class C interior finish materials shall be allowed in administrative spaces.
- i. Class C interior finish materials shall be allowed in rooms with a capacity of four persons or less.
- j. Class B materials shall be permitted as wainscoting extending not more than 48 inches above the finished floor in corridors.
- k. Finish materials as provided for in other sections of this code.
- l. Applies when the vertical exits, exit passageways, corridors or rooms and spaces are protected by an approved automatic sprinkler system installed in accordance with Section 903.3.1.1 or 903.3.1.2.

804.3.3.2 Minimum critical radiant flux. In all occupancies, new interior floor finish and floor covering materials in enclosures for stairways and ramps, exit passageways, corridors and rooms or spaces not separated from corridors by full-height partitions extending from the floor to the underside of the ceiling shall withstand a minimum critical radiant flux. The minimum critical radiant flux shall not be less than Class I in Groups I-1, I-2 and I-3 and not less than Class II in Groups A, B, E, H, I-2.1, I-4, M, R-1, R-2 and S.

Exception: Where a building is equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1 or 903.3.1.2, Class II materials shall be permitted in any area where Class I materials are required and materials complying with DOC FF-1 "pill test" (CPSC 16 CFR Part 1630) or with ASTM D 2859 shall be permitted in any area where Class II materials are required.

807.1 General requirements. In occupancies in Groups A, E, I and R-1 and dormitories in Group R-2, curtains, draperies, hangings and other decorative materials suspended from walls or ceilings shall meet the flame propagation performance criteria of NFPA 701 in accordance with Section 806.2 or be noncombustible.

Exceptions:

- 1. Curtains, draperies, hangings and other decorative materials suspended from walls of sleeping units and dwelling units in dormitories in Group R-2 protected by an approved automatic sprinkler system installed in accordance with Section 903.3.1 and such materials are limited to not more than 50 percent of the aggregate area of walls.
- 2. Decorative materials, including, but not limited to, photographs and paintings in dormitories in Group R-2 where such materials are of limited quantities such that a hazard of fire development or spread is not present.

In Groups I-1, ~~and I-2~~ and I-2.1, combustible decorative materials shall meet the flame propagation criteria of NFPA 701 unless the decorative materials, including, but not limited to, photographs and paintings, are of such limited quantities that a hazard of fire development or spread is not present. In Group I-3, combustible decorative materials are prohibited.

Fixed or movable walls and partitions, paneling, wall pads and crash pads applied structurally or for decoration, acoustical correction, surface insulation or other purposes shall be considered interior finish if they cover 10 percent or more of the wall or of the ceiling area, and shall not be considered decorative materials or furnishings.

In Group B and M occupancies, fabric partitions suspended from the ceiling and not supported by the floor shall meet the flame propagation performance criteria in accordance with Section 807.2 and NFPA 701 or shall be noncombustible.

907.2.13 High-rise buildings and Group I-2 occupancies having occupied floors located more than 75 feet above the lowest level of fire department vehicle access. High-rise buildings and Group I-2 occupancies having occupied floors located more than 75 feet above the lowest level of fire department vehicle access shall be provided with an automatic smoke detection system in accordance with Section 907.2.13.1, a fire department communication system in accordance with Section 907.2.13.2 and an emergency voice/alarm communication system in accordance with Section 907.6.2.2.

Exceptions:

1. Airport traffic control towers in accordance with Sections 907.2.22 and 412 of the *California Building Code*.
2. Open parking garages in accordance with Section 406.5 of the *California Building Code*.
3. Buildings with an occupancy in Group A-5 in accordance with Section 303.1 of the *California Building Code*.
4. Low-hazard special occupancies in accordance with Section 503.1.1 of the *California Building Code*.
5. In Group I-2, I-2.1 and R-2.1 occupancies, the alarm shall sound at a constantly attended location and occupant notification shall be broadcast by the emergency voice/alarm communication system.

907.5.2.2 Emergency voice/alarm communication systems. Emergency voice/alarm communication systems required by this code shall be designed and installed in accordance with NFPA 72. The operation of any automatic fire detector, sprinkler waterflow device or manual fire alarm box shall automatically sound an alert tone followed by voice instructions giving approved information and directions for a general or staged evacuation in accordance with the building's fire safety and evacuation plans required by Section 404. In high-rise buildings and Group I-2 occupancies having occupied floors located more than 75 feet above the lowest level of fire department vehicle access, the system shall operate on a minimum of the alarming floor, the floor above and the floor below. Speakers shall be provided throughout the building by paging zones. At a minimum, paging zones shall be provided as follows:

1. Elevator groups.
2. Exit stairways.
3. Each floor.
4. Areas of refuge as defined in Chapter 2.

Exception: In Group I-2, I-2.1 and R-2.1 occupancies, the alarm shall sound in a constantly attended area and a general occupant notification shall be broadcast over the overhead page.

907.5.2.5 Groups I-2 and ~~4-2-4~~I-2.1. Audible appliances shall be used in nonpatient areas. Visible appliances are allowed to be used in lieu of audible appliances in patient occupied areas. Audible appliances located in patient areas shall be only chimes or similar sounding appliances for alerting staff.

In occupancies housing nonambulatory persons where restraint is practiced, staff and attendants shall be provided and housed or located in such a manner that such supervisory personnel will also be alerted upon activation of the fire alarm system or any detector required by this section.

909.5.2 Opening protection. Openings in smoke barriers shall be protected by self-closing devices or automatic-closing devices actuated by the required controls for the mechanical smoke control system. Door openings shall be protected by fire door assemblies complying with Section 716.5.3 of the *California Building Code*.

Exceptions:

1. Passive smoke control systems with automatic-closing devices actuated by spot-type smoke detectors listed for releasing service installed in accordance with Section 907.4. *When used in a Group I-2 or a I-2.1, such detectors shall activate the building fire alarm system and shall close all the smoke barrier doors within the effected zone.*
2. Fixed openings between smoke zones that are protected utilizing the airflow method *in other than Group I-2 or I-2.1.*
3. In Group I-2 or I-2.1, where doors are installed across corridors, a pair of opposite-swinging doors without a center mullion or horizontal sliding doors that comply with Section 1008.1.4.3 **shall be installed.** Vision panels consisting of fire-rated glazing in approved frames shall be provided in each cross-corridor swinging door and at each cross-corridor horizontal-sliding door in a smoke barrier. The doors shall be close fitting within operational tolerances, and shall not have undercuts, louvers or grilles. Swinging doors shall have head and jamb stops and astragals or rabbets at meeting edges. *Doors installed across corridors shall be automatic closing by smoke detection in accordance with Section 716.5.9.3 of the California Building Code.* Positive-latching devices are required. *Doors installed across corridors shall comply with Section 1008.1.1.*

4. Group I-3.
5. Openings between smoke zones with clear ceiling heights of 14 feet (4267 mm) or greater and bank-down capacity of greater than 20 minutes as determined by the design fire size.
6. *In Group I-2 or I-2.1, smoke damper activation may be accomplished by a fire alarm control unit provided that an open area smoke detection system is provided within all areas served by an HVAC system.*

1003.3.3.1 Horizontal projections for Group I-2 and I-2.1 occupancies. *Structural elements, fixtures or furnishings shall not project horizontally from either side more than 1-1/2 inches (38 mm) into the required width of an exit access corridor serving any area caring for one or more nonambulatory or bedridden persons.*

Exceptions:

1. *Handrails are permitted to protrude 3/2 inches (89 mm) from the wall.*
2. *Alcohol-based hand-rub dispensers are permitted to protrude 4 inches.*
3. *Manual fire alarm boxes with a protective cover installed are permitted to protrude 4 inches.*

1003.5 Elevation change. Where changes in elevation of less than 12 inches (305 mm) exist in the *means of egress*, sloped surfaces shall be used. Where the slope is greater than one unit vertical in 20 units horizontal (5-percent slope), *ramps* complying with Section 1010 shall be used. Where the difference in elevation is 6 inches (152 mm) or less, the *ramp* shall be equipped with either handrails or floor finish materials that contrast with adjacent floor finish materials.

Exceptions:

1. A single step with a maximum riser height of 7 inches (178 mm) is permitted for buildings with occupancies in Groups F, H, R-2, R-3, S and U at exterior doors not required to be accessible by Chapter 11A or 11B of the *California Building Code*.
2. A stair with a single riser or with two risers and a tread is permitted at locations not required to be accessible by Chapter 11 of the *California Building Code*, provided that the risers and treads comply with Section 1009.7, the minimum depth of the tread is 13 inches (330 mm) and at least one handrail complying with Section 1012 is provided within 30 inches (762 mm) of the centerline of the normal path of egress travel on the stair.
3. A step is permitted in aisles serving seating that has a difference in elevation less than 12 inches (305 mm) at locations not required to be accessible by Chapter 11A or 11B of the *California Building Code*, provided that the risers and treads comply with Section 1028.11 and the *aisle* is provided with a handrail complying with Section 1028.13.

Throughout a story in a Group I-2 *and Group I-2.1 occupancies*, any change in elevation in portions of the means of egress that serve nonambulatory persons shall be by means of a *ramp* or sloped walkway.

1008.1.1 Size of doors. The minimum width of each door opening shall be sufficient for the occupant load thereof and shall provide a clear width of *not less than* 32 inches (813 mm). Clear openings of doorways with swinging doors shall be measured between the face of the door and the stop, with the door open 90 degrees (1.57 rad). Where this section requires a minimum clear width of 32 inches (813 mm) and a door opening includes two door leaves without a mullion, one leaf shall provide a clear opening width of 32 inches (813 mm). The maximum width of a swinging door leaf shall be 48 inches (1219 mm) nominal. Means of egress doors in a Group I-2 *or I-2.1* occupancy used for the movement of beds *and litter patients* shall provide a clear width not less than ~~41 1/2~~ 44 inches (~~1054~~ 1118 mm). The height of door openings shall not be less than 4480 inches (40542032 mm).

Exceptions:

1. The minimum and maximum width shall not apply to door openings that are not part of the required means of egress in Group R-2 and R-3 occupancies.
2. Door openings to resident sleeping units in Group I-3 occupancies shall have a clear width of not less than 28 inches (711 mm).
3. Door openings to storage closets less than 10 square feet (0.93 m²) in area shall not be limited by the minimum width.
4. Width of door leaves in revolving doors that comply with Section 1008.1.4.1 shall not be limited.
5. Door openings within a dwelling unit or sleeping unit shall not be less than 78 inches (1981 mm) in height.
6. Exterior door openings in dwelling units and sleeping units, other than the required exit door, shall not be less than 76 inches (1930 mm) in height.
7. In other than Group R-1 occupancies, the minimum widths shall not apply to interior egress doors within a dwelling

unit or sleeping unit that is not required to be adaptable or accessible as specified in Chapter 11A or 11B..

1008.1.1.1 Projections into clear width. There shall not be projections into the required clear width lower than 34 inches (864 mm) above the floor or ground. Projections into the clear opening width between 34 inches (864 mm) and 80 inches (2032 mm) above the floor or ground shall not exceed 4 inches (102 mm).

Exceptions:

1. Door closers and door stops shall be permitted to be 78 inches (1980 mm) minimum above the floor.
2. *In a Group I-2 or I-2.1 occupancy, there shall be no projections into the clear width of doors used for the movement of beds and litter patients in the means of egress.*

1009.4 Width. The width of stairways shall be determined as specified in Section 1005.1, but such width shall not be less than 44 inches (1118 mm). See Section 1007.3 for accessible means of egress stairways.

Exceptions:

1. Stairways serving an occupant load of less than 50 shall have a width of not less than 36 inches (914 mm).
2. Spiral stairways as provided for in Section 1009.12.
3. Aisle stairs complying with Section 1028.
4. Where an incline platform lift or stairway chairlift is installed on stairways serving occupancies in Group R-3, or within dwelling units in occupancies in Group R-2, a clear passage width not less than 20 inches (508 mm) shall be provided. If the seat and platform can be folded when not in use, the distance shall be measured from the folded position.

Means of egress stairs in a Group I-2 or I-2.1 occupancy used for the movement of beds and litter patients shall provide a clear width not less than 44 inches (1118 mm).

1014.2.2 Basement exits in Group I-2 occupancies. *For additional requirements for occupancies in Group I-2 or I-2.1, see Sections 407 of the California Building Code.*

**TABLE 1014.3
COMMON PATH OF EGRESS TRAVEL**

(Table not shown)

For SI: 1 foot = 304.8 mm.

- a. Buildings equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1.
- b. Buildings equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1 or 903.3.1.2. See Section 903 for occupancies where automatic sprinkler systems are permitted in accordance with Section 903.3.1.2.
- c. For a room or space used for assembly purposes having fixed seating, see Section 1028.8.
- d. The length of a common path of egress travel in a Group S-2 open parking garage shall not be more than 100 feet (30 480 mm).
- e. The length of a common path of egress travel in a Group R-3 occupancy located in a mixed occupancy building.
- f. For the distance limitations in Group I-2 or I-2.1, see Section 407.4 of the *California Building Code*.

1015.1 Exits or exit access doorways from spaces. Two exits or exit access doorways from any space shall be provided where one of the following conditions exists:

1. The occupant load of the space exceeds one of the values in Table 1015.1.

Exceptions:

1. In Group R-2 and R-3 occupancies, one means of egress is permitted within and from individual dwelling units with a maximum occupant load of 20 where the dwelling unit is equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1 or 903.3.1.2.
2. Care suites in Group I-2 or I-2.1 occupancies complying with Section 407.4.3 of the *California Building Code*.

2. The common path of egress travel exceeds one of the limitations of Section 1014.3.
3. Where required by Section 1015.3, 1015.4, 1015.5, or 1015.6.
4. *In detention and correctional facilities and holding cells, such as are found in courthouse buildings, when the occupant load is more than 20 see Section 408.3.11 of the California Building Code.*

TABLE 1016.2
EXIT ACCESS TRAVEL DISTANCE^a
 (Table not shown)

For SI: 1 foot = 304.8 mm.

- a. See the following sections for modifications to exit access travel distance requirements:
 - Section 402.8 of the *California Building Code*: For the distance limitation in malls.
 - Section 404.9 of the *California Building Code*: For the distance limitation through an atrium space.
 - Section 407.4 of the *California Building Code*: For the distance limitation in Group I-2 or I-2.1.
 - Section 408.3.10 of the *California Building Code*: For increased limitation in Group I-3.
 - Sections 408.6.1 and 408.8.1 of the *California Building Code*: For the distance limitations in Group I-3.
 - Section 411.4 of the *California Building Code*: For the distance limitation in Special Amusement Buildings.
 - Section 1015.4: For the distance limitation in refrigeration machinery rooms.
 - Section 1015.5: For the distance limitation in refrigerated rooms and spaces.
 - Section 1016.3: For increased limitation in Groups F-1 and S-1.
 - Section 1021.2: For buildings with one exit.
 - Section 1028.7: For increased limitation in assembly seating.
 - Section 1028.7: For increased limitation for assembly open-air seating.
 - Section 3103.4 of the *California Building Code*: For temporary structures.
 - Section 3104.9 of the *California Building Code*: For pedestrian walkways.
- b. Buildings equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1 or 903.3.1.2. See Section 903 for occupancies where automatic sprinkler systems are permitted in accordance with Section 903.3.1.2.
- c. Buildings equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1
- d. Not permitted in non-sprinklered Group I-3 Occupancies.

1018.1 Construction. Corridors shall be fire-resistance rated in accordance with Table 1018.1. The corridor walls required to be fire-resistance rated shall comply with Section 708 of the *California Building Code* for fire partitions.

Exceptions:

1. A fire-resistance rating is not required for corridors in an occupancy in Group E where each room that is used for instruction has at least one door opening directly to the exterior and rooms for assembly purposes have at least one-half of the required means of egress doors opening directly to the exterior. Exterior doors specified in this exception are required to be at ground level.
2. A fire-resistance rating is not required for corridors contained within a dwelling or sleeping unit in an occupancy in Group R.
3. A fire-resistance rating is not required for corridors in open parking garages.
4. A fire-resistance rating is not required for corridors in an occupancy in Group B which is a space requiring only a single means of egress complying with Section 1015.1.
5. Corridors adjacent to the exterior walls of buildings shall be permitted to have unprotected openings on unrated exterior walls where unrated walls are permitted by Table 602 of the *California Building Code* and unprotected openings are permitted by Table 705.8 of the *California Building Code*.
6. A fire-resistance rating is not required for corridors within suites in a Group I-2 or I-2.1 occupancy provided with an automatic sprinkler system throughout and constructed in accordance with Section 407.4.3.5 or 407.4.3.6 of the *California Building Code*.

TABLE 1018.1
CORRIDOR FIRE-RESISTANCE RATING

OCCUPANCY	OCCUPANT LOAD SERVED BY CORRIDOR	REQUIRED FIRE-RESISTANCE RATING (hours)	
		Without sprinkler system	With sprinkler system ^c
H-1, H-2, H-3	All	Not Permitted	1
H-4, H-5	Greater than 30	Not Permitted	1
A ^d , B, F, M, S, U	Greater than 30	1	0
R-1, R-2, R-3, R-3.1, R-4	Greater than 10	Not Permitted	1
I-2 ^a , I-2.1, I-4	Greater than 6	Not Permitted	1

I-3, R-2.1	Greater than 6	Not Permitted	1 ^b
E	Greater than 10	1	1

- a. For requirements for occupancies in Group I-2 and I-2.1, see Sections 407.2 and 407.3 of the *California Building Code*.
- b. For a reduction in the fire-resistance rating for occupancies in Group I-3, see Sections 408.8.1.2 and 408.8 of the *California Building Code*.
- c. Buildings equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1 or 903.3.1.2 where allowed.
- d. [SFM] See Section 1028.

Notation:

Authority: Health and Safety Code Sections 1250, 1569.72, 1569.78, 1568.02, 1502, 1597.44, 1597.45, 1597.46, 1597.54, 1597.65, 13108, 13108.5, 13114, 13143, 13143.2, 13143.6, 13146, 17921, 18949.2

References: Health and Safety Code Sections 13143, 18949.2,

[Item 5. Adoption of NFPA 502.]

SECTION 319
ROAD TUNNELS, BRIDGES, AND OTHER LIMITED ACCESS HIGHWAYS [SFM]

319.1 General. *Road tunnels, bridges, and other limited access highways that are state owned shall comply with NFPA 502.*

Notation:

Authority: Health and Safety Code Sections 13108, 13110, 13143, 18949.2

References: Health and Safety Code Sections 13143, 18949.2

[Item 6. Reinstate model code provisions missing.]

907.2.29.1 New public school campus. *An automatic fire alarm system shall be provided in all occupancies that activates the occupant notification system signal utilizing an emergency voice/alarm communication system meeting the requirements of Section 907.5.2.2 and installed in accordance with Section 907.6. The provisions of this section shall apply to any public school project consisting of one or more buildings on a new school campus and receiving state funds pursuant to Leroy F. Greene School Facilities Act of 1998, California Education Code sections 17070.10 through 17079. For purposes of this section, new campus refers to a school site, where an application for construction of original buildings was made to DSA on or after July 1, 2002.*

Exceptions:

1. *A relocatable building that is sited with the intent that it be at the site for less than three years and is sited upon a temporary foundation in a manner that is designed to permit easy removal. Also see CCR, Title 24, Part 1, California Administrative Code, Section 4-314 for definition of relocatable building.*
2. *Detached buildings designed and used for non-instructional purposes that meet the applicable requirements for that occupancy. Buildings would include, but not be limited to:*

*Concession Stand
Press Box
Restroom Facilities
Shade Structure
Snack Bar
Storage Building
Ticket Booth*

Notation:

Authority: Health and Safety Code Sections 13108, 13108.5, 13114, 13143, 13146, 13210, 13211, 18949.2, Public Education Code 17010, through 17079
References: Health and Safety Code Sections 13143, 13211, 18949.2, Public Education Code 17010, through 17079

[Item 7. Clarification and editorial modifications for photovoltaic solar systems.]

503.1.1 Buildings and facilities. Approved fire apparatus access roads shall be provided for every facility, building or portion of a building hereafter constructed or moved into or within the jurisdiction. The fire apparatus access road shall comply with the requirements of this section and shall extend to within 150 feet (45 720 mm) of all portions of the facility and all portions of the exterior walls of the first story of the building as measured by an approved route around the exterior of the building or facility.

Exceptions:

1. The fire code official is authorized to increase the dimension of 150 feet (45 720 mm) where:

1.1. The building is equipped throughout with an approved automatic sprinkler system installed in accordance with Section 903.3.1.1, 903.3.1.2 or 903.3.1.3.

1.2. Fire apparatus access roads cannot be installed because of location on property, topography, waterways, nonnegotiable grades or other similar conditions, and an approved alternative means of fire protection is provided.

1.3. There are not more than two Group R-3 or Group U occupancies.

2. Where approved by the fire code official, fire apparatus access roads may be exempted and/ or modified for solar photovoltaic power generation facilities.

605.11 Solar photovoltaic power systems. Solar photovoltaic power systems shall be installed in accordance with Sections 605.11.1 through ~~605.11.4~~605.11.3, the *California Building Code* and the *California Electrical Code*.

~~**Exception:** Detached, nonhabitable Group U structures including, but not limited to, parking shade structures, carports, solar trolleys and similar structures shall not be subject to the requirements of this section.~~

~~**605.11.1 Marking.** Marking is required on interior and exterior direct-current (DC) conduit, enclosures, raceways, cable assemblies, junction boxes, combiner boxes and disconnects.~~

~~**605.11.1.1 Materials.** The materials used for marking shall be reflective, weather resistant and suitable for the environment. Marking as required in Sections 605.11.1.2 through 605.11.1.4 shall have all letters capitalized with a minimum height of 3/8 inch (9.5 mm) white on red background.~~

~~**605.11.1.2 Marking content.** The marking shall contain the words "WARNING: PHOTOVOLTAIC POWER SOURCE."~~

~~**605.11.1.3 Main service disconnect.** The marking shall be placed adjacent to the main service disconnect in a location clearly visible from the location where the disconnect is operated.~~

~~**605.11.1.4 Location of marking.** Marking shall be placed on interior and exterior DC conduit, raceways, enclosures and cable assemblies every 10 feet (3048 mm), within 1 foot (305 mm) of turns or bends and within 1 foot (305 mm) above and below penetrations of roof/coiling assemblies, walls or barriers.~~

~~**605.11.2 Locations of DC conductors.** Conduit, wiring systems, and raceways for photovoltaic circuits shall be located as close as possible to the ridge or hip or valley and from the hip or valley as directly as possible to an outside wall to reduce trip hazards and maximize ventilation opportunities. Conduit runs between sub arrays and to DC combiner boxes shall be installed in a manner that minimizes the total amount of conduit on the roof by taking the shortest path from the array to the DC combiner box. The DC combiner boxes shall be located such that conduit~~

runs are minimized in the pathways between arrays. DC wiring shall be installed in metallic conduit or raceways when located within enclosed spaces in a building. Conduit shall run along the bottom of load bearing members.

~~605.11.3~~ **605.11.1 Access and pathways.** Roof access, pathways, and spacing requirements shall be provided in accordance with Sections ~~605.11.3.1 through 605.11.3.3~~ 605.11.1.1 through 605.11.1.3.3.

Exceptions:

1. Residential structures shall be designed so that each photovoltaic array is no greater than 150 feet (45 720 mm) by 150 feet (45 720 mm) in either axis.

2. Panels/modules shall be permitted to be located up to the roof ridge where an alternative ventilation method approved by the fire chief has been provided or where the fire chief has determined vertical ventilation techniques will not be employed.

1. Detached, nonhabitable Group U structures including, but not limited to, parking shade structures, carports, solar trellises and similar structures.

2. Roof access, pathways, and spacing requirements need not be provided where the fire chief has determined rooftop operations will not be employed.

~~605.11.3.1~~ **605.11.1.1 Roof access points.** Roof access points shall be located in areas that do not require the placement of ground ladders over openings such as windows or doors, and located at strong points of building construction in locations where the access point does not conflict with overhead obstructions such as tree limbs, wires, or signs.

~~605.11.3.2 Residential systems for one and two family dwellings.~~ **605.11.1.2 Solar photovoltaic systems for Group R-3 buildings.** Access to residential systems for one and two family dwellings ~~Solar photovoltaic systems for Group R-3 buildings~~ shall comply with Sections 605.11.3.2.1 through 605.11.3.2.4.

Exception: These requirements shall not apply to structures designed and constructed in accordance with the California Residential Code.

605.11.1.2.1 Size of solar photovoltaic array. Each photovoltaic array shall be limited to 150 feet (45 720 mm) by 150 feet (45 720 mm). Multiple arrays shall be separated by a 3-foot-wide (914 mm) clear access pathway.

~~605.11.3.2.1 Residential buildings with h~~ **605.11.1.2.2 Hip roof layouts.** Panels ~~and~~ and modules installed on residential ~~Group R-3 buildings~~ with hip roof layouts shall be located in a manner that provides a 3-foot-wide (914 mm) clear access pathway from the eave to the ridge on each roof slope where panels ~~and~~ and modules are located. The access pathway shall be located at a structurally strong location on the building capable of supporting the live load of fire fighters accessing the roof.

Exception: These requirements shall not apply to roofs with slopes of two units vertical in 12 units horizontal (2:12) or less.

~~605.11.3.2.2 Residential buildings with a single ridge~~ **605.11.1.2.3 Single ridge roofs.** Panels ~~and~~ and modules installed on residential ~~Group R-3 buildings~~ with a single ridge shall be located in a manner that provides two, 3-foot-wide (914 mm) access pathways from the eave to the ridge on each roof slope where panels ~~and~~ and modules are located.

Exception: This requirement shall not apply to roofs with slopes of two units vertical in 12 units horizontal (2:12) or less.

~~605.11.3.2.3 residential buildings with roof hips and valleys~~ **605.11.1.2.4 Roofs with hips and valleys.** Panels ~~and~~ and modules installed on residential ~~buildings~~ ~~Group R-3 buildings~~ with roof hips and valleys shall be located no closer than 18 inches (457 mm) to a hip or a valley where panels ~~and~~ and modules are to be placed on both sides of a hip or valley. Where panels are to be located on only one side of a hip or valley that is of equal length, the panels shall be permitted to be placed directly adjacent to the hip or valley.

Exception: These requirements shall not apply to roofs with slopes of two units vertical in 12 units horizontal (2:12) or less.

~~605.11.3.2.4 Residential building~~ **605.11.1.2.5 Allowance for smoke ventilation operation.** Panels ~~and~~ and modules

installed on ~~Residential buildings~~ Group R-3 buildings shall be located no ~~higher~~ less than 3 feet (914 mm) ~~below~~ from the ridge in order to allow for fire department smoke ventilation operations.

Exception: Panels and modules shall be permitted to be located up to the roof ridge where an alternative ventilation method approved by the fire chief has been provided or where the fire chief has determined vertical ventilation techniques will not be employed.

~~605.11.3.3~~ **605.11.1.3** Other than residential buildings **Group R-3 buildings.** Access to systems for ~~occupancies~~ buildings other than ~~one- and two-family dwellings~~ those containing Group R-3 occupancies shall be provided in accordance with Sections ~~605.11.3.3.1~~ 605.11.2.3.1 through ~~605.11.3.3~~ 605.11.2.3.3.

Exception: Where it is determined by the fire code official that the roof configuration is similar to that of a ~~one- or two-family dwelling~~ Group R-3 occupancy, the residential access and ventilation requirements in Sections ~~605.11.3.2.1~~ 605.11.2.2.1 through ~~605.11.3.2.4~~ 605.11.2.2.5 shall be permitted to be used.

~~605.11.3.3.1~~ **605.11.1.3.1** **Access.** There shall be a minimum 6-foot-wide (1829 mm) clear perimeter around the edges of the roof.

Exception: Where either axis of the building is 250 feet (76 200 mm) or less, ~~there~~ the clear perimeter around the edges of the roof shall be a minimum 4-foot-wide (1290 mm) ~~clear perimeter around the edges of the roof.~~

~~605.11.3.3.2~~ **605.11.1.3.2** **Pathways.** The solar installation shall be designed to provide designated pathways. The pathways shall meet the following requirements:

1. The pathway shall be over areas capable of supporting fire fighters accessing the roof.
2. The centerline axis pathways shall be provided in both axes of the roof. Centerline axis pathways shall run where the roof structure is capable of supporting the live load of fire fighters accessing the roof.
3. Shall be a straight line not less than 4 feet (1290 mm) clear to ~~skylights~~ roof standpipes or ventilation hatches.
- ~~4. Shall be a straight line not less than 4 feet (1290 mm) clear to roof standpipes.~~
- ~~5.4.~~ Shall provide not less than 4 feet (1290 mm) clear around roof access hatch with at least one not less than 4 feet (1290 mm) clear pathway to parapet or roof edge.

~~605.11.3.3.3~~ **605.11.1.3.3** **Smoke ventilation.** The solar installation shall be designed to meet the following requirements:

1. Arrays shall be no greater than 150 feet (45 720 mm) by 150 feet (45 720 mm) in distance in either axis in order to create opportunities for fire department smoke ventilation operations.
2. Smoke ventilation options between array sections shall be one of the following:
 - 2.1. A pathway 8 feet (2438 mm) or greater in width.
 - 2.2. A 4-foot (1290 mm) or greater in width pathway and bordering roof skylights or gravity-operated dropout smoke and heat vents on not less than one side.
2.2. A 4-foot (1290 mm) or greater in width pathway and bordering all sides of nongravity-operated dropout smoke and heat vents on not less than one side.
 - ~~2.3.2.4~~ A 4-foot (1290 mm) or greater in width pathway and bordering 4-foot by 8-foot (1290 mm by 2438 mm) "venting cutouts" every 20 feet (6096 mm) on alternating sides of the pathway.

~~605.11.4~~ **605.11.2** **Ground-mounted photovoltaic arrays.** Ground-mounted photovoltaic arrays shall comply with Sections ~~605.11 through 605.11.2~~ and this section and the California Electrical Code. Setback requirements shall not apply to ground-mounted, free-standing photovoltaic arrays. A clear, brush-free area of 10 feet (3048 mm) shall be required for ground mounted photovoltaic arrays.

Notation:

Authority: Health and Safety Code Sections 13108, 13110, 13143, 13210, 13211, 18949.2

References: Health and Safety Code Sections 13110, 13143, 13211, 18949.2

[Item 8. Clarification and coordination of residential fire sprinkler systems, antifreeze and NFPA 13D and modifications to the referenced standards.]

Delete the "NFPA 92a" should only be NFPA 92 in the Matrix Table
 Add NFPA 502 in the Matrix Table

**CALIFORNIA FIRE CODE – MATRIX ADOPTION TABLE
 CHAPTER 80 – REFERENCED STANDARDS**

(Matrix Adoption Tables are non-regulatory, intended only as an aid to the user.
 See Chapter 1 for state agency authority and building applications.)

Adopting Agency	BS C	SFM		HCD			DSA		OSHPD				CS	DH	AG	DW	CE	C	S	SL
		T-24	T-19*	1	2	1/AC	AC	SS	1	2	3	4	A	S	R	R	C	A	L	C
Adopt Entire Chapter																				
Adopt Entire Chapter as amended (amended sections listed below)		X																		
Adopt only those sections that are listed below																				
[California Code of Regulations, Title 19, Division 1]																				
Chapter / Section																				
NFPA 92a-12		X																		
NFPA 502-14		X																		

**CHAPTER 80
 REFERENCED STANDARDS**

NFPA National Fire Protection Association
 1 Batterymarch Park
 Quincy, MA 02269-9101

Standard reference number	Title	Referenced in code section number
13—13	Installation of Sprinkler Systems <i>as amended</i> *	903.3.1.1, 903.3.2, 903.3.5.1.1, 903.3.5.2, 904.11, 905.3.4, 907.6.3, 1009.3, 3201.1, 3204.2, Table 3206.2, 3206.9, 3207.2, 3207.2.1, 3208.2.2, 3208.2.2.1, 3208.4, 3210.1, 3401.1, 5104.1, 5106.5.7, 5704.3.3.9, Table 5704.3.6.3(7), 5704.3.7.5.1, 5704.3.8.4

**NFPA 13, Amended Sections as follows:*

Revise Section 2.2 and add publications as follows:

2.2 NFPA Publications.

NFPA 25, *Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems*, ~~2006~~2013 California edition.

Add a new definition as 3.4.1.1 to read as follows:

~~3.4.1.1 Premixed Antifreeze Solution. A mixture of an antifreeze material with water that is prepared by the manufacturer with a quality control procedure in place that ensures that the antifreeze solution remains homogeneous.~~

Revise 7.6.1.5 to read as follows:

7.6.1.5 A placard shall be placed on the antifreeze system main valve that indicates the manufacture type and brand of the antifreeze solution, the concentration by volume of the antifreeze solution used, and the volume of the antifreeze solution used in the system.

Revise 7.6.2.1 to read as follows:

7.6.2.1* Antifreeze solutions shall be limited to premixed antifreeze solutions of glycerin (chemically pure or United States Pharmacopoeia 96.5%) at a maximum concentration of 50% by volume, or propylene glycol at a maximum concentration of 40% by volume.

Add a new 7.6.2.1.1 to read:

7.6.2.1.1 Premixed antifreeze solutions of propylene glycol exceeding 40% concentration by volume shall be permitted for use with ESFR sprinklers where the ESFR sprinklers are listed for such use in a specific application.

Add new 7.6.2.1.2 to read as follows:

7.6.2.1.2 Premixed antifreeze solutions other than those described in 7.6.2.1 that are listed for use in sprinkler systems shall be permitted to be used.

Add a new 7.6.2.1.3 to read as follows:

7.6.2.1.3 All premixed antifreeze solutions shall be provided with a certificate from the manufacturer indicating the type of antifreeze, concentration by volume, and freezing point.

Delete current Table 7.6.2.2 and replace it with the following table in the annex renumbered as Table A.7.6.2.1

A.7.6.2.1 See Table A.7.6.2.1.

Table A.7.6.2.1 Properties of Glycerin and Propylene Glycol

Material	Solution (by volume)	Specific Gravity at 77°F (25°C)	Freezing Point	
			°F	°C
Glycerin (C.P. or U.S.P. grade)	0%	1.000	32	0
	5	1.014	31	-0.5
	10	1.029	28	-2.2
	15	1.043	25	-3.9
	20	1.059	20	-6.7
	25	1.071	16	-8.9
	30	1.087	10	-12
	35	1.100	4	-15.5
	40	1.114	-2	-19
	45	1.130	-11	-24
	50%	1.141	-19	-28
Propylene glycol	0%	1.000	32	0
	5	1.004	26	-3

	10	1.008	25	-4
	15	1.012	22	-6
	20	1.016	19	-7
	25	1.020	15	-10
	30	1.024	11	-12
	35	1.028	2	-17
	40%	1.032	-6	-21

C.P.: Chemically Pure; U.S.P.: United States Pharmacopocia 96.5%.

~~Delete 7.6.2.3 and Table 7.6.2.3.~~

Revise 7.6.2.4 to read as follows:

~~7.6.2.4 A premix antifreeze solution with a freezing point below the expected minimum temperature for the locality shall be provided.~~

~~Delete existing 7.6.2.5 as well as the Figures 7.6.2.5(a), 7.6.2.5(b), and 7.6.2.5(c) and Annex A.7.6.2.5.~~

~~Delete 7.6.2.6.~~

Add an asterisk to Section 7.6 and a new Annex A.7.6 to read as follows:

A.7.6 In cold climates and areas where the potential for freezing of pipes is a concern, options other than antifreeze are available. Such options include installing the pipe in warm spaces, tenting insulation over the piping (as illustrated in NFPA 13D), listed heat tracing, and the use of dry pipe systems and preaction systems.

In A.7.6.2, delete the second paragraph.

A.7.6.2 Listed CPVC sprinkler pipe and fittings should be protected from freezing with glycerine only. The use of diethylene, ethylene, or propylene glycols is specifically prohibited. Laboratory testing shows that glycol-based antifreeze solutions present a chemical environment detrimental to CPVC.

Revise Section 24.4(2) and Add Section 24.4(3) as follows:

24.4 Instructions.

The installing contractor shall provide the property owner or the property owner's authorized representative with the following:

- (1) All literature and instructions provided by the manufacturer describing proper operation and maintenance of any equipment and devices installed
- (2) NFPA 25, *Standard for the Inspection, testing, and maintenance of Water-Based Fire Protection Systems, 2006/2013 California Edition*
- (3) *California Code of Regulations, Title 19, Chapter 5, "Fire Extinguishing Systems".*

**NFPA 13D, Amended Sections as follows:*

Add a new definition as 3.3.9.1.1 and related annex note to read as follows:

3.3.9.1.1* Premixed Antifreeze Solution. A mixture of an antifreeze material with water that is prepared and factory-mixed by the manufacturer with a quality control procedure in place that ensures that the antifreeze solution remains homogeneous.

~~A.3.3.9.1.1 Where a tank is used as the water supply for the sprinkler system, the tank is not permitted to be filled with antifreeze.~~

Revise 4.1.4 and related annex note to read as follows:

4.1.4* Antifreeze Systems.

~~A.4.1.4 Sampling from the top and bottom of the system helps to determine if the solution has settled. Antifreeze solutions are heavier than water. If the antifreeze compound is separating from the water due to poor mixing, it will exhibit a higher concentration in the lower portion of the system than in the upper portions of the system. If the concentration is acceptable near the top, but too low near the water connection, it may mean that the system is becoming diluted near the water supply. If the concentration is either too high or too low in both the samples, it may mean that the wrong concentration was added to the system.~~

~~On an annual basis, test samples should be drawn from test valve B as shown in Figure 8.3.3.2-1(1), especially if the water portion of the system has been drained for maintenance or repairs. A small hydrometer can be used so that a small sample is sufficient. Where water appears at valve B, or where the sample indicates that the solution has become weakened, the entire system should be emptied and refilled with acceptable solution as previously described.~~

~~Where systems are drained in order to be refilled, it is not typically necessary to drain drops that are less than 36 inches in length. Most systems with drops have insufficient volume to cause a problem, even if slightly higher concentration solutions collect in the drops. For long drops with significant volume, consideration should be given to draining drops if there is evidence that unacceptably high concentrations of antifreeze have collected in these long drops.~~

~~When emptying and refilling antifreeze solutions, every attempt should be made to recycle the old solution with the antifreeze manufacturer rather than discarding it.~~

4.1.4.1 Annual Antifreeze Solution Test and Replacement Procedure.

~~4.1.4.1.1 Samples of antifreeze solution should be collected by qualified individuals in accordance with 4.1.4.1.1.1 or 4.1.4.1.1.2 on an annual basis.~~

~~4.1.4.1.1.1 The system shall be drained to verify that (a) the solution is in compliance with 8.3.3, and (b) the solution provides the necessary freeze protection. Solution samples shall be taken near the beginning and near the end of the draining process.~~

~~4.1.4.1.1.2* Solution samples shall be taken at the highest practical elevation and the lowest practical elevation of the system.~~

~~A.4.1.4.1.1.2 If not already present, test connections (valves) for collection of solution samples should be installed at the highest and lowest practical locations of the system or portion of the system containing antifreeze solution.~~

~~4.1.4.1.2 The two samples collected in accordance with the procedures specified in 4.1.4.1.1.1 or 4.1.4.1.1.2 shall be tested to verify that the specific gravity of both samples is similar and that the solution is in compliance with 8.3.3. The specific gravity of each solution shall be checked using a hydrometer with a suitable scale or a refractometer having a scale calibrated for the antifreeze solution.~~

~~4.1.4.1.3* If concentrations of the two samples collected in accordance with the procedures above are similar and in compliance with 8.3.3, then (a) the solution drained in accordance with 4.1.4.1.1.1 can be used to refill the system, or (b) the existing undrained solution tested in accordance with 4.1.4.1.1.2 shall be permitted to continue to be used. If the two samples are not similar and not in compliance with 8.3.3, then a solution in compliance with 8.3.3 shall be used to refill the system.~~

~~A.4.1.4.1.3 In the past, for some existing systems subject to extremely low temperatures, antifreeze solutions with concentrations greater than what is now permitted by NFPA 13D were used. Such high concentrations of antifreeze are no longer permitted. In situations where extremely low temperatures are anticipated, refilling the fire sprinkler system with a concentration of antifreeze solution currently permitted by the standard might not provide sufficient freeze protection without additional measures. Such measures might include converting the antifreeze system to another type of sprinkler~~

system.

4.1.4.1.4 A tag shall be attached to the riser indicating the date the antifreeze solution was tested. The tag shall also indicate the type and concentration of antifreeze solution (by volume) with which the system is filled, the date the antifreeze was replaced (if applicable), the name of the contractor that tested and/or replaced the antifreeze solution, the contractor's license number, a statement indicating if the entire system was drained and replaced with antifreeze, and a warning to test the concentration of the antifreeze solutions at yearly intervals per NFPA 13D.

Add an asterisk to 8.3.3 and add a new A.8.3.3 to read as follows:

8.3.3* Antifreeze Systems.

A.8.3.3 Where protection of pipes from freezing is a concern, options other than antifreeze are available. Such alternatives include running the piping in warm spaces, tenting insulation over pipe, dry pipe systems, and preaction systems.

Revise 8.3.3.2.1 to read as follows:

8.3.3.2.1* Unless permitted by 8.3.3.2.1.1, antifreeze solutions shall be limited to premixed antifreeze solutions of glycerine (chemically pure or United States Pharmacopoeia 96.5%) at a maximum concentration of 50% by volume, propylene glycol at a maximum concentration of 40% by volume, or other solutions listed specifically for use in fire protection systems.

Add a new 8.3.3.2.1.1 to read as follows:

8.3.3.2.1.1. For existing systems, antifreeze solutions shall be limited to premixed antifreeze solutions of glycerine (chemically pure or United States Pharmacopoeia 96.5%) at a maximum concentration of 50% by volume, propylene glycol at a maximum concentration of 40% by volume, or other solutions listed specifically for use in fire protection systems.

Delete 8.3.3.2.2 and 8.3.3.2.3 and related Annex material A.8.3.3.2.3.

Move Table 8.3.3.2.3 to the annex and renumber as Table A.8.3.3.2.1 while deleting the rows in the table dealing with glycerine and 40% water, glycerine and 30% water, propylene glycol and 50% water and propylene glycol and 40% water. Add an annex note so that the annex and Table would appear as follows:

A.8.3.3.2.1 See Table A.8.3.3.2.1.

Table A.8.3.3.2.1 Properties of Glycerine and Propylene Glycol

Material	Solution (by volume)	Specific Gravity at 60°F (15.6°C)	Freezing Point	
			°F	°C
Glycerine (C.P. or U.S.P. grade)	50% water	1.145	-20.9	-29.4
Hydrometer scale 1.000 to 1.200				
Propylene glycol	60% water	1.034	-6	-21.1
Hydrometer scale 1.000 to 1.200 (subdivisions 0.002)				

C.P.: Chemically Pure; U.S.P.: United States Pharmacopoeia 96.5%.

Renumber 8.3.3.2.3.1 to 8.3.3.2.2.

8.3.3.2.2 The concentration of antifreeze solutions shall be limited to the minimum necessary for the anticipated minimum temperature.

Delete 8.3.3.2.4, 8.3.3.2.5 and Table 8.3.3.2.5.

Renumber 8.3.3.2.6 as 8.3.3.2.3 and renumber A.8.3.3.2.6 as A.8.3.3.2.3. Also renumber Figure A.8.3.3.2.6 as Figure A.8.3.3.2.3.

8.3.3.2.3* An antifreeze solution with a freezing point below the expected minimum temperature for the locality shall be installed.

A.8.3.3.2.3 Beyond certain limits, an increased proportion of antifreeze does not lower the freezing point of the solution (see *Figure A.8.3.3.2.3*). Glycerine, diethylene glycol, ethylene glycol, and propylene glycol never should be used without mixing with water in the proper proportions, because these materials tend to thicken near 32°F (0°C).

Renumber 8.3.3.2.7 as 8.3.3.2.4 and revise to read as follows:

8.3.3.2.4 The specific gravity of the antifreeze shall be checked by a hydrometer with a scale having 0.002 subdivisions in accordance with *Figure 8.3.3.2.4(a)* and *8.3.3.2.4(b)*.

Renumber *Figure 8.3.3.2.3(a)* as *Figure 8.3.3.2.4(a)* and delete the 50% curve.

Renumber *Figure 8.3.3.2.3(b)* as *Figure 8.3.3.2.4(b)* and delete the 60% and 70% curves.

8.6.48.3.4* Sprinklers shall not be required in detached garages, open attached porches, carports with no habitable space above, and similar structures.

13R—13

Installation of Sprinkler Systems in Residential Occupancies Up to and Including Four Stories in Height as amended* 903.3.1.2, 903.3.5.1.1, 903.3.5.1.2, 903.4

***NFPA 13R, Amended Sections as follows:**

Revise Section 2.2 and add publications as follows:

2.2 NFPA Publications.

NFPA 25, *Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems*, ~~2006~~2013 California edition.

Add Section 6.3.5 as follows:

6.3.5 Instructions.

The installing contractor shall provide the property owner or the property owner's authorized representative with the following:

- (1) All literature and instructions provided by the manufacturer describing proper operation and maintenance of any equipment and devices installed
- (2) NFPA 25, *Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems* ~~2006~~2013 California Edition and California Code of Regulations, Title 19, Chapter 5.
- (3) Once the system is accepted by the authority having jurisdiction a label as prescribed by Title 19, California Code of Regulations, Chapter 5, shall be affixed to each system riser.

NFPA National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02269-9101

Standard reference number	Title	Referenced in code section number
92A—12	Standard for Smoke Control Systems Utilizing Barriers and Pressure Differences	

NFPA National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02269-9101

Standard reference number	Title	Referenced in code section number

Notation:

Authority: Health and Safety Code Sections 1250, 1569.72, 1569.78, 1568.02, 1502, 1597.44, 1597.45, 1597.46, 1597.54, 1597.65, 13108, 13108.5, 13114, 13143, 13143.2, 13143.6, 13146, 17921, 18949.2, Government Code Section 51189

References: Health and Safety Code Sections 13143, 18949.2, Government Code Sections 51176, 51177, 51178, 51179, Public Resources Code Sections 4201 through 4204

[Item 9. Editorial or clarifying corrections to the model code or SFM amendments.]

**SECTION 202
GENERAL DEFINITIONS**

Business Group B. Business Group B occupancy includes, among others, the use of a building or structure, or a portion thereof, for office, professional or service-type transactions, including storage of records and accounts. Business occupancies shall include, but not be limited to, the following:

Airport traffic control towers
 Ambulatory care facilities *servicing five or fewer patients (see Group I-2.1 or Section 308.4.2 California Building Code for facilities servicing more than five patients)*
 Animal hospitals, kennels and pounds
 Banks
 Barber and beauty shops
 Car wash
 Civic administration
 Clinic—outpatient *(not classified as Group I-2.1)*
 Dry cleaning and laundries: pick-up and delivery stations and self-service
 Educational occupancies for students above the 12th grade
 Electronic data processing
 Laboratories: testing, research and *[SFM] instruction*
 Motor vehicle showrooms
 Post offices
 Print shops
 Professional services (architects, attorneys, dentists, physicians, engineers, etc.)
 Radio and television stations
 Telephone exchanges
 Training and skill development not within a school or academic program *(this shall include, but not be limited to, tutoring centers, martial arts studios, gymnastics, and similar uses regardless of the ages served, and where not classified as a Group A occupancy)*

903.2.6 Group I. An automatic sprinkler system shall be provided throughout buildings with a Group I fire area.

Exceptions:

1. An automatic sprinkler system installed in accordance with Section 903.3.1.2 shall be permitted in Group I-1 facilities.
2. An automatic sprinkler system installed in accordance with Section 903.3.1.3 shall be allowed in Group I-1 facilities when in compliance with all of the following:
 - 2.1. A hydraulic design information sign is located on the system riser;
 - 2.2. Exception 1 of Section 903.4 is not applied; and
 - 2.3. Systems shall be maintained in accordance with the requirements of Section 903.3.1.2.
3. An automatic sprinkler system is not required where day care facilities are at the level of exit discharge and where every room where care is provided has at least one exterior exit door.
4. In buildings where Group I-4 day care is provided on levels other than the level of exit discharge, an automatic

sprinkler system in accordance with Section 903.3.1.1 shall be installed on the entire floor where care is provided and all floors between the level of care and the level of exit discharge, all floors below the level of exit discharge, other than areas classified as an open parking garage.

1. Those areas exempted by Section 407.6 of the California Building Code.

2. Pursuant to Health and Safety Code Section 13113 (d), Group I-2 occupancies, or any alterations thereto, located in Type IA construction in existence on March 4, 1972.

904.8.1 System test. Systems shall be inspected and tested for proper operation ~~at 12-month intervals~~ in accordance California Code of Regulations, Title 19, Division 1, Chapter 5.

904.9.1 System test. Systems shall be inspected and tested for proper operation ~~at 12-month intervals~~ in accordance California Code of Regulations, Title 19, Division 1, Chapter 5.

904.10.1 System test. Systems shall be inspected and tested for proper operation ~~at 12-month intervals~~ in accordance California Code of Regulations, Title 19, Division 1, Chapter 5.

907.2.9.4.1 Smoke alarms. Single- and multiple-station smoke alarms shall be installed in accordance with Section 907.2.11.

907.5.2.2.4 Emergency voice/alarm communication captions. Where stadiums, arenas and grandstands are required to caption audible public announcements in accordance with ~~Section 1108.2.7.3~~ Chapter 11B of the California Building Code, the emergency/voice alarm communication system shall also be captioned. Prerecorded or live emergency captions shall be from an approved location constantly attended by personnel trained to respond to an emergency.

1003.3.4 Clear width. Protruding objects shall not reduce the minimum clear width of accessible routes as required in ~~Section 1104~~ Chapter 11B of the California Building Code.

**TABLE 1004.1.2
MAXIMUM FLOOR AREA ALLOWANCES PER OCCUPANT**

FUNCTION OF SPACE	OCCUPANT LOAD FACTOR^a
Accessory storage areas, mechanical equipment room	300 gross
Agricultural building	300 gross
Aircraft hangars	500 gross
Airport terminal	
Baggage claim	20 gross
Baggage handling	300 gross
Concourse	100 gross
Waiting areas	15 gross
Assembly	
Gaming floors (keno, slots, etc.)	11 gross
Exhibit gallery and museum	30 net
Assembly with fixed seats	See Section 1004.4
Assembly without fixed seats	
Concentrated (chairs only-not fixed)	7 net
Standing space	5 net
Unconcentrated (tables and chairs)	15 net
Bowling centers, allow 5 persons for each lane including 15 feet of runway, and for additional areas.	7 net
Business areas	100 gross

Courtrooms-other than fixed seating areas	40 net
Day care	35 net
Dormitories	50 gross
Educational Classroom area	20 net
Shops and other vocational room areas	50 net
Exercise rooms	50 gross
Group H-5 Fabrication and manufacturing areas	200 gross
Industrial areas	100 gross
Institutional areas Inpatient treatment areas	240 gross
Outpatient areas	100 gross
Sleeping areas	120 gross
Kitchens, commercial	200 gross
Laboratory <i>Educational</i>	50 net
<i>Laboratories, non-educational</i>	100 net
<i>Laboratory suite^{ab}</i>	200 gross
Library Reading rooms	50 net
Stack area	100 gross
Locker rooms	50 gross
Mall buildings – covered and open	See Section 402.8.2 of the <i>California Building Code</i>
Mercantile Areas on other floors	60 gross
Basement and grade floor areas	30 gross
Storage, stock, shipping areas	300 gross
Parking garages	200 gross
Residential	200 gross
Skating rinks, swimming pools Rink and pool	50 gross
Decks	15 gross
Stages and platforms	15 net
Warehouses	500 gross

For SI: 1 square foot = 0.0929 m².

^a Floor area in square feet per occupant.

^b See Section 443.2 of the *California Building Code*

1004.4 Fixed seating. For areas having fixed seats and aisles, the occupant load shall be determined by the number of fixed seats installed therein. The occupant load for areas in which fixed seating is not installed, such as waiting spaces, shall be determined in accordance with Section 1004.1.2 and added to the number of fixed seats.

The occupant load of wheelchair spaces and the associated companion seat shall be based on one occupant for each wheelchair space and one occupant for the associated companion seat provided in accordance with ~~Section 1108.2.3~~ Chapter 11B of the *California Building Code*.

For areas having fixed seating without dividing arms, the occupant load shall not be less than the number of seats

based on one person for each 18 inches (457 mm) of seating length.

The occupant load of seating booths shall be based on one person for each 24 inches (610 mm) of booth seat length measured at the backrest of the seating booth.

**TABLE 1021.2(1)
STORIES WITH ONE EXIT OR ACCESS TO ONE EXIT FOR R-2, R-3 AND R-4 OCCUPANCIES**

STORY	OCCUPANCY	MAXIMUM NUMBER OF DWELLING UNITS	MAXIMUM EXIT ACCESS TRAVEL DISTANCE
Basement, first, second or third story above <i>grade plane</i>	R-2 ^{a, b} R-3 ^a , R-4	4 dwelling units NA	125 feet NA
Fourth story and above	R-3 ^a , R-4	NA	125 feet

For SI: 1 foot = 3048 mm.

NA – Not Applicable

a. Buildings classified as Group R-2 or R-3 equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1 or 903.3.1.2 and provided with emergency escape and rescue openings in accordance with Section 1029.

b. This Table is used for R-2 occupancies consisting of dwelling units. For R-2 occupancies consisting of sleeping units, use Table 1021.2(2).

APPENDIX CHAPTER 4

425.8.4.2 *The minimum clear width of a corridor shall be as follows:*

1. Group R-2.1 occupancies shall have 60 inches (1524 mm) on floors housing nonambulatory clients and 44 inches (1118 mm) on floors housing only ambulatory clients.
2. Group R-4 occupancies shall have 44 inches (1118 mm) on floors housing clients.

Exceptions:

1. Corridors serving an occupant load of 10 or less shall not be less than 36 inches (914 mm) in width.
2. Corridors serving ambulatory persons only and having an occupant load of 49 or less shall not be less than 36 inches (914 mm) in width.

In Group R-2.1 occupancies provided with fire sprinklers throughout and which are required to have rated corridors, door closers need not be installed on doors to client sleeping rooms.

Notation:

Authority: Health and Safety Code Sections 1250, 1569.72, 1569.78, 1568.02, 1502, 1597.44, 1597.45, 1597.46, 1597.54, 1597.65, 13108, 13108.5, 13114, 13143, 13143.2, 13143.6, 13146, 17921, 18949.2, Government Code Section 51189

References: Health and Safety Code Sections 13143, 18949.2, Government Code Sections 51176, 51177, 51178, 51179, Public Resources Code Sections 4201 through 4204

[Item 10. Smoke and heat removal for Group F-1 and S-1 occupancies.]

901.6.1 Standards. Fire protection systems shall be inspected, tested and maintained in accordance with the referenced standards *listed* in Table 901.6.1.

**TABLE 901.6.1
FIRE PROTECTION SYSTEM MAINTENANCE STANDARDS**

SYSTEM	STANDARD
Portable fire extinguishers	<i>California Code of Regulations, Title 19, Division 1, Chapter 3</i>
Carbon dioxide fire-extinguishing system	NFPA 12

Halon 1301 fire-extinguishing systems	NFPA 12A
Dry-chemical extinguishing systems	NFPA 17
Wet-chemical extinguishing systems	NFPA 17A
Water-based fire protection systems	California Code of Regulations, Title 19, Division 1, Chapter 5
Fire alarm systems	NFPA 72
Mechanical smoke exhaust systems	NFPA 204
Smoke and heat vents	NFPA 204
Water-mist systems	NFPA 750
Clean-agent extinguishing systems	NFPA 2001

910.1 General. Where required by this code or otherwise installed, smoke and heat vents or mechanical smoke exhaust ~~removal~~ systems and draft curtains shall conform to the requirements of this section.

Exceptions:

- ~~1. Frozen food warehouses used solely for storage of Class I and II commodities where protected by an approved automatic sprinkler system.~~
- ~~2. Automatic smoke and heat vents or mechanical smoke exhaust systems are not required within areas of buildings equipped with early suppression fast response (ESFR) sprinklers unless any of the following conditions exist:~~
 - ~~2.1. The building is a state institution,~~
 - ~~2.2. The building is a state-owned or state-occupied building,~~
 - ~~2.3. The building is any of the applications listed in Section 1.11 regulated by the Office of the State Fire Marshal, or~~
 - ~~2.4. The area of a Group F-1 or S-1 occupancy protected with the early suppression fast response (ESFR) sprinklers has an exit access travel distance of more than 250 feet (76 200 mm).~~

910.2 Where required. Smoke and heat vents or mechanical smoke exhaust removal systems shall be installed in the roofs of buildings or portions thereof occupied for the uses set forth in as required by Sections 910.2.1 and 910.2.2.

Exceptions:

In occupied portions of a building where the upper surface of the story is not a roof assembly, mechanical smoke exhaust in accordance with Section 910.4 shall be an acceptable alternative.

1. Frozen food warehouses used solely for storage of Class I and II commodities where protected by an approved automatic sprinkler system.
2. Where areas of buildings are equipped with early suppression fast-response (ESFR) sprinklers, smoke and heat removal shall not be required within these areas.

910.2.1 Group F-1 or S-1. Smoke and heat vents installed in accordance with Section 910.3 or a mechanical smoke removal system installed in accordance with Section 910.4 shall be installed in buildings and portions thereof used as a Group F-1 or S-1 occupancy having more than 50,000 square feet (4645 m²) of undivided area. In occupied portions of a building where the upper surface of the story is not a roof assembly, a mechanical smoke removal system in accordance with Section 910.4 shall be installed.

Exception: *Group F-1 aircraft manufacturing buildings and Group S-1 aircraft repair hangars.*

910.2.2 High-piled combustible storage. Smoke and heat removal required by Table 3206.2, for buildings and portions thereof containing high-piled combustible stock or rack storage shall be installed in accordance with Section 910.3 in unsprinklered buildings. In buildings and portions thereof containing high-piled combustible storage equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1 in any occupancy group when required by Section 3206.7, a smoke and heat removal system shall be installed in accordance with Section 910.3 or 910.4. In occupied portions of a building where the upper surface of the story is not a roof assembly, a mechanical smoke removal system in accordance with Section 910.4 shall be installed.

910.3 Smoke and heat vents Design and installation. The design and installation of smoke and heat vents and draft curtains shall be as specified in accordance with Sections 910.3.1 through 910.3.5.2 and Table 910.3.3.

TABLE 910.3
REQUIREMENTS FOR DRAFT CURTAINS AND SMOKE AND HEAT VENTS

910.3.1 Design ~~Listing and labeling.~~ Smoke and heat vents shall be listed and labeled to indicate compliance with FM 4430, ICC ES II AC 331, or UL 793.

910.3.2 Vent operation. ~~Smoke and heat vents shall be capable of being operated by approved automatic and manual means. Automatic operation of smoke and heat vents shall conform to the provisions of Sections 910.3.2.1 through 910.3.2.3.~~

910.3.2.1 Gravity-operated drop-out vents. ~~Automatic smoke and heat vents containing heat-sensitive glazing designed to shrink and drop out of the vent opening when exposed to fire shall fully open within 5 minutes after the vent cavity is exposed to a simulated fire, represented by a time-temperature gradient that reaches an air temperature of 500°F (260°C) within 5 minutes.~~

910.3.2.2 Sprinklered buildings. ~~Where installed in buildings provided with an approved automatic sprinkler system, smoke and heat vents shall be designed in accordance with Sections 910.3.2.2.1 through 910.3.2.2.3.~~

910.3.2.2.1 Automatic operation. ~~Smoke and heat vents shall be designed to operate automatically.~~

910.3.2.2.2 Control mode sprinkler system. ~~Smoke and heat vents installed in areas of buildings with a control mode sprinkler system shall have operating elements with a higher temperature classification than the automatic fire sprinklers in accordance with NFPA 13.~~

910.3.2.2.3 Early suppression fast-response (ESFR) sprinkler system. ~~Smoke and heat vents installed in areas of buildings with early suppression fast-response (ESFR) sprinklers shall be equipped with a standard-response operating mechanism with a minimum temperature rating of 360°F (182°C) or 100°F (56°C) above the operating temperature of the sprinklers, whichever is higher.~~

910.3.2.3 Nonsprinklered buildings. ~~Where installed in buildings not provided with an approved automatic sprinkler system, smoke and heat vents shall operate automatically by actuation of a heat-responsive device rated at between 100°F (38°C) and 220°F (104°C) above ambient.~~

Exception: ~~Gravity-operated drop-out vents complying with Section 910.3.2.1.~~

910.3.3 Vent dimensions. ~~The effective venting area shall not be less than 16 square feet (1.5 m²) with no dimension less than 4 feet (1219 mm), excluding ribs or gutters having a total width not exceeding 6 inches (152 mm).~~

910.3.4 ~~910.3.2~~ Smoke and heat vent locations. Smoke and heat vents shall be located 20 feet (6096 mm) or more from adjacent lot lines and fire walls and 10 feet (3048 mm) or more from fire barriers. Vents shall be uniformly located within the roof in the areas of the building where the vents are required to be installed by Section 910.2, with consideration given to roof pitch, ~~draft curtain location,~~ sprinkler location and structural members.

910.3.3 Smoke and heat vents area. The required aggregate area of smoke and heat vents shall be calculated as follows:

For buildings equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1:

$$A_{VR} = V/9000 \quad \text{(Equation 9-4)}$$

Where:

A_{VR} = the required aggregate vent area (ft²)

V = volume (ft³) of the area that requires smoke removal

For unsprinklered buildings:

$$A_{VR} = A_{FA}/50 \quad \text{(Equation 9-5)}$$

Where:

A_{VR} = the required aggregate vent area (ft²)

A_{FA} = the area of the floor of the area that requires smoke removal.

910.3.5 Draft curtains. Where required by Table 910.3, draft curtains shall be installed on the underside of the roof in accordance with this section.

~~**Exception:** Where areas of buildings are equipped with ESFR sprinklers, draft curtains shall not be provided within these areas. Draft curtains shall only be provided at the separation between the ESFR sprinklers and the non-ESFR sprinklers.~~

~~**910.3.5.1 Construction.** Draft curtains shall be constructed of sheet metal, lath and plaster, gypsum board or other approved materials that provide equivalent performance to resist the passage of smoke. Joints and connections shall be smoke tight.~~

~~**910.3.5.2 Location and depth.** The location and minimum depth of draft curtains shall be in accordance with Table 910.3.~~

~~**910.4 Mechanical smoke removal systems exhaust.** Engineered mechanical smoke exhaust removal systems shall be designed and installed in accordance with Sections 910.4.1 through 910.4.7 an acceptable alternative to smoke and heat vents.~~

~~**910.4.1 Automatic sprinklers required.** The building shall be equipped throughout with an approved automatic sprinkler system in accordance with Section 903.3.1.1.~~

~~**910.4.2 Exhaust fan construction.** Exhaust fans that are part of a mechanical smoke removal system shall be rated for operation at 105 deg. C. Exhaust fan motors shall be located outside of the exhaust fan air stream.~~

~~**910.4.3 System design criteria.** The mechanical smoke removal system shall be sized to exhaust the building at a minimum rate of two air changes per hour based upon the volume of the building or portion thereof without contents. The capacity of each exhaust fan shall not exceed 30,000 cubic feet per minute.~~

~~**910.4.3.1 Make-up air.** Make-up air openings shall be provided within six feet (add metric) of the floor level. Operation of make-up air openings shall be manual or automatic. The minimum gross area of make-up air inlets shall be 8 ft² per 1000 cfm of smoke exhaust.~~

~~**910.4.4 Activation.** The mechanical smoke removal system shall be activated by manual controls only.~~

~~**910.4.5 Manual control location.** Manual controls shall be located so as to be accessible to the fire service from an exterior door of the building and be protected against interior fire exposure by not less than 1-hour fire barriers constructed in accordance with Section 707 of the California Building Code or horizontal assemblies constructed in accordance with Section 712 of the California Building Code, or both.~~

~~**910.4.1 Location.** Exhaust fans shall be uniformly spaced and the maximum distance between fans shall not be greater than 100 feet (30 480 mm).~~

~~**910.4.2 Size.** Fans shall have a maximum individual capacity of 30,000 cfm (14.2 m³/s). The aggregate capacity of smoke exhaust fans shall be determined by the equation:~~

$$C = A \times 300 \quad \text{(Equation 9-4)}$$

where:

C = Capacity of mechanical ventilation required, in cubic feet per minute (m³/s).

A = Area of roof vents provided in square feet (m²) in accordance with Table 910.3.

910.4.3 Operation. Mechanical smoke exhaust fans shall be automatically activated by the *automatic sprinkler system* or by *heat detectors* having operating characteristics equivalent to those described in Section 910.3.2. Individual manual controls for each fan unit shall also be provided.

910.4.4 ~~910.4.6 Control~~ wiring and control. Wiring for operation and control of *mechanical smoke removal systems* exhaust fans shall be connected ahead of the main disconnect *in accordance with Section 701.12E of NFPA 70* and *be* protected against *interior fire* exposure to temperatures in excess of 1,000°F (538°C) for a period of not less than 15 minutes. Controls shall be located so as to be immediately accessible to the fire service from the exterior of the building and protected against interior fire exposure by not less than 1-hour fire barriers constructed in accordance with Section 707 of the *California Building Code* or *horizontal assemblies* constructed in accordance with Section 714 of the *California Building Code*, or both.

910.4.5 Supply air. ~~Supply air for exhaust fans shall be provided at or near the floor level and shall be sized to provide a minimum of 50 percent of required exhaust. Openings for supply air shall be uniformly distributed around the periphery of the area served.~~

910.4.6 Interlocks ~~910.4.7 Controls~~. On combination comfort air handling/smoke removal systems or independent comfort air handling systems, fans shall be controlled to shut down in accordance with the *approved smoke control sequence*. ~~Where building air handling and mechanical smoke removal systems are combined or where independent building air-handling systems are provided, fans shall automatically shut down in accordance with the California Mechanical Code. The manual controls provided for the smoke removal system shall have the capability to override the automatic shutdown of fans that are part of the smoke removal system.~~

910.5 Maintenance. Smoke and heat vents and mechanical smoke ~~removal exhaust~~ systems shall be maintained in an operative condition in accordance with *Section 910.5.1 or 910.5.2, respectively NFPA 204*.

910.5.1 Smoke and heat vents. Smoke and heat vents shall be maintained in an ~~operative condition~~ in accordance with NFPA 204 *and Section 910.5.1.1*.

910.5.1.1 Fusible links. Fusible links *for smoke and heat vents* shall be promptly replaced whenever fused, damaged or painted. ~~Smoke and heat vents and mechanical smoke exhaust systems shall not be modified.~~

910.5.2 Mechanical smoke removal systems. *Mechanical smoke removal systems shall be maintained in accordance with the equipment manufacturer's maintenance instructions and Sections 910.5.2.1 through 910.5.2.4.*

910.5.2.1 Frequency. *Systems shall be operationally tested not less than once per year. Testing shall include the operation of all system components including control elements.*

910.5.2.2 Testing. *Operational testing of the mechanical smoke removal system shall include all equipment such as fans, controls and make-up air openings.*

910.5.2.3 Schedule. *A routine maintenance and operational testing program shall be initiated and a written schedule for routine maintenance and operational testing shall be established.*

910.5.2.4 Written record. *A written record of mechanical smoke exhaust system testing and maintenance shall be maintained on the premises. The written record shall include the date of the maintenance, identification of the servicing personnel and notification of any unsatisfactory condition and the corrective action taken, including parts replaced.*

TABLE 3206.2

GENERAL FIRE PROTECTION AND LIFE SAFETY REQUIREMENTS

COMMODITY CLASS	SIZE OF HIGH-PILED STORAGE	ALL STORAGE AREAS (See Sections 3206, 3207 and 3208) ^b	SOLID-PILED STORAGE, SHELF STORAGE AND PALLETIZED STORAGE (see Section 3207.3)
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	AREA ^a (square feet) (see Sections 3206.2 and 3206.4)	Automatic fire- extinguishin g system (see Section 3206.4)	Fire detectio n system (see Section 3206.5)	Building access (see Section 3206.6)	Smoke and heat removal (see Section 3206.7)	Draft curtains (see Section 3206.7)	Maximum pile dimension ^c (feet)	Maximum permissibl e storage height ^d (feet)	Maximu m pile volume (cubic feet)
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(Portions of table not shown remain unchanged)

3206.7 Smoke and heat removal. Where smoke and heat removal ~~is~~ are required by Table 3206.2, ~~smoke and heat vents~~ it shall be provided in accordance with Section 910. ~~Where draft curtains are required by Table 3206.2, they shall be provided in accordance with Section 910.3.5.~~

**CALIFORNIA FIRE CODE – MATRIX ADOPTION TABLE
CHAPTER 80 – REFERENCED STANDARDS**

(Matrix Adoption Tables are non-regulatory, intended only as an aid to the user.
See Chapter 1 for state agency authority and building applications.)

Adopting Agency	BS C	SFM		HCD			DSA		OSHPD				CS A	DH S	AG R	DW R	CE C	C A	S L	SL C	
		T-24	T-19*	1	2	1/AC	AC	SS	1	2	3	4									
Adopt Entire Chapter																					
Adopt Entire Chapter as amended (amended sections listed below)		X																			
Adopt only those sections that are listed below																					
[California Code of Regulations, Title 19, Division 1]																					
Chapter / Section																					
FM 4430-12		X																			

Notation:

Authority: Health and Safety Code Sections 13108, 13110, 13143, 13210, 13211, 18949.2

References: Health and Safety Code Sections 13110, 13143, 13211, 18949.2