



COALINGA FIRE DEPARTMENT

GREG DUPUIS, FIRE CHIEF

300 W. Elm Ave • Coalinga, CA 93210 • Phone (559) 935-1652 • Fax (559) 935-1638

CITY OF COALINGA FIRE DEPARTMENT

FIRE PREVENTION STANDARD

STANDARD TITLE:	403.003b FIRE HYDRANT FLOW TESTING	
STANDARD NUMBER: 403.003b	EFFECTIVE DATE: 1 October 2022	REVISION DATE: 1 October 2022

PURPOSE

This policy has been established to provide direction to Coalinga Fire Department (CFD or Department) Prevention Division staff on conducting and documenting a measured fire hydrant flow test for determining available water supply for fire protection within the City of Coalinga (City) and contract service areas.

APPLICATION

This policy applies to areas within the City that have water supply systems capable of providing service to fire hydrants and fire sprinkler systems. These systems are managed by the City of Coalinga Public Works department.

OPERATIONAL POLICY

Measured flow testing will generally be done under the field supervision of the Fire Marshal and Public Works Supervisor. Testing will be performed jointly with the Department and Public Works Water Division. For private fire hydrants, testing can be conducted by a licensed contractor for insurance purposes but the results of such testing will not be used for fire protection system design unless approved by the Fire Marshal. The City of Coalinga Public Works Division are also allowed to conduct flow testing on their own water system, but typically such testing is done with the Department.

Look up the flow test location on the FlowMSP and determine the best location for the test; considerations include avoiding high traffic areas and flowing at a location near the project area where the water main infrastructure is similar to the project frontage. Print the flow test area image for field use and after test documentation. If a high traffic volume area cannot be avoided, arrange through the Shift Captain and the assistance of a fire company for traffic control. When needed, be sure to time the flow test set-up so that you are ready when assistance arrives to minimize their time away from normal duties. If time is available, visit the test site on a previous day to verify test hydrants are operational and there is not adjacent street construction that could be impacted by water flow.

The following equipment is needed to conduct a fire hydrant flow test:

- Portable radios
- Base pad and hydrant barrel located operating valve hydrant wrenches
- 4-1/2 inch Hose Monster Big Boy diffuser with 0-60 psi liquid filled pressure gauge and remote reading hose



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- 4½” defuser
- 2-1/2” outlet hydrant cap adapted for the static/residual gauge
- Traffic cones
- Reflective safety vest
- Toolbox with adjustable wrenches, assorted pliers/screw drivers, and small plumbing parts (including hose bib adaptor, various reducers to ¼” pipe thread, and a roll of Teflon tape)

Optional equipment:

- Extra set of hydrant wrenches
- Turnout boots
- Shovel
- Bolt cutters
- 25-foot and 50-foot lengths of LDH
- For multiple simultaneous hydrant flow testing, use additional conventional 4” flow tube and pitot tube with liquid filled gauge. Use velocity pressure conversion table and orifice co-efficient factors from National Fire Protection Association (NFPA) 291, Recommended Practice for Fire Flow Testing and Marking of Hydrants, for determining flow gpm from conventional flow testing devices.

OPERATIONAL GUIDELINE

NFPA 291, Recommended Practice for Fire Flow Testing and Marking of Hydrants, may be used for background information on conducting flow tests. Due to water conservation issues and the logistics of multiple simultaneous fire hydrant flow tests, dropping residual pressures to 10 psi below static often is not always possible. This pressure drop guideline is used in an attempt to get adjacent water well pumps to start and requires an extended flow of water. For most fire sprinkler designs, the required flow for the hydraulic design is much less than the minimum hydrant fire flow requirement of 1500 gallons per minute (GPM) and the nearby pumps may not detect the fire sprinkler demand. It should also be noted that during the periodic local ISO surveys, fire hydrant flow testing has always been conducted by using a single hydrant.

Step-by-Step operations for conducting a flow test:

1. Locate the pre-determined flow hydrant and verify it is operational. Remove the 4-1/2” cap and tighten the 2-1/2 inch caps.



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Note: Know where the water is going to flow to! Verify that no open construction trenches or other conditions will be impacted by the fire flow. The flow diffuser will direct water but large flows may cause water to pond in traffic lanes. Take special care in areas without curb and gutter.

2. Set up traffic cones and obtain traffic control assistance as needed for a particular site.
3. The static and residual pressure (S/R) gauge location needs to be upstream from a flow fire hydrant on a dead end main or for circulating mains, located as close as possible to the project site.
4. The S/R gauge may be placed at one of the following water sources:
 - a. On the 2-1/2" outlet using the cap adaptor on the closest fire hydrant to the flow hydrant on the same water main. The hydrant with the S/R gauge only needs to be opened a couple of turns to obtain a pressure reading.
 - b. On the supply (City) side of a reduced pressure (RP) backflow device using one of the pipe adaptors in the tool kit. RP devices have arrows on the body indicating direction of flow if not readily apparent from the water meter location. There must be no domestic water use occurring on the system side of the RP during the test. Choose the irrigation service RP if possible (can be determined from the I-View water plat information layer) as landscape watering is not permitted during the day.
 - c. On the hose bib of an adjacent house (ask permission!) using the adaptor in the tool kit. There is no RP backflow device required for houses; just verify that no water is being used while the test is being conducted. Never place the S/R gauge downstream of an RP backflow device.
5. Position one (1) staff member at each of the two gauge locations described in #4 and #6; establish communications via hand signals, portable radio, or cell phone. Have pen and paper handy for recording gauge readings.
6. Upon notification from flow hydrant staff, record the static pressure at the S/R hydrant. Standby to record the residual pressure upon notification from the flow hydrant.
7. Fire dispatch should be notified of the flow test location and estimated duration of the test. Opening and closing a flow hydrant may result in water surges that can activate



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water flow switches on nearby fire sprinkler systems and flooding of streets may result in citizen 911 calls.

8. Fully open the flow hydrant slowly and adjust the defuser as needed. Monitor where the water is flowing at all times. Note the velocity pressure on the remote gauge (hold gauge at the height of the 4-1/2" outlet when taking this reading). When the flow pressure has stabilized, notify the S/R hydrant to take the residual pressure reading.

Note: Residual pressure must not be dropped below 20 psi in order to avoid damage to water pipes and creation of a potential backflow condition from domestic water systems. Notify flow hydrant staff of a residual pressure approaching 20 psi and cease opening the hydrant further to maintain a residual pressure not less than 20 psi. This situation typically will only occur where pipe sizes are less than 8 inch and pumping capacity is insufficient.

9. 10. Slowly close the flow fire hydrant to mitigate water surges; when fully closed, the post flow S/R hydrant residual pressure also needs to be recorded. A reading higher than the pre-flow reading will indicate that a well pump was activated during the test.
10. Record all S/R and flow hydrant pressure readings and note the hydrant number(s) where the readings were taken.
11. Disassemble all test equipment; restore hydrant caps, and double check the test area for all tools.

Note: Always open the bleed valve on the S/R hydrant cap before closing the hydrant valve to prevent a water hammer from damaging the gauge.

12. After the test, the Fire Marshal will analyze the flow data, complete Fire Prevention Division, Flow Test Result form, CPD-F-32, and scan the document into the Fire Hydrant Flow Test folder on the F Drive.



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PROCESS

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INFORMATION

The water supplies for the City of Coalinga currently primarily come from aqueduct water supply and pump stations throughout the Coalinga area.

Historically, the water allotment from the California State Board of Reclamation has been reduced over the years, resulting in mandatory restrictions in use of water. Both the State of California and local water purveyors have restricted water use to certain days of the week and hours within the day and imposed penalties for water wasting. Routine full flow testing of fire hydrants will use +/- 2000 gallons per minute during the test and has a negative reaction from a public that is being continually reminded about the need to conserve water.

Since the late 1980s, the Department has practiced water conservation by limiting the flow of water during annual hydrant maintenance and providing fire protection design engineers with prescriptive water flow curves based on the infrastructure of the City of Coalinga water system. Measured and documented full flow fire hydrant testing has been limited to Insurance Services Office (ISO) mandated surveys, specific high water demand projects, and to diagnose problems in the existing water infrastructure. Both newly installed public and private fire hydrants have to be flowed to remove debris from the pipe and ensure the hydrant is operating but these acceptance test flows are not typically measured.

Water flow testing is usually done during daylight hours both for staffing and logistical reasons. In any 24-hour period, the highest domestic water consumption in most of the city occurs between 0000 and 0600 hours daily with landscape irrigation. Also, peak domestic water demand occurs in the summer months when landscape watering is at its most demanding. The use of prescriptive water supply curves is a methodology formulated to account for these water system operation parameters and provides an inherent safety factor for fire protection design to account for peak domestic demand periods and future growth patterns.

Prescriptive flow curves provided for fire protection design are as follows:

- Curve A: 45 psi static/35 psi residual/flow of 1800 GPM (for 10 inch and larger circulating transmission grid water mains---TGMs).
- Curve B: 45 psi static/35 psi residual/flow of 1350 GPM (8 inch circulating water mains connected to TGMs within ½ mile of the project site, 10 inch or larger dead end water mains exceeding 1000 feet).



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- **Curve C: 40 psi static/25 psi residual/flow of 1350 GPM (other infrastructure 6 inch or larger not covered by A & B above).**

These curves are based on City water system operating parameters and historical production data.

DEFINITIONS

1. **Static Water Pressure:** Water system pressure present during periods of domestic water consumption without any fire hydrant and/or fire protection systems water demand.
2. **Residual Water Pressure:** Water system pressure present with a fire hydrant and/or fire protection water demand plus domestic water use.
3. **Velocity Pressure:** A reading on a pitot gauge tool that is converted to gallons per minute based on a mathematical formula using the factors of pitot gauge pressure, diameter of the flow outlet, and coefficient of flow orifice discharge.
4. **Fireflow:** Available fire protection water supply in GPM at a residual pressure of 20 psi.
5. **Hose Monster Big Boy:** A proprietary flow test diffuser with built in Factory Mutual approved calibrated pitotless nozzle.

CROSS REFERENCES

National Fire Protection Association (NFPA)

NFPA 291, Recommended Practice for Fire Flow Testing and Marking of Hydrants

Fire Prevention Manual

Flow Test Result Form, CPD-F-001