



# EL DORADO COUNTY REGIONAL FIRE PROTECTION STANDARD

## Fire Water Supply without a Purveyor Residential & Commercial

STANDARD #D-003

EFFECTIVE 01-04-2016

### 1. PURPOSE

1.1. The California Fire Code (CFC) requires an approved water supply capable of providing the required fire flow for fire protection to premises upon which facilities, buildings or portions of buildings which are hereinafter constructed or moved into within the jurisdiction. The CFC further explains that the water supply shall consist of reservoirs, pressure tanks, elevated tanks, water mains or other fixed systems capable of providing the required fire flow. The CFC gives the minimum fire flow for residential one- and two-family dwellings as 1,000 gallons per minute for 60 minutes for dwellings 3,600 square feet or smaller. Many areas of El Dorado County do not have a water purveyor with piped underground supply lines to provide this fire flow. The tank size required to accomplish this minimum supply would be 60,000 gallons and the system would require a fire pump rated at 1000 gallons per minute for a single home. The CFC allows this supply to be reduced by 50% when the home is equipped with automatic fire sprinklers (AFS). This would still require 30,000 gallons of water storage plus the pumping system. The CFC gives the fire chief the authority to reduce the fire flow requirements for buildings in rural areas where the development of full fire flow requirements is impractical. The purpose of this standard is to communicate the *minimum* level of water storage and delivery system requirements for one- and two-family dwellings that can be approved under the reduced fire flow allowance within the fire jurisdictions that adopt this standard.

### 2. SCOPE

2.1. This standard identifies *minimum* fire water supply requirements for one- and two-family dwellings and associated buildings in rural and suburban El Dorado County where an adequate reliable water supply does not exist. The CFC allows the fire code official to use the NFPA 1142 standard or the California Wildland-Urban Interface Code to develop these modified local standards.

### 3. EXEMPTIONS

3.1. Where El Dorado County has determined that **no** permit is required for construction.

### 4. AUTHORITY

- 4.1. California Fire Code
- 4.2. NFPA 1142, NFPA 22, NFPA 24
- 4.3. California Wildland – Urban Interface Code

- 4.4. California Code of Regulations, Title 19, Section 4291
- 4.5. California Code of Regulations, Title 14, Fire Safe Regulations SRA

## 5. **DEFINITIONS**

- 5.1. **Fire Flow** – The flow rate of a water supply measured at 20 pounds per square inch residual pressure that is available for fire fighting.
- 5.2. **Fire Flow Calculation Area** – The floor area of all floor levels within the exterior walls and under the horizontal projections of the building roof.
- 5.3. **Water Purveyor** – A public utility, a mutual water company, a government agency or special district, or other entity owning and operating a water system and holding a valid permit from the California State Department of Public Health to purvey water. (such as El Dorado Irrigation District, Georgetown Divide Public Utility District, or South Tahoe Public Utility District)
- 5.4. **Hose Stream Allowance** – Water supply that is dedicated to the use of the fire department for the suppression of any type of fire.
- 5.5. **Sprinkler Demand – NFPA 13D** – Water supply required to meet the design flow rate of a residential automatic fire sprinkler system designed and installed by a California licensed C-16 contractor for ten minutes’ minimum.
- 5.6. **Domestic Water Supply** – Water that is used for domestic consumption only.

## 6. **PERMITS and OTHER CODES AND STANDARDS**

- 6.1. Construction of water supply systems built to these standards shall meet all additional requirements of the El Dorado County Building Department for permits and compliance with other applicable federal, state or local codes. Plan submittal requirements are detailed in section 8.1 of this standard.

## 7. **COMMERCIAL WATER SUPPLY- WITHOUT A PURVEYOR**

- 7.1.1. Commercial projects will be allowed to use this standard ONLY when the local water purveyor is unable to provide water supply to the site, and has indicated this in written communication addressed to the fire department.
- 7.1.2. All commercial water supply without a purveyor shall be designed by a certified engineer.
- 7.1.3. Back up electrical / generators are required in State Fire Marshal regulated occupancies.
- 7.1.4. When a purveyor is within 1000’ feet of the project site, the project shall be required to request Annexation into El Dorado Irrigation District. (EID).

## **8. INSTALLATION REQUIREMENTS**

### **8.1. PLANS**

- 8.1.1. Plans shall be submitted and approved by the fire department prior to installation.
- 8.1.2. Each fire agency may have a different submittal requirement for providing either paper plan set(s) or digital plans.
- 8.1.3. Scaled plans shall include the plan view and elevation view of access roads and driveways, structures, tank size, tank location, hydrant location, and all associated piping.
- 8.1.4. Submitted plans shall include the manufacturer's specification sheets for the tank and all system components.

### **8.2. INSTALLATION TIMELINE**

- 8.2.1. The required water supply system shall be operational prior to occupancy of the new construction.

### **8.3. TANK CONSTRUCTION**

- 8.3.1. Tanks shall be manufactured with materials designed specifically for residential potable water storage requirements.
- 8.3.2. Tanks shall be installed following the tank manufacturer's requirements for foundation, venting, flexible piping attachments, corrosion protection and other manufacturer required features.
- 8.3.3. Above ground plastic tanks shall be constructed with UV light protection.
- 8.3.4. Tanks are required to be connected to a water supply that will keep the required water levels maintained. (auto fill)

### **8.4. TANK LOCATION**

- 8.4.1. Water storage tanks shall be located a minimum of 30 feet from the closest structure to be protected and a minimum of 10 feet from the property line, roads or driveways. Where this requirement is impractical a fire barrier may be required by the fire official.
- 8.4.2. Combustible vegetation shall be maintained clear for 30 feet around the tank or to the property line.
- 8.4.3. Footings, foundation(s) or other supports shall be constructed per the tank manufacturer's specifications. Soil grading adjacent to the tank shall be performed to prevent water run-off from eroding the foundation, footings or support.
- 8.4.4. Elevation of the tank floor shall be the same level or higher than the outlet of the hydrant. Exception: Elevation of the tank floor may be no more than 5 feet below the fire hydrant outlet where the plan view distance from the hydrant to the tank outlet is no more than 20 feet.

- 8.4.5. Where topography allows, the water tank should be located at an elevation that is as high above the hydrant outlet as reasonably possible.
- 8.4.6. Where topography does not allow compliance with (8.4.4) above, the fire code official may consider a system design with a brass or bronze check valve installed at the tank end of the piping in an above ground horizontal pipe section downstream from the tank shut-off valve.
- 8.4.7. Water storage tanks may be located within a structure. Combustible vegetation clearance and distance to property line requirements for structures detailed in CRC, Title 19, Section 4291, must still be met.

**8.5. TANK SIZE**

- 8.5.1. Tank systems covered by this standard shall provide, at a minimum, the water capacity of Hose Stream Allowance indicated on Table 8.5.1 based on the volume calculation of the largest structure on the parcel to be protected, as determined by the Fire Code Official. Additional water capacity shall be added to the tank system if either a residential fire sprinkler system water supply is required and/or domestic water supply is requested. See 8.5.2 and 8.5.3 below, respectively. These additional water supply needs may be provided by systems separate from the hose allowance system. Systems that provide water for a combination of hose allowance and automatic fire sprinklers and/or domestic use, shall be designed with either piping or controls that assure that hose stream allowance water is always reserved for fire department use. See (Figure 1) for graphics showing some possible approved design methods.
- 8.5.2. If additional water storage capacity is needed in the tank for automatic fire sprinkler system design, the tank size shall be increased 500 gallons minimum, or the amount specified by the Licensed California C-16 Contractor who designs and builds the sprinkler system per the NFPA 13D standard.
- 8.5.3. If additional water storage capacity is required by the building owner for domestic use, the tank size shall be increased 500 gallons minimum.

<p>Table 8.5.1 Hose Stream Allowance - Minimum Tank Size Calculation</p> <p>Tanks Size Calculation based on Total Volume of Largest Structure on the Parcel</p> <p><b>*WS<sub>min</sub> = VS<sub>tot</sub>/OHC x CC</b></p> <p>(OHC = 7 in type R-3 applications, CC = 1.5 in type V-B applications)</p> <p><b><u>This formula works out to requiring 1 GALLON of water per 1 SQUARE FOOT of Structure</u></b></p> <p>WS<sub>min</sub> = Water Supply min., VS<sub>tot</sub> = Total Volume of Structure, OHC = Occupancy Hazard Class, CC = Construction Class  <i>*WS<sub>min</sub> requirements can be reduced by 50% if building is equipped with an NFPA 13D sprinkler system</i></p> <p><b>NOTE:</b> This Table is Hose Stream tank sizing only. If AFS or Domestic water are stored in the same tank the tank size must be increased accordingly. See 8.5.2 &amp; 8.5.3</p>
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## 8.6. TANK VENTING

- 8.6.1. Rapid use of water during firefighting operations requires sufficient tank venting to prevent tank collapse or fire water delivery impairment. Tanks shall be provided with a vent above the maximum water level. Tank vents shall have a cross sectional area greater than or equal to one half the area of the hydrant supply pipe or the tank fill pipe, whichever is larger.
- 8.6.2. Tank vents shall be provided with a screened inlet configured to prevent the impairment of the vent or tank intrusion by birds, mammals, insects or debris.
- 8.6.3. Tank vents shall be installed above the potential snow level for the site elevation. Approval required by the Fire Code Official.

## 8.7. PIPING

- 8.7.1. Tank piping attachments for fill, venting, supply, overflow, or drain shall meet the requirements of the tank manufacturer.
- 8.7.2. All supply piping shall be designed and installed to provide 250 gallons per minute of flow rate minimum to a fire department apparatus pumping at draft at the hydrant location.
- 8.7.3. Above ground piping shall be Schedule 40 galvanized steel pipe minimum.
- 8.7.4. Tank fill piping shall be  $\frac{3}{4}$  inch minimum.
- 8.7.5. Hydrant supply piping attachment point on the tank shall be  $2\frac{1}{2}$  inch minimum.
- 8.7.6. Hydrant supply piping shall be  $2\frac{1}{2}$  inch minimum for all above ground piping and shall continue as galvanized pipe to the underground piping with a minimum of a 2-foot horizontal galvanized section at the tank end and the hydrant end of the underground piping. See (Figure 2)
- 8.7.7. Underground piping installations using no more than 20 feet of underground piping on the horizontal run may be constructed of  $2\frac{1}{2}$  inch pipe.
- 8.7.8. Where underground piping is longer than 20 feet and no greater than 100 feet, the underground piping shall be 4 inch. Underground piping up to 4 inch may be constructed with schedule 40 minimum PVC pipe. See (Figure 2) Underground piping greater than 100 feet in length shall be designed by an engineer.
- 8.7.9. Underground galvanized steel piping shall be coated and wrapped.
- 8.7.10. All underground piping shall be placed on 6 inches of sand or other fill material approved for underground utilities and covered 6 inches minimum with the same material prior to backfill. See (Figure 2) Underground piping shall be buried 24 inches below finished grade unless it is routed under roads or driveways in which case it shall be buried 36 inches minimum below finished grade.

- 8.7.11. Underground non-metallic piping shall have a tracer wire buried with the pipe.
- 8.7.12. Hydrant supply piping may be approved to remain above ground between the tank and the hydrant when approved by the fire code official.

## **8.8. HYDRANTS**

- 8.8.1. Hydrant location shall be located no closer than 50 feet from protected structures.
- 8.8.2. Hydrant location shall be no more than 250 feet from protected structures as measured along the route of a road or driveway.
- 8.8.3. The center height of the hydrant outlet shall be 18 to 24 inches above the finished grade. See (Figure 2)
- 8.8.4. The center height of the hydrant outlet shall be no greater than 5 feet above the bottom elevation of the water supply tank. See (Figure 2) See also detailed requirements in paragraph 8.4.4
- 8.8.5. The hydrant outlet shall be 2½ inch minimum. The hydrant outlet shall be 2½ inch NST male hose thread (also known as NH and NS).
- 8.8.6. The male hose threaded outlet shall be provided with a lugged protective cap.
- 8.8.7. The hydrant may be a single assembly or may be a 2½ inch gate or ball valve with an appropriate 2½ inch hose thread adapter on the outlet.
- 8.8.8. The hydrant shall be visible and accessible.
- 8.8.9. The hydrant shall be located adjacent to a fire apparatus turnout from the driveway or the road that intersect with that driveway as approved by the fire department per the current El Dorado County driveway standard and Title 14 requirements for driveways, roads, and clearances.
- 8.8.10. The hydrant shall be located no closer than (4) four feet nor farther than (12) twelve feet from a roadway and in a location where fire apparatus using it, will not block the roadway.
- 8.8.11. The hydrant shall be painted per the local fire department requirements.
- 8.8.12. A permanent sign shall be attached to the hydrant stating “NO PARKING - Drafting Fire Hydrant - \_\_\_\_\_ Gallons”. Permanent lettering characters shall be 1½ inch minimum and shall be red in color on a white background.
- 8.8.13. The hydrant shall have (8) eight feet of clearance from weeds and flammable vegetation.
- 8.8.14. A reflectorized blue marker, with a minimum dimension of 3” inches, shall be located on the driveway address sign and within 3’ feet of the draft hydrant on a post or sign.
- 8.8.15. Dry hydrants shall be installed on projects where there is a potential snow level for the site elevation. Approval required by the Fire Code Official.

**8.9. FREEZE PROTECTION**

- 8.9.1. All aboveground water piping shall be designed and installed to protect against freezing.
- 8.9.2. The water tank shall be protected against freezing when required by the fire code official.

**8.10. WATER LEVEL ASSURANCE**

- 8.10.1. An approved method shall be used to provide automatic water storage fill to the minimum level of fire department hose allowance.
- 8.10.2. The system shall be designed such that when the source water supply to the water storage system is impaired, the hose stream allowance will be reserved for firefighting only. The methods used to provide this assurance may include tank plumbing design/configuration and/or approved electric control systems. See (Figure 1)
- 8.10.3. A sight gauge may be required as part of the water level assurance design.

**8.11. INSPECTIONS/TESTING**

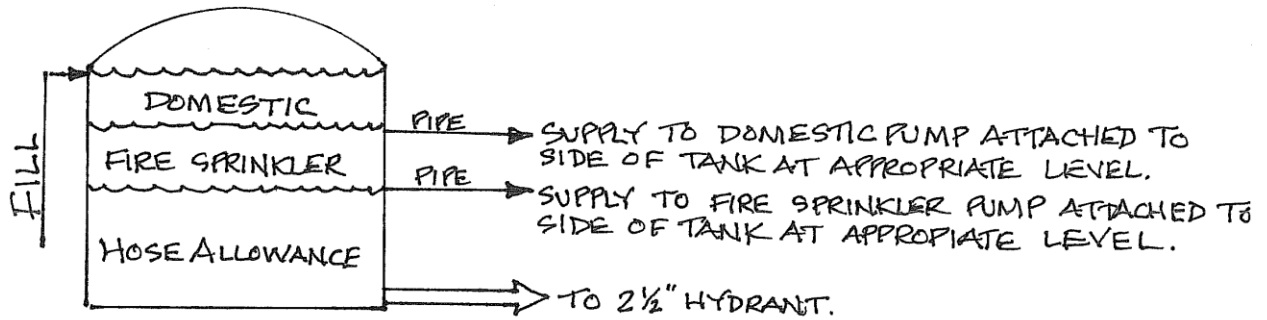
- 8.11.1. All underground piping shall be inspected by the fire department prior to covering with fill. Piping shall be pressurized for the inspection with water or air at 20 psig or the maximum expected system pressure, whichever is greater. There shall be no evidence of leaks.
- 8.11.2. Systems designed with a check valve per paragraph 8.4.6 may require a draft primer pump performance test to verify that the check valve will hold water up to the hydrant for 30 minutes' minimum.
- 8.11.3. A final inspection including functional test of liquid level controls shall be performed by the fire department prior to building occupancy of new construction

**8.12. WATER STORAGE TANK INSPECTION, TESTING, & MAINTAINANCE**

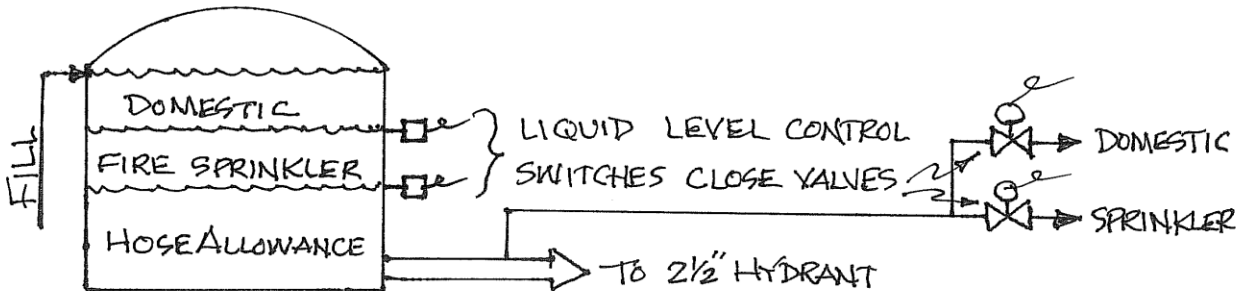
- 8.12.1. Owners of residential water systems, installed per the requirements of this standard, shall perform necessary ongoing maintenance and repairs to the system to assure the proper performance of the system as it was designed and installed. All inspections, testing, maintenance, and record keeping shall comply with all requirements per Title 19, Division 1, Chapter 5. See Table 9.1 for ITM Schedule. Impairments to the fire protection water supply system shall be reported immediately to the fire department.
- 8.12.2. Vegetation and combustible debris (i.e. leaves, pine needles, branches, etc.) shall be kept at a minimum 30' foot clearance from the fire water tank to prevent flames impinging on the tank structure.

# FIGURE 1

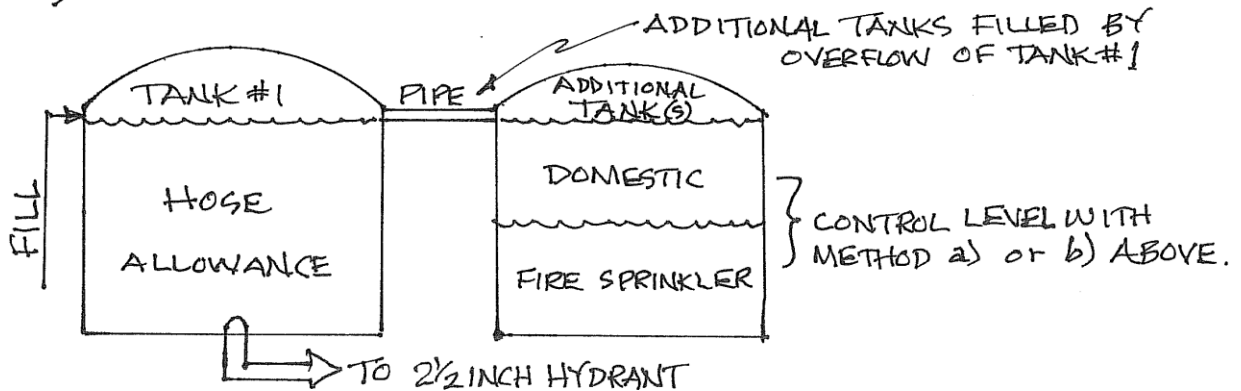
## a) SINGLE TANK - MECHANICAL LEVEL ASSURANCE



## b) SINGLE TANK - ELECTRICAL LEVEL ASSURANCE

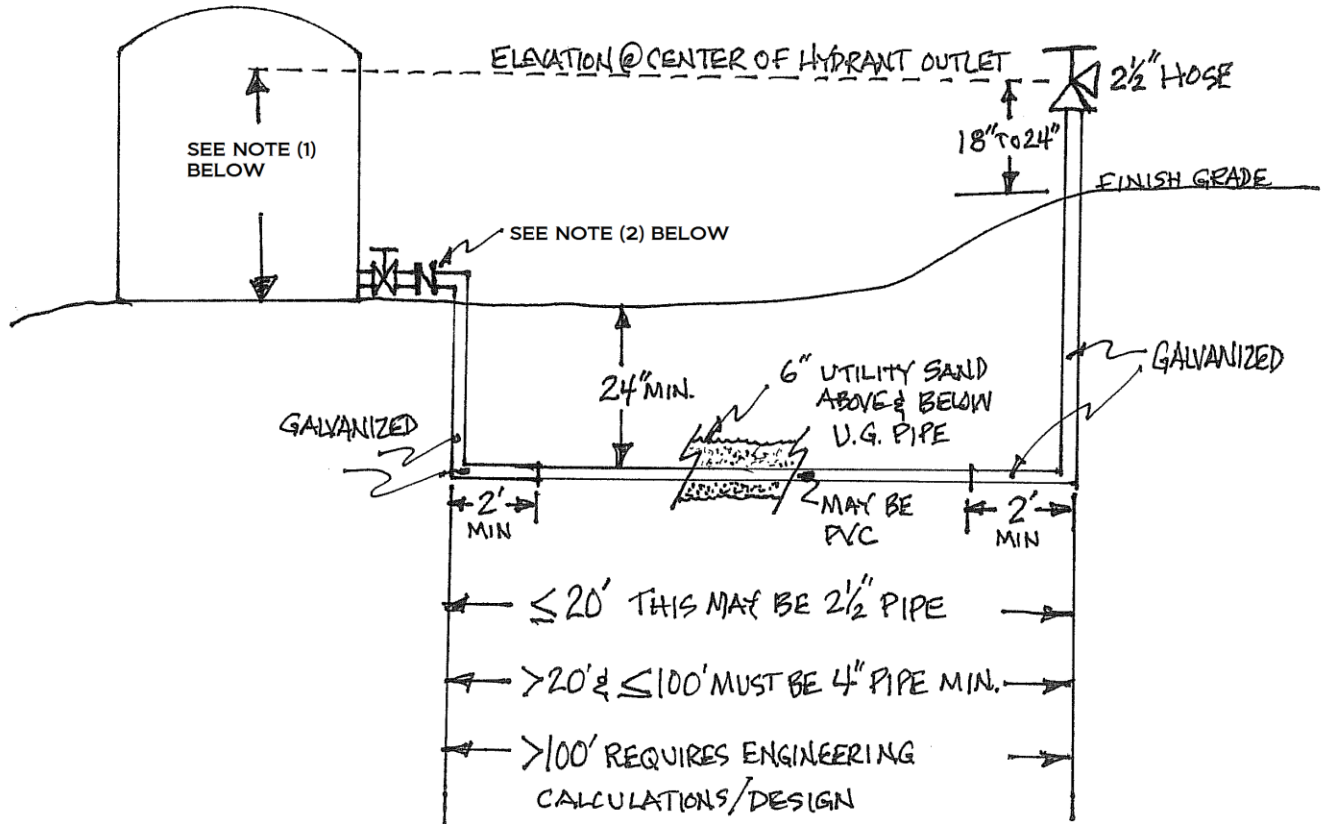


## c) MULTIPLE TANKS





# FIGURE 2



**NOTES:**

- 1.) MAXIMUM 5 FEET OF DROP FROM HYDRANT OUTLET TO THE TANK BOTTOM ALLOWED ONLY WHEN CONDITIONS IN PARAGRAPHS 8.4.4, 8.4.5, & 8.4.6 ARE MET
- 2.) WHERE TOPOGRAPHY DOES NOT ALLOW COMPLIANCE WITH (8.4.4) ABOVE, THE FIRE CODE OFFICIAL MAY CONSIDER A SYSTEM DESIGN WITH A BRASS OR BRONZE CHECK VALVE INSTALLED AT THE TANK END OF THE PIPING IN AN ABOVE GROUND HORIZONTAL PIPE SECTION DOWNSTREAM FROM THE TANK SHUT-OFF VALVE. (SEE PARAGRAPH 8.4.6)