



Natural Resources Conservation Service

CONSERVATION PRACTICE STANDARD

DRY HYDRANT

CODE 432

(no)

DEFINITION

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

PURPOSE

This practice is used to accomplish the following purpose:

- Apply this practice to provide all weather access to an available water source for fire suppression

CONDITIONS WHERE PRACTICE APPLIES

This standard applies where an adequate volume of water is available, where transport vehicles can access the site, and where a source of water is needed for fire suppression.

CRITERIA

General Criteria Applicable to All Purposes

Design, construction, and operation of dry hydrants shall comply with all Federal, State, Local laws and rules, including safety and health regulations governing all activities in or along streams or bodies of water. The owner or operator shall be responsible for securing all required permits or approvals and for operating the dry hydrant in accordance with such laws and regulations.

Site Accessibility

Prior to construction, obtain a letter of approval from the landowner that allows the local fire department to use the dry hydrant. Prior to installation of the dry hydrant, review access, topography, elevations, and dry hydrant location with fire department personnel. Locate or develop fire truck and pumper unit vehicle accessibility to the dry hydrant in conjunction with local fire officials.

Provide a well-drained all-weather surface access road a minimum of 12 feet wide to facilitate movement by personnel and equipment during an emergency using Access Road Practice Standard (560).

Clearly mark the dry hydrant in a manner acceptable to the fire department.

In order to limit the length of suction lines, locate the fire truck and pumper connection within 10 feet of the edge of the access.

If the dry hydrant is located in a constructed impoundment, locate the access road and fire truck and pumper connection at a higher elevation than the auxiliary spillway.

Upon completion of construction, provide a copy of the location map showing the exact site of the hydrant and vehicle access to the local fire department and to the landowner.

Water Requirement

The minimum quantity of water available to a dry hydrant is the amount obtainable at not over 15 feet total static lift during a drought. An adequate volume of water is a minimum of 30,000 gallons (1.1 acre-inches) of pumpable impounded water or a minimum pump flow rate of 250 gallons per minute (gpm) without interruption for 2 hours.

Determine the adequacy of the water supply in accordance with appropriate local fire department criteria. It is the intent of this standard to comply with the current National Fire Protection Association (NFPA) 1142, "Standard on Water Supplies for Suburban and Rural Fire Fighting". Contact the local fire department that will use the dry hydrant for specific requirements that could exceed these minimum standards.

Determine the volume of water supply in water impounding structures using TR-19: Reservoir Operation Study Computer Program (RESOP) or other similar computer programs or models. Determine the adequacy of streamflow sources using regional analysis of stream gage data or other appropriate techniques.

Pump Lift

Install the hydrant so that the top of the fire truck pumping connection or the centerline of pump (whichever is higher) is no more than 15 feet in elevation above the centerline of the dry hydrant pipe intake.

Coordinate with the local fire department to determine the proper height of the fire truck pumper connection. Typically, this height is approximately 24 inches above the ground surface but must never be higher than the intake of the fire truck drawing from the dry hydrant. The total lift (pumping head) including all losses, must not exceed 20 feet. Pumping head losses include head loss from the strainer, elbows, line friction, elevation (static head), and the suction hose connecting the dry hydrant to the fire truck.

Pipe

The pipe material may be flexible conduit such as plastic pipe, steel pipe, aluminum pipe, or ductile iron pipe that meets material specifications.

Design the pipe, using NRCS National Engineering Handbook (NEH) Part 636, Structural Engineering, Chapter 52, Structural Design of Flexible Conduits, to withstand pumping pressures at design flow to meet water requirement criteria.

Use pipe with a nominal diameter of 6 inches or larger. Use no more than two 90-degree elbows in the entire pipe system. Fit the pipe with an intake strainer and hydrant head with standard fire truck hose adapters acceptable to the local fire department, for quick connect/release.

Protect plastic pipe from ultraviolet rays.

Pipe Intake

Install the top of the pipe intake 2 feet below the low water surface elevation and at least 2 feet below the frost-free depth for the area, whichever is deeper. In Ohio, it is acceptable to estimate the 50-year drought and freeze condition to be 4 feet below the normal water level (principal spillway crest elevation). Therefore, place the top of the water intake a minimum of 4 feet below the normal water level, plus the depth of water necessary to obtain 30,000 gallons (2 ft. minimum). Place the outlet at least two (2) feet above the bottom of the pond to reduce the risk of plugging by sediment.

Install the dry hydrant intake pipe on a slope toward the water source in order to avoid accumulation of sediment in the joint. Support and secure the intake screen or strainer at least two feet above the pool bottom and at least four feet beyond the earth slope in pits or impoundments.

Strainer

Fabricate a strainer of material compatible with the pipe or use corrosion resistant manufactured well screens. Use non-corrosive materials for all components, including pins. Screens and strainers must have

a minimum open area of 4 times the pipe cross sectional area with individual inlet holes no greater than 3/8-inch in diameter.

A strainer may be formed by drilling 1/4-inch to 3/8-inch diameter holes with a minimum of one hole diameter distance between the holes in PVC pipe matching the diameter of the intake pipe or larger. Debur drill holes and clean the pipe before putting the strainer into service.

End Cap

Cap the inlet end of the intake pipe with a perforated end cap that is easily removed without special tools. Perforations improve flow conditions into the strainer and allow jetting action for silt cleanout.

Dry Hydrant

Do not use conventional dry barrel hydrants, such as those found in public water supply systems. It is necessary for the intake pipe to be absolutely airtight, and as a result, excess suction loss may occur if the dry barrel hydrant is not 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 aesthetic needs. Also referred to as a flush-mount hydrant, this type of dry hydrant does not require the 24-inch riser. It may be used with either the 45° or straight dry hydrant head assembly.

Dry Hydrant Head

Use a bronze, brass, aluminum alloy, or other durable, non-corrosive metal hydrant sleeve permanently affixed inside the head that will not interact with the dry hydrant pipe material that is acceptable to the local fire department, for quick connect/release.

The hydrant head must accept a 6-inch NST (National Standard Thread), also known as NH (National Hose thread), connection to provide maximum supply.

Dry Hydrant Cap

Install a snap-on/snap-off cap that is removable without special tools and joined permanently to the dry hydrant head with a steel cable or chain. Use a cap made of hard plastic or of same metal as NST connection for maximum corrosion resistance.

Testing

Allow pipe joint sealants to cure before testing the piping system. The local fire department is responsible for performing an initial pump test at the design capacity after installation to confirm satisfactory operation. Give careful attention to silt, debris, or other interference that may limit the full operation of the hydrant.

Protection

After installing the dry hydrant, grade the site to provide surface drainage and vegetate or otherwise protect from erosion. Vegetate in accordance with conservation practice standard Critical Area Planting Standard (342).

The hydrant head is vulnerable to vehicle damage. Install a steel post (recommend 3" diameter or larger) adjacent to and on both sides of the head, allowing for adequate personnel access.

CONSIDERATIONS

Dry hydrant use may result in dewatering of the water source and adversely impact aquatic organisms and other wildlife that may depend upon the water source. If the operation of the dry hydrant will dewater the water sources, include mitigation measures in the design to address these issues.

Consider pumping rates that will be adequate to meet anticipated water needs and equipment capabilities for the next 10 to 20 years.

Appropriate erosion and sediment control measures are required during and immediately following construction.

A spill mitigation plan is advisable in order to mitigate the possible effects on surface and ground water of spilled fuels and lubricants by fire trucks using the dry hydrant.

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 follow the NRCS State policy during construction and maintenance.

Consider using physical barriers to protect any above ground piping. Use reflective paint on signs and on the connection cap to improve visibility during emergencies.

Consider visibility and sight distances when locating access roads and pull-off areas. When local road traffic may be involved, completely separate the access road from any public road for the safety of emergency service personnel and the public.

PLANS AND SPECIFICATIONS

Prepare plans and specifications for dry hydrants that describe the requirements for applying the practice according to this standard. Obtain required permits prior to initiating any work. Requirements for all drawings prepared by NRCS/SWCD as well as by others (Professional Engineer or Registered Architect) are contained in the National Engineering Manual (NEM) Part 541- Drafting and Drawings. As a minimum the plans and specifications must include, but are not limited to the following:

- Dry hydrant location
- Plan view of the installation
- Profile of the pipe line
- Access road requirements
- Details of pipe intake
- Details of stand pipe, including hydrant head.
- Site stabilization requirements
- Materials list

OPERATION AND MAINTENANCE

Develop and provide an operation and maintenance plan to the owner and operator of the dry hydrant. The minimum requirements to be address in the operation and maintenance plan are:

- Keep the site clear of obstruction and mow the dry hydrant access area regularly to maintain ready access to the hydrant for emergency use. When feasible, schedule mowing to take place outside of the primary nesting season for grass-nesting birds.
- Pumper test the dry hydrant annually at the maximum designed flow rate to verify site usability. Back flush the system before testing. Inspect the hydrant each spring and fall and back flush if necessary to remove silt or sediment debris that may have accumulated on the screen.
- Regularly clear the intake screen of excess aquatic growth that may limit full operation of the dry hydrant.

REFERENCES

National Fire Protection Association (NFPA) 1142, "Standard on Water Supplies for Suburban and Rural Fire Fighting", current edition (reproduction of part of this document is contained in the NRCS Ohio eFOTG Section 1 "General References", under Reference Lists\ 4. Engineering\ d. Dry Hydrants).

USDA-NRCS, National Engineering Handbook, Part 636, Structural Engineering, Chapter 52, Structural Design of Flexible Conduits.