



California State Fire Marshal Information Bulletin 15-002

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Best Practices in Water Management during Required Testing of Fire Protection System

California is facing one of the most severe droughts on record. Governor Brown has declared a State of Emergency and directed state officials to take all necessary actions to prepare for water shortages. He is also requesting significant cut backs in water usage.

The Office of the State Fire Marshal is issuing this Information Bulletin to address concerns regarding the growing need to manage water release during the required inspection, testing and maintenance of water based fire protection systems. This publication is intended to guide the fire protection community in best practices of water management for water-based fire protection systems in order to efficiently and effectively maintain these important fire safety systems during these extreme drought conditions. This document provides a set of options (tools) from which dischargers and local agencies may select and customize for their particular needs while meeting the intent of state regulations and local codes.

To assist those involved in the inspection, testing and maintenance of water based fire protection systems, this bulletin may service as a best practices guideline for the discharge of water during the inspection, maintenance and testing of fire protection systems. The management of water might include the redirecting and/or collecting of the discharged water. The types of water discharge covered in this bulletin are associated with:

- Water-based fire protection system acceptance testing
- Periodic water-based fire protection system testing and maintenance
- Fire hydrant testing
- Water-based fire protection system leaks and emergency repairs

Water-based Fire Protection Systems requiring Water Discharge:

The California Code of Regulations (Title 19) specifies the types of fire protection systems that require testing. Fire sprinkler systems, standpipe and hose systems,

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private fire service mains, fire pumps, and water storage tanks have statutory requirements for inspection, testing and maintenance; different frequencies are established within regulations for each system type and item. It is important to remember that not all items within a system require testing by flowing water.

Fire Protection Infrastructure:

Fire protection systems are an important element in the overall infrastructure in California. Regulations governing building construction include requirements for fire protection systems because of the important role they play in building safety. These systems protect property, buildings and building contents. Fire protection systems save lives and reduce injuries, not only to occupants of the buildings, but also to the firefighters that may be responding to a fire incident.

California's fire protection infrastructure provides water to fire hoses used by responding firefighters. It also provides the water delivered to fire protection systems that are installed into buildings to protect people, building contents and the building structure from the incipient stages of a fire.

Responding firefighters will utilize water from municipal fire hydrants to douse flames when responding to a call. Building fire protection systems can prevent fires from increasing in size, which reduces the amount of water utilized in response to a fire. The amount of water used to put out a fire is substantially less when water-based fire protection systems are present. In fact, studies indicate that about ten times the amount of water is used in the event of a fire when fire sprinklers are not present.

This infrastructure extends from underground piping systems feeding fire hydrants all the way to feeding fire sprinkler systems inside the buildings. As an important and active fire safety element, these systems require attention to ensure they will operate properly when needed. California regulations include requirements for inspection, testing and maintenance of these systems. Provisions are also included for inspection and testing of newly constructed systems. All of these regulations are necessary for proper operation of fire protection systems.

Hundreds of thousands of fire protection systems are installed in buildings throughout California. Fire sprinkler systems are required in most newly constructed buildings, from schools, hospitals, industrial, and commercial, to residential buildings. Regulations for building fire suppression systems have been part of California regulations for decades.

The integrity of this fire protection infrastructure is vital to California's prosperity. The inspection, testing and maintenance of these systems can be completed efficiently and effectively by utilizing the best practice of water management for water-based fire protection systems.

Sound Water Management:

Situational awareness is critical for those involved with inspecting, testing and maintaining fire protection systems. The discharge of water during these activities may not be necessary and when water discharge is needed the water may be collected and redirected for other use or storage. Planning to conduct a water flow event with the use

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of sound water management can significantly reduce the amount of water utilized. When there is separation between the termination of a system test and flow control, two people with adequate communication devices can minimize the amount of flow. Usually this is done by taking every measure to minimize the time and volume of water flowing.

Public perception is that fire protection system water flow tests are “wasting water.” Take the opportunity to educate the public to increase awareness of the importance of testing these life-saving systems.

Current California Regulations:

The California Building Standards and Code of Regulations recognize the importance of properly maintained fire protection systems. These life safety systems are essential to providing a complete and holistic approach to human life and building fire protection.

The California Building Standards, Title 24, Part 9 (California Fire Code) specifies that “Fire protection systems shall be maintained in accordance with the original installation standards for that systems” and goes on to specify that “fire detection and alarm systems, fire-extinguishing systems, fire hydrant systems, fire standpipe systems, fire pump systems, private fire service mains and all other fire protection systems and appurtenances thereto shall be subject to acceptance testing as contained in the installation standards and as approved by the fire code official”. The California Fire Code also requires the inspection, testing and maintenance of fire detection, alarms, and extinguishing systems.

The California Code of Regulations, Title 19 Division 1, provides the state’s mandated inspection, maintenance, and testing frequencies and the procedures for conducting such activities. This regulation specifies the use of the National Fire Protection Association, Standard 25 (NFPA 25), 2011 edition for the frequency and procedural requirements. The Office of the State Fire Marshal has amended NFPA 25 to recognize technology and to meet the intent of the standard. These amendments are located in Title 19 Chapter 5, Section 901. Together these are NFPA 25, 2013 California Edition.

Below are tips for best practices for water management. Sections cited are within the NFPA 25, 2013 California Edition:

1. Inspector Test (Section 5.3.3, Water Flow Alarm Devices):

The national standard requires vane type water flow alarm devices to be tested semi-annually, and mechanical water flow alarms to be tested quarterly. California has **amended** these requirements to an **annual test**, which will save water.

There are measures that can be taken to further reduce water discharge and still satisfy the requirements. The intent of this requirement is to ensure the water flow alarm activates. This requirement is not intended to flush the system clean but to open the inspector test valve to simulate a sprinkler discharge. Once the alarm activates, immediately shut the inspector test valve.

Often the inspector test valve is remotely located from the alarm notification. To expedite the procedure, have two people present with one located at the valve and one

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located to verify alarm notification. They should be able to communicate directly so that when the alarm activates, the persons communicate to shut the valve promptly. This can save up to 15 gpm during the test. If possible, water discharged should be collected or diverted and reused appropriately, such as for watering landscaping, etc.

2. Main Drain Test (Section 13.2.5, Main Drain Test):

The national standard requires a main drain test on each riser. Systems without a backflow preventer or a pressure reducing valve are required to conduct an annual main drain test. Systems with backflow preventers or a pressure reducing valve shall conduct the test quarterly. California has **amended** the quarterly requirement to an **annual test**, which will save water.

The intent of the main drain test is to flush the system of foreign material. This is usually determined by the color of the water discharged. Efforts should be taken to shut off the main drain valve immediately after it is determined that the water is flowing with minimal debris.

Since the discharge may be at a separate location than the valve, two people should be present in order to be able to communicate directly with each other during the test. This will ensure the valve is shut promptly, reducing water discharged. If possible, water discharged should be collected or diverted and reused appropriately.

3. Standpipe Flow Test (6.3.1, Flow Tests):

The national standard requires a flow test to be conducted every 5 years to determine if the water supply provides the design pressure at the required flow. This requirement is not amended in the NFPA 25, 2013 California Edition.

The requirement for standpipe flow testing only applies to Class I and Class III type standpipe systems. The minimum flow must be achieved for hydraulically most remote outlet for each zone of the standpipe system. Once the flow and pressure is verified, the valve can be immediately closed. If possible, water discharged should be collected or diverted and reused appropriately.

4. Underground Flow Test (Section 7.3.1, Water Supply and Underground Piping Evaluation):

The national standard requires underground and exposed piping to be flow tested to determine the internal condition of the piping at a minimum of 5 year intervals. This provision has been **amended** by California to recognize conditions that will initiate such testing. **California does not require all underground and exposed piping to be tested at 5 year intervals.** Refer to the criteria established in NFPA 25, 2013 California Edition, Section 7.3.1.1 to determine if a water supply test is necessary.

If a flow test is determined to be necessary, efforts should be made to stop the water flow immediately once the evaluation has been completed. This may require multiple participants during the test in order to communicate for an immediate shut down. If possible, water discharged should be collected or diverted and reused appropriately.

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5. Private Fire Service Mains (Section 7.3.2.1):

The national standard requires that private hydrants must be flowed annually to flush foreign material from the lines. This requirement is not modified in California. This **applies only to private fire hydrants**, and does not apply to public hydrants.

Note: The flowing of a public hydrant may unnecessarily duplicate flow tests conducted under the AWWA requirements.

The provision states hydrants must flow for no less than one minute. After one minute, and after it is determined that foreign material has been flushed, immediately and safely close the hydrant valve to shut down the water flow. The person conducting the flow test should remain at the hydrant ready to close the hydrant valve when first possible. Again, water discharged should be collected or diverted and reused appropriately.

6. Fire Pump Flow Testing (Section 8.3.3.1, Annual Flow Testing):

The national standard requires that all fire pumps are flow tested annually to test capacity, requiring the test to be recorded at 3 flow points on the curve (at churn, 100% and 150%). California has **not amended** this section.

While this is an annual flow test, Section 8.3.3.1.2.3 allows closed loop metering 2 out of 3 years. Closed loop metering does not discharge water from the system and should be utilized as allowed.

On the third year when water is discharged, care should be taken to stop the flow of water once the flow test is completed. When fire pump testing is being conducted, discharged water should be collected or diverted and reused.

7. Water Storage Tank Inspection (Section 9.2.6, Interior Inspection):

The national standard requires a visual inspection of the interior of water storage tanks every 3 years. California has **amended** the inspection frequency to every 5 years. The initial inspection does not require the tank to be drained and can be conducted using alternate methods such as underwater cameras or persons in SCUBA gear. Consideration should only be given to draining the tank only to the level needed if a problem with the tank is determined. Any discharged water should be collected or diverted and reused where possible.

8. Level Indicator Testing (Section 9.3, Testing):

The national standard requires that level indicators be tested every 5 years. California has not amended this test frequency. It is important to remember that it is only necessary to drain the tank to the point that the level indicator is intended to actuate. There is no requirement to drain the entire tank. Any discharged water should be collected or diverted and reused where possible.

9. Interior Obstruction Investigations (Section 14.5):

The national standard requires that an inspection of piping and branch lines be conducted every 5 years by opening a flushing connection at the end of one main and

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removing a sprinkler toward the end of one branch line in order to inspect for foreign materials. California has amended Chapter 14 of the national standard to permit the use of alternative non-destructive examination methods. This is in lieu of flowing water. Should flushing be conducted, any discharged water should be collected or diverted and reused.

Fire safety and water go hand in hand. Helping to save water during required inspection, testing, and maintenance of life safety systems ensures there will be adequate water to extinguish fire. Together we can all be fire safe and water wise. For more information concerning California changes to the national standard or questions concerning fire protection system regulations, please contact the Office of the State Fire Marshal, Fire Engineering Division or visit our website for the Water-Based Fire Protection Systems Discharge Best Management Practices Manual at

<http://osfm.fire.ca.gov/strucfireengineer/pdf/aes/waterdischargemanual.pdf>