

**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.

The installation of this practice will be compatible with the needs and equipment of the end user (e.g. local fire department).

CRITERIA

Design, construction and use of dry hydrants will comply with all federal, state and local laws.

Site Accessibility. Prior to construction, obtain a letter of approval to use the site from the landowner. 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. This rate requires 4000 cubic feet of useable water. The 50-year drought and freeze conditions and other water uses are considered as unavailable water. In Indiana, the 50-year drought and freeze conditions in lakes and ponds may be estimated to be 4 feet below the normal pool for areas north of U.S. Highway 40 and 3 feet below normal pool for areas south of U.S. Highway 40. The water elevation for design purposes will be below the drought and freeze requirements.

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

Conservation practice standards are reviewed periodically, and updated if needed. To obtain the current version of this standard, contact the Natural Resources Conservation Service State Office, or download it from the Field Office Technical Guide for your State.

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.

Shape pond banks to 2:1 or flatter to prevent undercutting.

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) 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 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. Plastic pipe will be schedule 40, SDR-26, or stronger. The depth at which the pipe is installed will be below the frost-free depth for the area (20 inches along the southern boundary and 52 inches along the northern boundary of Indiana)

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.

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.

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 between the holes in PVC pipe. 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 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° 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 acceptable to the local fire department for quick connect/release. Sleeve must be permanently affixed inside a PVC head using epoxy and stainless steel bolts.

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

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

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 the dry hydrant is installed, grade the site to provide surface drainage and vegetate or otherwise protect from erosion. Vegetation will be established according to Indiana (IN) Field Office Technical Guide (FOTG) standard Critical Area Planting (342).

Additional Criteria for Drafting Basin Type Installations

The minimum pipeline diameter is 8 inches.

The riser will be precast concrete manholes that meets the requirements of INDOT Standard Specifications Section 720 or other manufactured manholes that are appropriate for the required depth. The manhole will have a minimum diameter of 36 inches.

CONSIDERATIONS

Any excavated trench near a body of water has a potential for saturation and unstable walls. Consider all safety precautions during construction.

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 installing the hydrant to minimize air lock.

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.

The hydrant head is vulnerable to vehicle damage. Consider installing a steel post (recommend 3" 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 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, the access road must be completely separated 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. As a minimum, include the following items in the plans and specifications:

- 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:

1. 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.
2. 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.

3. Regularly clear the intake screen of excess aquatic growth that may limit full operation of the dry hydrant.

REFERENCES

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