

**NATURAL RESOURCES CONSERVATION SERVICE  
CONSERVATION PRACTICE STANDARD**

**DRY HYDRANT**

(Each)

**CODE 432**

**DEFINITION**

A non-pressurized permanent pipe assembly system installed into a water source that permits the withdrawal of water by suction.

**PURPOSE**

To provide all weather access to an available water source for fire suppression.

**CONDITIONS WHERE PRACTICE APPLIES**

Where a dependable source of water is available, where [fire district pumping equipment](#) can access the site, and where a source of water is needed for fire suppression.

**CRITERIA**

**Site Conditions.** Site conditions shall be such that an all weather vehicle access is available to the dry hydrant or can be developed. The dry hydrant shall be reasonably close to the water source to minimize the length of suction line. This should be determined in conjunction with local fire officials. Special care and maintenance will be required when debris and fine soil particles are part of the streambed.

**Water Requirement.** The quantity to be considered available to a dry hydrant is the minimum available (at not over 15 feet total static lift) during [low water conditions](#). A minimum of 30,000 gallons (1.1 acre-inches) of pumpable impoundment water or a minimum pump flow rate of 250 gpm without interruption for 2 hours is considered a dependable water supply [for structures with no exposure](#)

[hazards](#). More information on water supply requirements are available in NFPA 1142: [Standard on Water Supplies for Suburban and Rural Fire Fighting and the Insurance Services Office Fire Suppression Rating Schedule](#).

**Location.** A location map showing the exact site of the hydrant and vehicle access shall be furnished [to the](#) local fire department with a copy to the landowner. A letter of approval to use the site shall be obtained from the landowner prior to construction. Access, topography, and location should be reviewed by fire department personnel prior to installation.

The fire truck connection shall be within 10 feet of the edge of an all weather access road. [Longer distances maybe allowed if designed accordingly, so that the required flow is obtained with a longer hard suction hose](#). The all weather access road and fire truck pumper connection shall be higher than the auxiliary spillway elevation if installed in a constructed impoundment.

**Water supply.** The adequacy of the water supply from impoundments shall be determined in accordance to appropriate local criteria. The RESOP or similar computer program can be used to determine the water supply contained by earthen construction or water impounding embankments. The adequacy of stream flow source can be determined from regional analysis of stream gage data.

<p>Conservation practice standards are reviewed periodically, and updated if needed. To obtain the current version of this standard, contact the Natural Resources Conservation Service.</p>
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**Pipe.** The pipe material may be iron, steel or plastic. Plastic pipe shall be a minimum of schedule 40, SDR-26, or other approved substitutions and must be protected from ultraviolet rays. The number of elbows used in the entire dry hydrant system should be kept to a minimum. Pipe shall be 6 inches nominal diameter or larger. The pipe shall be fitted with intake screen or strainer and standard fire truck hose adapters for quick connect/release operations acceptable to the local fire department. For priming purposes, the maximum dry pipe length for six-inch diameter pipe shall not exceed 30 feet. The maximum dry pipe length for eight-inch diameter pipe shall not exceed 18 feet.

The depth at which the pipe is installed shall be below the frost-free depth for the area.

The pipe and fittings shall be designed to meet the strength and pressure requirements for the site conditions. Watertight joints shall have a strength equal to that of the pipe. Fittings must be of the same material as the pipe or specifically manufactured for mating dissimilar materials (ie. Steel to PVC). All fittings shall be protected against corrosion.

Proper pipe material and installation shall conform to Vermont Construction Specification 41 – Pipe Conduits & Drains. Rubber gaskets for pipe joints shall conform to ASTM F477, Elastomeric Seals (Gaskets) for Joining Plastic Pipe.

**Pipe Intake.** For impoundment applications, the depth of water over the pipe intake shall be a minimum of 2 feet after design flow for two hours. An additional depth over the pipe intake shall be added to for ice accumulation. For stream applications, the depth of water over the pipe intake shall be a minimum of 2 feet. The intake screen shall have a minimum opening of 4 times the pipe cross sectional area. Where the intake is more than 3 feet off the bottom, a trash rack may be used in lieu of a screen.

A dry hydrant installation shall provide for a positive slope toward the water source. In pits or impoundment, the intake screen or strainer shall be supported and secured at least two feet above the pool bottom. The intake shall be at least 4 feet beyond the earth slope.

**Pump Lift.** The top of the fire truck pumping connection or centerline of pump (whichever is higher) shall be no more than 15 feet in elevation above the surface of the fire protection pool or stream surface at the lowest design operating level.

The fire truck connection shall be approximately 24 inches above the ground surface, but never higher than the intake of the using fire truck.

The total lift (pumping head) shall not exceed 20 feet when all losses are totaled. Pumping head for each site shall include head loss from screen or strainer, elbows, pipe friction, elevation (static head), velocity head, and hard rubber or flexible suction hose to the fire truck. The total suction lift to the centerline of the pump intake shall be computed to ensure that the maximum allowable suction lift is not exceeded by the desired pumping rate. Vermont Supplement 3-70.1 and 3-70.2 of the Engineering Field Handbook may be used to compute the total pumping head.

**Dry Hydrant.** Dry barrel (conventional) hydrants may not be used due to excess suction loss and the necessity that they be absolutely airtight.

A recessed hydrant (below ground-level connection) may be specified for use in areas with special needs, such as in a high vandalism area or for low profile and esthetic needs. It is also referred to as a flush mount hydrant and does not require the 24-inch riser. It may be used with the 45° or straight dry hydrant head assembly.

**Dry Hydrant Head.** The hydrant sleeve shall be made of bronze, brass, aluminum alloy or other durable, non-corrosive metal. Sleeve shall be permanently affixed inside a PVC (or other approved material) head using epoxy adhesive and stainless steel bolts.

The hydrant head shall be able to accept a 6-inch NHT (American National Fire Hose Thread) connection to provide maximum supply. Hydrant (6 inch) head shall conform to ASTM 2466. If necessary, adapters shall be used to accommodate the local fire district equipment.

All hydrants shall contain a removable head strainer and stainless steel snap ring that can be removed without special tools. The strainer shall be conical in shape to maximize straining area. All hydrants shall use a rubber "O" ring between the threaded sleeve and PVC head.

**Dry Hydrant Cap.** The cap shall be of snap-on/snap-off design or threaded caps and removable without special tools. It shall be joined with a steel cable or chain and be permanently attached to the dry hydrant head. The cap shall be hard plastic or of same metal as NHT connection for maximum corrosion resistance.

**Strainer.** The strainer shall be fabricated from PVC material compatible with the pipe. Individual inlet holes shall not exceed 3/8-inch diameter. All components, including pins, shall be non-corrosive. Manufactured well screens shall be corrosion resistant. Screens and strainers shall have a minimum open area of 4 times the pipe cross sectional area.

A strainer may be formed by drilling 1/4 inch to 3/8 inch diameter holes with a minimum of one hole diameter between the holes in PVC pipe. Drill holes shall be deburred and the pipe cleaned before putting the strainer into service. The screens or strainers shall be capped with a removable end cap.

[A strainer may also be fabricated from well screen made of stainless steel that has a slot size of 0.030 inches.](#)

**End Cap.** The end cap must be easily removed without special tools. Perforations are recommended in the end cap, also, to improve flow conditions into the strainer and for jetting action for silt cleanout.

**Materials.** All materials shall meet or exceed the minimum requirements for materials described in the various sections of this standard.

**Access.** Vehicle access to and from the dry hydrant shall be provided for fire truck and pumper units. Access shall have an all-weather surface, be well drained and be at least 12 feet wide for ease of movement by personnel and equipment during an emergency. When local road traffic may be involved, an all-weather road surface adjacent to the dry hydrant and completely off the public

road is recommended for safety of the emergency personnel and the public.

**Protection.** All pipe fittings exposed to sunlight shall be primed and painted. Guard rails or posts shall be installed next to the hydrant for protection. Stakes and manufactured hydrant markings of sufficient height and visibility shall also be installed next to the hydrant to locate the hydrant in deep snow. "NO PARKING, FIRE LANE" signs shall be installed near the dry hydrant.

[When the dry hydrant installation is complete, the site shall be graded to allow positive surface drainage and vegetated or otherwise protected from erosion. Vegetation shall be in accordance with Vermont Construction Specification 52 – Seeding.](#)

## CONSIDERATIONS

1. Effect of the use of the dry hydrant on upstream and downstream water quantity.
2. Sediment production caused by erosion during construction.
3. [Stream Alteration and Army Corps of Engineers permits may be required for hydrant installation.](#)
4. Possible effects on surface and ground water of spilled fuels and lubricants by fire trucks using the dry hydrant.
5. This practice has the potential to negatively affect National Register listed or eligible (significant) cultural resources (archaeological, historical or traditional cultural properties); it also has the potential to protect listed or eligible historic structures. Consider these factors during planning and also follow the NRCS State policy during construction and maintenance.
6. [Protecting the streambank or shoreline in the immediate area of the dry hydrant to prevent erosion or damage from flooding or wave action.](#)
7. [The visible components of the dry hydrant must be esthetically pleasing.](#)
8. [Ensure the dry hydrant components are compatible to the local fire district's equipment.](#)

9. For stream applications, install dry hydrants where drainage area is 8 square miles or greater, to assure sufficient water during a 2% drought period.

10. Effects on endangered species.

11. Special design consideration may be necessary to address vortex action over the pipe intake.

12. Special design consideration may be necessary to address potential vandalism.

### **PLANS AND SPECIFICATIONS**

Plans and specifications for installing dry hydrants shall be in keeping with this standard and shall describe the requirements for applying the practice to achieve its intended purpose. A topographic profile from the water source to the point of delivery shall be surveyed. Soil investigation may be required to determine the depth of bedrock and ascertain the feasibility of the site. Required permits shall be obtained prior to initiating any work.

### **OPERATION AND MAINTENANCE**

Keeping the site clear of obstruction and regular mowing of the dry hydrant access area will be required to keep the area readily available for emergency use. Vegetation and surface protection around the hydrant must be re-established and repaired as needed.

The visible pipe and fittings shall be inspected annually for damage and repaired, if necessary. Remove and clean hydrant screen, if needed.

Pumper testing of the dry hydrant shall be done at least annually to verify site usability. This test shall include back flushing, followed by a pumper test at the maximum designed flow rate. Careful attention should be given to silt, debris, aquatic growth, or other interference that may limit the full operation of the dry hydrant. If the maximum design flow rate is reduced, the cause must be determined and corrected.

Checks of the intake screen should be made once every five years to identify any sediment build up and to provide information for a clean-out operation or for aquatic growth control needs. The hydrant should be back-flushed each spring and fall to remove any silt or debris that may have accumulated on the screen. When back flushing, care must be taken not to damage the components.