

**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

This practice may be applied 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

Laws, rules, and regulations. This practice shall conform to all federal, state, and local laws, rules, and regulations. Laws, rules, and regulations of particular concern include those involving water rights, land use, pollution control, property easements, wetlands, preservation of cultural resources, and endangered species.

The landowner is responsible for securing necessary permits, complying with all laws and regulations, and meeting legal requirements applicable to the installation and operation and maintenance of the dry hydrant and associated structures.

Site accessibility. Prior to construction, obtain a letter of approval from the landowner to use the site. 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.

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 defined as 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 criteria. Determine the volume of water supply in water impounding structures using Reservoir Operation Study Program (RESOP), Soil-Plant-Air-Water (SPAW), 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 that is drawing from the dry hydrant. The total lift (pumping head) must not exceed 20 feet when all losses are totaled. Pumping head losses include head loss from the strainer, elbows, line friction, elevation (static head), and the suction hose that connects 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 [Chapter 52 in National Engineering Handbook Part 636, Structural Engineering](#), 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. For quick connect/release, fit the pipe with an intake strainer and hydrant head with standard fire truck hose adapters that is acceptable to the local fire department.

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). To avoid a vortex or whirlpool during pumping, the top of the inlet pipe shall be at least 2 feet below the low water level unless a special design is prepared to prevent vortex.

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 2 feet above the pool bottom and at

least 4 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 1 hole diameter between the holes in polyvinyl chloride (PVC) pipe. Deburr 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 that dry-barrel hydrants be absolutely airtight; and as a result, excess suction loss may occur if used for a dry hydrant installation.

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 the 45-degree or straight dry hydrant head assembly.

Dry hydrant head. Use a bronze, brass, aluminum alloy, or other durable, non-corrosive metal hydrant sleeve that is permanently affixed inside the head 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 an 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 the same metal as the 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 the dry hydrant is installed, grade the site to provide surface drainage and vegetate or otherwise protect it from erosion. Vegetate in accordance with [Conservation Practice Standard](#) and [Construction Specifications](#) 342, Critical Area Planting Standard.

CONSIDERATIONS

Dry hydrant use may result in dewatering of the water source and may 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.

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 groundwater 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 also follow [General Manual Title 420, Part KS401](#) during construction and maintenance.

The hydrant head is vulnerable to vehicle damage. Consider installing a steel post (recommended to be 3 inches in diameter or larger) adjacent to and on both sides of the head, allowing for adequate personnel access. Physical barriers may be needed to protect any aboveground 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, the access road must be completely separated from any public road for the safety of emergency service personnel and the public.

Notify all overhead and underground utility companies prior to excavation and consider utilities during the planning of the access.

Dry hydrants shall be placed far enough away from the edge of the water or steep banks to prevent hazardous situations during use and maintenance.

Shape pond banks by the intake to 3 horizontal to 1 vertical (3:1) slopes or flatter to prevent undercutting.

Any excavation along streams or ponds has a high potential for trench cave-ins. Most of these excavations will have water in the trench, creating unstable trench walls. If workers must enter the trench, Occupational Safety and Health Administration (OSHA) 1926, Excavation Regulations, shall be followed.

The dry hydrant should be thoroughly and completely tested at the pumping pressures for pressure strength and leakage while uncovered or only partly backfilled.

Dry hydrants are intended to give local fire departments water supplies to fight fires. The end user is the local fire department; therefore, it is necessary to involve them in the planning stages of these facilities. A pumping rate goal of 250 gallons per minute is recommended to meet anticipated future needs.

Sediment, debris, and low water may influence the value of intakes placed in streams. An installation in a stream should be treated as a special design consideration.

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. As a minimum, include the following items in the plans and specifications:

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

OPERATION AND MAINTENANCE

An operation and maintenance (O&M) plan shall be prepared for use by the landowner or operator responsible for dry hydrant installation. The plan shall provide specific instructions for the installation.

The [O&M plan sheet](#) can be used. Add site-specific recommendations as needed.

REFERENCES

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