

NATURAL RESOURCES CONSERVATION SERVICE
VIRGINIA CONSERVATION PRACTICE STANDARD

DRY HYDRANT

(Each)

CODE 432

DEFINITION

A non-pressurized permanent pipe assembly system installed into 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 transport vehicles can access the site, and where a source of water is needed for fire suppression.

CRITERIA

Plan, design, and construct dry hydrants to meet all federal, tribal, state, and local regulations.

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. Placement of dry hydrants in streams is not recommended due to sediment, debris, and water fluctuations. Use stream intakes only after full evaluation of other alternative sites. Special care and maintenance will be required when debris and fine soil particles are part of the stream bed.

Water Requirement. The quantity to be considered available to a dry hydrant is the minimum available during a drought having a 50-year recurrence interval if not otherwise

specified by local fire protection policy. 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. Consult local fire officials and apply local criteria in evaluating the adequacy of the water supply.

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. The all weather access road and fire truck pumper connection shall be higher than the auxiliary spillway elevation if installed in a constructed impoundment.

Pipe. The pipe material may be iron, steel or plastic. Use Schedule 40 or SDR-26 as minimum quality criteria for plastic pipe. Protect exposed plastic from ultraviolet rays. No more than two 90-degree elbows shall be used in the entire pipe system. 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.

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

Pipe Intake. The pipe intake depth shall be calculated from the design water elevation plus pipe diameter plus 2

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feet. The intake screen should 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 impoundments, 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 bottom of the fire protection pool or stream surface during drought conditions.

The total lift (pumping head) shall not exceed 20 feet when all losses are totaled.

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

The fire truck connection shall typically be approximately 24 inches above the ground surface, but never higher than the intake of the fire truck. A recessed or flush mount 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 aesthetic needs.

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

The hydrant head must meet local requirements in order to be compatible with fire-fighting equipment and provide maximum supply. The hydrant head shall conform to ASTM D2466.

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 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 the same metal as the 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. The screens or strainers shall be capped with a removable end cap.

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.

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. The access road shall be in conformance with Virginia Conservation Practice Standard *Access Road (Code 560)*. The road surface and the surface at the dry hydrant shall provide adequate support for heavy vehicles at all times of the year. Adequate space for vehicle turn around shall be provided where feasible. Access must be acceptable to the local fire department.

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. Take visibility and sight distances into account when locating access roads and pull-off areas.

Protection. After the dry hydrant installation, the site shall be graded for surface drainage and vegetated or otherwise protected from erosion. Vegetation shall be in accordance with the Virginia Conservation Practice Standard *Critical Area Planting (Code 342)*.

Testing. The local fire department shall perform an initial pump test at the design capacity after installation to confirm satisfactory operation. After the initial test, perform tests on a regular basis in conformance with local fire protection policy and the Operation and Maintenance plan.

Markings. The dry hydrant shall be clearly marked in a manner acceptable to the local fire department.

CONSIDERATIONS

Fire trucks are generally equipped to pump water directly from a stream, if needed. Therefore, install dry hydrants in streams only when doing so facilitates water access and no better alternatives are available. Also consider the consequences of wasted time associated with emergency personnel attempting to use a failed stream hydrant.

Additional considerations include:

- effects of the use of the dry hydrant on upstream and downstream water quantity;
- possible effects on surface and ground water of spilled fuels and lubricants by fire trucks using the dry hydrant.

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. Required permits shall be obtained prior to initiating any work.

Record all required information in an engineer field book, on a plan sheet or design computation sheet, or in another appropriate location.

DESIGN DATA

1. Completed Environmental Evaluation (Form VA-EE-1) and subsequent requirements.
2. Soils investigation. Collect information pertinent to estimating water seepage losses for use in evaluating the adequacy of the source. Note soils where pipe will be placed and any adverse conditions affecting installation. Note soils and adequacy of drainage in access area.
3. Survey and plot data: profile, cross-sections, topography, as needed.
4. Design computations, including purpose of practice and references used.
 - a. Water surface elevation corresponding to drought conditions having a 50-year recurrence interval or as determined by local fire protection policy.
 - b. Computations (such as a stage-storage curve) documenting the adequacy of the water supply in accordance with this standard and local fire protection criteria.
 - c. Document that static lift (elevation head) is no more than 15 feet.
 - d. Document that total lift (pumping head) is no more than 20 feet. Include head loss from screen or strainer, elbows, line friction, elevation (static head), and hard rubber or flexible suction hose to the fire truck.
5. Plan view of site with existing and planned features, such as the access road. Include dimensions, distances, etc.
6. Standard Cover Sheet (VA-SO-100A).
7. Materials and quantities needed. Identify borrow material and/or spoil area, as needed.
8. Vegetation and/or ground cover requirements.
9. Identification of needed Erosion & Sediment Control measures.
10. Supplemental practices required.
11. Virginia Conservation Practice Specifications (700 Series).
12. Operation and Maintenance Plan.
13. Site markings.

CHECK DATA

1. As-built survey.
2. As-built plans including dimensions, types and quantities of materials installed, and variations from design. Include justification for variations.
3. Locations of appurtenant practices.
4. Adequacy of vegetation and/or ground cover.
5. Complete as-built section of Cover Sheet.

OPERATION AND MAINTENANCE

Keep the site clear of obstructions and regularly mow the dry hydrant access area to keep it readily available for emergency use.

Pumper testing of the dry hydrant shall be done at least semi-annually (spring and fall) or as directed by local fire protection policy to

verify site usability. This test shall include back flushing, followed by a pumper test at the maximum designed flow rate. Give careful attention to the intake and intake screen. Check for silt, debris, aquatic growth, or other interference that may limit the full operation of the dry hydrant.

REFERENCES

1. ASTM D2466 Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40.
2. National Fire Protection Association (NFPA) Standard 1231, "Water Supplies for Suburban and Rural Fire Fighting."
3. NRCS, VA, Field Office Technical Guide (FOTG), Section IV.
4. USDA Forest Service, 1993. Dry Hydrant Manual. "A Guide for Developing Alternative Water Sources and Delivery Systems for Rural Fire Protection." Technical Publication R8-TP 19.

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