



**DEPARTMENT OF FORESTRY AND FIRE PROTECTION  
OFFICE OF THE STATE FIRE MARSHAL**

P.O. Box 944246  
SACRAMENTO, CA 94244-2460  
(916) 445-8550  
Website: [www.fire.ca.gov](http://www.fire.ca.gov)



## **Fire Sprinkler, Standpipe System, Fire Pump and Water Tank Submittal Guideline**

**SCOPE:** The Office of the State Fire Marshal requirements for the submittal and approval of plans for installation of:

- Fire sprinkler systems in accordance with the California Building Code and NFPA 13.
- Standpipe systems in accordance with the California Building Code and NFPA 14.
- Fire pumps systems in accordance with the California Building Code and NFPA 20.
- Water tanks that supply water for private fire systems which are installed in accordance the California Building Code and NFPA 22.

### **Specifications and Submittal Requirements:**

The following is a check list of information that should be used as an aid and is not intended to cover every code requirement.

#### **A. General Submittal Requirements:**

1. Permit Application.
2. Only one (1) set of drawings are required. Additional sets may be submitted, if the contractor desires.
  - a. Drawings must be original prints with no handwritten changes after printing.
  - b. Drawings must be stapled into sets.
  - c. All sheets must be wet stamped.
  - d. All submittals must be legible and readable.
3. Hydraulic Calculations.
  - a. Each calculated area must be stapled individually.
  - b. Do not hole punch calculations
  - c. Do not submit more than one (1) set of calculations.
4. Manufacturer's specifications (cut sheets).
  - a. Provide specifications for all new components that will be used on the job
  - b. Do not submit more than one (1) set of Manufacturer's specifications (cut sheets).
5. For modifications or additions to existing systems, the plans must show enough of the existing system to enable complete review and to verify existing system layout and compatibility of all equipment.
6. For submittals involving work on a portion of any plan (such as tenant work or partial revisions), the area of work must be clearly defined. Any areas shown that are not within the scope of work must be crossed off or otherwise delineated as outside the area of work.

## **B. Information Required on Drawings:**

### **1. General**

- a. Project name and address. Clearly indicate the state department's name, do not use abbreviations.
- b. California State Fire Sprinkler Contractor License number & expiration date.
- c. Each page must include the designer's name and original signature, certification number, and expiration date.
- d. Sprinkler contractor name, address, telephone number, & sprinkler contractor contact person.
- e. Symbol & abbreviation key.
- f. Minimum scale for floor plans is 1/8" per ft.
- g. CSFM File Number. The CSFM file number is required on the cover page. This can be found on the approved architectural plans.
- h. Remove any references to local fire or building departments. Also remove standard notes.

### **2. List all applicable Codes and Standards.** Plans submitted to the Office of the State Fire Marshal for review shall list all applicable codes and standards. The code year shall match the code years the architectural plans were approved under. Codes in italic are required to be listed on all submittals. If additional codes or standards are required list them with the correct code year.

- *2013 CA Building Standards Administrative Code*
- *2013 California Building Code*
- *2013 California Residential Building Code*
- *2013 California Electrical Code*
- *2013 California Mechanical Code*
- *2013 California Plumbing Code*
- *2013 California Energy Code*
- *2013 California Historical Building Code*
- *2013 California Fire Code*
- *2013 California Existing Building Code*
- *2013 California Green Building Standards Code*
- *2013 California Reference Standards Code*
- *CCR Title 19. Public Safety: Division 1. State Fire Marshal*
- *2013 NFPA 13- Installation of Fire Sprinklers\**
- *2013 NFPA 14- Installation of Standpipe and Hose System\**
- *2013 NFPA 20- Installation of Stationary Pumps for Fire Protection*
- *2013 NFPA 24- Installation of Private Fire Service Mains and Their Appurtenances\**
- *2006 NFPA 25 California Edition, Inspection, Testing & Maintenance of Water-Based Fire Protection Systems*
- *2013 NFPA 72- National Fire Alarm and Signaling Code\**

***\*as amended by California***

**3. Building Code Analysis.** Plans submitted to the Office of the State Fire Marshal for review shall include a complete Building Code Analysis for all projects. Information to be included on the plans Building Data Block is as follows:

1. Occupancy classification and use.
2. Building construction type.
3. Number of stories.
4. Actual building height.
5. Building area in Square Feet.
6. Area of project in Square Feet. (i.e. Tenant Improvements)
7. Separated or Non-separated Use
8. Allowable area per 2013 CBC.
9. Area increase.
10. Height increase.
11. Fire Sprinklers (yes or no). Type: Wet, Dry, Pre-action, Deluge
12. Fire Alarm (yes or no). Type: Manual, Automatic, etc.
13. Other Fire Protection System (yes or no)
14. Smoke Control System (yes or no)
15. Occupant load for entire building & each floor.
16. Year building was constructed.
17. Is building in High Fire Hazard Severity Zone
18. Seismic Joints (yes/no) if yes, provide location.
19. Emergency Responder Radio Coverage (yes or no)

**4. OSFM Fire Sprinkler Shop Drawing Notes.** Place the following notes verbatim on the plans:

- Scope of work: (Define scope of work)
- The point of connection is: (i.e. 6" above finished floor)
- Sprinkler plans shall be approved prior to the installation of any pipe. A stamped set of approved automatic fire sprinkler drawings shall be on the job site & used for installation. Any deviation from the approved plans, including the substitution of components, shall be approved by the Office of the State Fire Marshal (OSFM).
- This automatic sprinkler system shall be designed, fabricated, and installed in accordance with 2010 NFPA 13 with CA amendments.
- Any discrepancies between the drawing and the code or recognized standards shall be brought to the attention of the inspector of record.
- A minimum of 72 hours' notice shall be required for any testing and/or inspection.
- All sprinkler piping shall remain uncovered until inspected by OSFM.
- Upon completion of the installation of the automatic fire sprinkler system, a satisfactory test of the entire system shall be made in the presence of the OSFM.
- A certificate of compliance shall be prepared by the installer and given to the OSFM upon completion of the installation.

## 5. Notes

- a. Number of sprinklers on each sheet must be shown in the legend.
- b. Total number of heads for each riser per floor
- c. Sprinkler symbols with make, model, orifice size, temperature rating, and SIN. If extended coverage sprinklers are used, clearly indicate their maximum spacing based on hydraulic calculations.
- d. Capacity in gallons of each dry pipe or anti-freeze systems.
- e. System area in square feet.
- f. Pipe type & fitting types, welds and bends. If it varies, give type for each size.
- g. If plastic pipe is used:
  - Indicate hanger intervals per manufacturer.
  - Show detail of method of restraint at sprinkler to counteract water force.
- h. If storage: Provide design analysis referencing figures, curves, and area/density modifications.
- i. All labeling and signage posted in accordance with NFPA 13

## 6. Architectural

- a. All room names
  - If the Classification of Occupancy (hazard) is not obvious by the room name, provide further clarification.
- b. c. Location of all partitions and doors.
- c. Identify the different fire rated walls shown on the floor plan with a wall legend.
- d. Provide fire-stopping design and details showing the required clearances and flexible fire-stop system/sealant where sprinkler piping penetrates rated walls where openings are required to be protected.
- e. Ceiling construction and height for all rooms.
- f. Ceiling obstructions and their dimensions. (lights, bulkheads, etc.)
- g. Explain blind spaces and other areas where sprinklers are not to be installed. Provide justifications on plans with code sections.
- h. Full height cross sections with enough detail to show all conditions. Provide elevations in terms of sea level for all floors and/or dimensions from the lowest floor level.

## 7. Site Plan

- a. To scale (indicate the scale) or dimensioned.
- b. Size, type, and arrangement of underground water mains and sprinkler supply line.
- c. Connection to water supply
- d. If underground pipe is installed by sprinkler contractor, show depth of cover.
- e. Point of compass. (North arrow)
- f. Fire Department Connection. (Within 100 feet of a hydrant for NFPA 13 systems.)
- g. Flow tests: show gauge & flow hydrants.
- h. When the Site Plan contains multiple buildings, it must clearly indicate the building(s) for which application for permit is being made and the address numbers of such.

## 7. Site Plan (cont'd.)

- i. Letter of Approval from Local Fire Authority on location of fire hydrant, fire department connection, and control valves.
- j. Clearly indicate what is within the submittals scope. If underground and or FDC are not part of scope, provide OSFM approved site plans for reference.

## 8. System Layout

- a. Show all Pipe sizes
- b. Center-to-center dimensions or cut-lengths of pipe, dimensions between sprinklers, and dimensions from sprinklers to walls in all areas & rooms.
  - For sloped ceilings, provide dimensions both along the slope and horizontal dimensions.
  - For above and below ceiling systems, give dimensions for both.
- c. Sizes & lengths of riser nipples & drops.
- d. Locations of high temperature sprinklers, if any.
- e. Pipe sizing shall be by pipe schedules or as proven by hydraulic calculation.
- f. Hanger locations.
- g. Seismic bracing locations.
- h. Valves, drains, and test connections.
- i. Hydraulic reference points corresponding to calculations.
- j. Elevations of sprinklers & supply points.
- k. Alarms and/or alarm connections.
- l. Multiple fire department connections on the same building must be interconnected.
- m. Fire department connection(s)
- n. Sprinkler system type
- o. Location and size of riser
- p. Kind and location of alarm bell
- q. Zoning:
  - By floor when required by California Building Code.
  - Coordinate with fire alarm & smoke control zones. Atriums will usually require independent zones.
  - For 2-story floor openings that are not classified as atriums and that are enclosed on the upper level, sprinklers at the top of the opening must be zoned with the lower level.
- b. Tenant Improvements (TIs), modifications, or additions to existing systems. Indicate on the plans the following items:
  - Riser location, type (wet/dry/etc.), and riser size
  - System static pressure
  - System configuration (tree/loop/grid/etc.)
  - Pipe legend showing new and existing pipe
  - Show all new pipe. Provide pipe size and length
  - Show all existing pipe within TI. Provide pipe size.
  - Provide key plan showing area(s) of work

## 9. Water Supply Information

- a. Provide letter of certification signed by approved responsible authority for fire flow data.
- b. Flow test data must be current and during peak use hours (within last 6 months).
- c. Provide time, date and location of test hydrant (s).

## 10. Riser Diagram

- a. Sizes of pipe and all devices.
- b. Make & model of all components used.
- c. Orifice size of test connection (if used)
- d. Fire department connection.
- e. Make, model & size of backflow preventer, detector check, and water meter (if required).
- f. Means for full flow testing of the backflow preventer. (where required)
- g. Air supervision for dry sprinkler systems or manual dry standpipe systems.
- h. Spare head box

## 11. Details

- a. Hanger- Provide details for each, with individual components labeled.
- b. Seismic Bracing- Provide details for each, with individual components labeled.
- c. Flexible sprinkler connection- provide detail of flexible sprinkler connection. Include a table that shows manufacture, models, length, bend information (amount of bends and bend radius), and equivalent lengths. Do not show models or lengths not proved by hydraulic calculations for this specific project.

## 12. Calculation Design Areas

- a. Show clearly the boundary of each design area. It shall comprise the actual floor area covered inside walls and halfway between adjacent sprinklers. Indicate actual total area calculated.
- b. For the room design method or irregular areas not meeting the  $1.2 \sqrt{A}$  requirement, show fire resistance ratings of walls and doors to conform to NFPA 13.
- c. If Flexible sprinkler connections are used, under each hydraulic calculation indicate the equivalent length hydraulically proven and the models available to use on that floor or area. For example "All sprinklers within the hydraulic calculation include an equivalent length of 21 ft. Based on this [Manufacture Name] Models [Model Numbers] may be used in this area"

## 13. High Piled & High Rack Storage

- a. Storage height and arrangement including aisle widths.
- b. Commodity classification.
- c. Owner's written certification of all storage limitations imposed by the sprinkler design.
- d. Multiple level storage with open grated walkways must be designed for two scenarios:

### 13. High Piled & High Rack Storage (cont'd.)

- The entire storage height as if the walkways were unobstructed, and
- e. Each level individually as if the walkways were obstructed.  
Clearly show area and/or density reduction calculations.

### 14. Standpipe Systems

- a. Riser & hose connection locations and riser detail, including gauges at the top of each riser.
- b. Show the coverage area/travel distance (hose reach) for each hose valve. The coverage area shall be shown on plans and be measured along the path of travel from hose valves, around walls and through doors, to the most remote areas of the floor. *Maximum travel distance is 150 feet to all portions of the building.*
- c. If, in order to meet travel distance/reach requirements, supplemental hose connections are needed outside of stair enclosures, the supplemental hose connections must be located in public or main corridors as consistently as possible on all floor levels.
- d. Hose connections located outside of stairs in Parking Garages shall not be obstructed by parking and shall be labeled with prominent signs or red column stripes. Preferably, they shall be located adjacent to drive aisles with acceptable barriers, or they shall be accessible via minimum 44" wide walkways defined by curbs or other approved fixed barriers.
- e. The plan must show section views with a riser diagram to describe the locations of mains, lines, and hose valves within the structure. A minimum of one view is required, although additional views may be necessary to determine compliance with NFPA 14. The section view must be drawn to a common architectural scale, minimum of 1/8". The riser diagram must indicate all components on the riser, including fire department connections; water supply components, including fire pumps and supply lines; interconnecting horizontal pipe; all standpipes on the system; control valves at the base of all standpipes; hose valves fed by the standpipes; and, where required for testing of pressure regulating valves, the drain lines.
- f. The plans shall include an isometric view showing the entire system in one view.
- g. Fire Department Connection Signage: A sign shall be provided adjacent to each FDC indicating what systems are being served. For manual standpipes indicate the minimum required pressure and flow at the Fire Department Connection for correct system operation. Provide a detail of this sign on the plan.
- h. Show the height of the hose connection above the finished floor.
- i. Show reducers, caps, and chains at each hose connection.
- j. A detail of the hydraulic data nameplate.
- k. Hydraulic reference points shown on the plan, including the top view, section view, and isometric view that correspond with comparable reference points on the hydraulic calculation sheets.
- l. Pressure Reducing Valves (PRVs): For all pressure reducing valves, including direct-acting and pilot-operated valves, which are shown on the plans, indicate the

#### 14. Standpipe Systems (cont'd.)

- m. make, model, and setting of the pressure-reducing valve, and provide a detail for each unique installation configuration.
- n. Where direct-acting pressure regulating hose valves are provided anywhere in the building, provide a chart on the plans. The chart shall have eight columns, as follows:
  - Floor Level – Provide numerical designation for all floor levels in the building.
  - Static Pressure, Inlet – Indicate the static pressure at the inlet of the hose valve on all floor levels. Provide a supporting hydraulic calculation at zero flow with churn pressure, providing a node at the hose valve on each floor level to indicate the static pressure at each hose valve.
  - Residual Pressure, Full Flow, Inlet – Indicate the residual pressure at the inlet of hose valves on each floor. Provide a supporting hydraulic calculation at full standpipe design flow per NFPA 14 (750 or 1,000 gpm), providing a node on each floor level to indicate the residual pressure at each hose valve.
  - Residual Pressure, 250-gpm flow, inlet - Indicate the residual pressure at the inlet of hose valves on each floor while flowing 250 gpm. Provide a supporting hydraulic calculation at 250 gpm flow at the most remote standpipe outlet, providing a node on each floor level of the most remote standpipe to indicate the residual pressure at each hose valve.
  - Valve Make and Model – Indicate the manufacturer of the valve on all floors, and the model number for the specific valve. Provide supporting manufacturer specifications.
  - Valve Setting – Indicate the hose valve setting or bonnet number proposed for each valve. The setting or bonnet number must be associated with the manufacturer specifications for the valve.
  - Residual Pressure, Full Flow, Outlet – Indicate the residual outlet pressure at the outlet of the hose valve under the full-flow condition. For PRV installations, the residual pressure is taken from pressure relation charts provided by the manufacturer. For non-PRV installation, the residual pressure is taken by analysis of the equivalent lengths of the fittings and the hose valve.
  - Residual Pressure, 250-gpm flow, Outlet - Indicate the residual outlet pressure at the outlet of the hose valve when flowing 250 gpm. This is necessary to establish the residual pressure expected during field inspection. For PRV installations, the residual pressure is taken from pressure relation charts provided by the manufacturer.
- o. OSFM Standpipe Shop Drawing Notes. Provide the following information on the plans:
  - Scope of work: (Define scope of work)
  - Indicate System Type (Automatic Wet, Wet Manual, Semi-Automatic Dry, etc.) and the class (I, II, III) of the system.

#### 14. Standpipe Systems (cont'd.)

- Indicate the minimum and maximum pressure requirements for the system.
- Indicate the minimum flow for the system and for each individual valve.
- Indicate the minimum flow rate
- Provide a description of hose valves used, detailing the manufacturer, model number(s), and outlet size.
- Manufacturer, schedule and type of piping.
- Manufacturer and type of fittings.
- Type of freeze protection (building heated, dry system, anti-freeze system, heat-trace, etc).
- Indicate the pressure required for the hydrostatic test, being 200 psi or 50 psi above pump churn pressure, whichever is higher.
- Indicate the quantity of hose valves shown on the submittal.

#### 15. Fire Pump Details

- b. Plan view of fire pump room showing fire pump, jockey pump, floor drain, relief valve, flow meter, controller for fire pump and jockey pump, fuel tank for diesel, test header, FDC, battery system, floor drain, access door, and all associated piping (diameter and cut length noted), appurtenances, etc.
  - Minimum scale for fire pump plan view is 1/4" per ft.
- c. Show a view of the eccentric reducer with the eccentric reducer, installed in accordance with the code, with flat side on top.
- d. Show a view of check valves, butterfly valves, OS & Y valves, sensing line and controllers. Indicate if valves are normally opened or closed.
- e. Section views showing all required components with enough section views provided from different angles and locations to provide a full understanding of the design.
- f. Manufacturer's specifications for the fire pump and all components.
- g. The factory fire pump test curve data sheets.
- h. A site plan indicating location of fire pump room and showing that the fire pump access door is an exterior access door and detailing water supply to fire pump. Include underground pipe size, length, location with respect to the building, class of piping, material, and point of connection to city main; type of valves, meters, and valve pits; and depth at which the top of the pipe is laid below grade.
- i. A copy of the approved civil utility and fire access sheets.
- j. Provide flow test information. For fire pumps supplied by city mains, location and size of city main in street, and location, size, and type of domestic line, including length to city connection, and water meter location and size. Static and residual hydrants that were used in flow tests shall be shown. Water flow tests shall be witnessed by the fire code official and are valid for a period not to exceed six months.
- k. The following information must be provided in Fire Pump Notes:
  - Manufacturer of fire pump and jockey pump, fire pump controller
  - Pipe manufacturer and pipe schedule.

## 15. Fire Pump Details (cont'd.)

- Rating and type of Fire Pump (electric, diesel, vertical, horizontal, etc)
  - Indicate signals received remotely from pump
  - Number and size of hose valves on test header
  - Provide a note indicating that the fire pump room is separated from the building protected with 2-hour separation.
  - Provide a note indicating that permanent lighting is provided
  - Indicate that venting is provided, if a diesel fire pump
  - Provide notes indicating minimum and maximum room temperatures (minimum 40°F in all cases), maximum 120°F for engine driven pumps. Also address temperature requirements for controllers and other equipment.
  - Fuel tank size and duration.
- l. Fire pumps shall be sized so system demands do not exceed 110% of the rating of the fire pump.
  - m. Minimum pipe sizing, test header, etc. must comply with the Summary of Fire Pump Data, of NFPA 20.
  - n. Pressure gauges must be a minimum of 3 ½ inches in diameter and must be liquid filled.
  - o. Pressure gauges must be able to indicate pressure to at least twice the working pressure of the fire pump. Readings must be in PSI.
  - p. If a separate fire pump house is provided, the minimum separation from the protected building must be 50 feet, unless the pump house has a 2-hour rating.
  - q. The distance between the suction flange and elbows and tees must be greater than 10 times the diameter of the pipe.
  - r. Provide foundation for fire pump in accordance with NFPA 20.
  - s. Clearly show which valves are normally shut and which valves are normally open.
  - t. Clearly indicate if valves are supervised.

## 16. Water tanks

- a. Water supply to refill tank
- b. Duration of use
- c. Information about tanks fabrication/standards.
- d. Tanks capacity/actual usable gallons
- e. System supply requirements
- f. Automatic fill devices
- g. Tank level monitoring
- h. Overflow/fill protection
- i. Location of tank and all piping and fittings to system pump/riser
- j. Tank protection from freezing
- k. Tank protection from collision/damage
- l. Define type of tank installed
- m. Provide vertical and horizontal (isometric) views of tank and relation to pump/riser location

## **16. Water tanks (cont'd.)**

- n. A permanent connection to an approved water supply shall be provided to fill the tank
- o. Where the tank serves as a break tank between the city supply and fire pump(s), the fill shall be through automatic fill valves that are tied to water level sensors, and a bypass line of equal size with a normally closed control valve shall be provided.
- p. The means to fill the tank shall be sized to fill the tank in a maximum time of 8 hours.
- q. Where the tank serves as a break tank between the city supply and building fire pump(s), the means to fill the tank shall be automatic and shall provide supply flow equal to 150% of the fire pump rated flow.
- r. 24-hour leak inspection
- s. Method of tank support

## **17. Schematic Drawings for Future Deferred Approval**

- a. Drawings must clearly indicate Deferred Approval on the cover page.
- b. Schematic drawings must have enough information to accurately reflect what the design intent is.
- c. All sprinkler spacing shall meet code requirements.
- d. Hangers and seismic bracing are not required to be shown.
- e. Show all pipe sizes.
- f. Pipe lengths are not required, unless part of a calculated area or along the path from a calculated area to the source.

## **C. Information Required on Hydraulic Calculations:**

### **1. General**

- a. Each calculation shall be stapled separately.
- b. Submit as many calculations as necessary to prove all conditions, including largest protection area of coverage per sprinkler, smallest pipe sizing, most demanding piping arrangements, most demanding sprinkler types, and different pipe types.
- c. Calculations are required to have a 10% PSI safety margin

### **2. Cover sheet of each calculation**

- a. Date.
- b. Project name and address.
- c. Floor level.
- d. Description of area.
- e. Identification corresponding to design area on plan.

### **3. Design Criteria**

- a. Classification of Occupancy. (Hazard)
- b. Design area. (Actual area calculated, not the minimum required by NFPA 13.)
- c. Design density.
- d. Inside and outside hose allowances.

### **3. Design Criteria (cont'd.)**

- e. Protection area of coverage per sprinkler as calculated.
- f. Water supply and pump information.
- g. Any general storage, shipping, receiving, loading, or other storage areas, regardless of room name, are classified as Ordinary Hazard (Group 2), unless special usage conditions and written owner certification allow Ordinary Hazard (Group 1) per NFPA 13 table for miscellaneous storage.
- h. Multi-purpose rooms are considered at least Ordinary Hazard (Group 1).
- i. Space-saving filing or storage units that close/collapse against one another are classified as Extra Hazard (Group 2) due to the shielding of combustibles.

### **4. Other**

- a. Summary graph sheet showing the adjusted water supply, pump adjustment, hose allowance, and system demand point.
- b. Gridded systems must include peaking proof and grid sketches showing reference points, flows, and flow directions.

### **Permit Resubmittals and Revisions**

Resubmittals to address a deficiency list will require a full submittal. These plans require a copy of the red lined plan from the previous submittal to facilitate the review. Clearly indicate all changes by clouding the change with the delta number to signify the date of plan change. Also provide an item by item response to the deficiency list.

Revisions (as-builts) to approved plans are required to be submitted and approved. A copy of the previously approved plan shall accompany the revised submittal to facilitate the review. Clearly indicate all changes to the revised plans by clouding the change with a delta number signify the date of plan change. When several changes have been made, a detailed list of changes is required.