

UNITED STATES DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE
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

General Criteria. All planned work shall comply with all Federal, State, and local laws and 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. Special care and maintenance will be required when debris and fine soil particles are part of the streambed. If streams are used, those with sand, gravel, or rock bottoms provide the best operating conditions.

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 a drought having an average

50-year (2.0 percent chance) recurrence interval. 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.

A 50-year frequency drought level would be the lowest water level in a pond, reservoir, or stream to be expected once in 50 years.

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.

Water supply. The adequacy of the water supply from impoundments shall be determined in accordance with appropriate local criteria. The adequacy of the water supply from impoundments shall be determined in accordance with Kentucky Engineering Technical Note Number 3. 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. Adequacy of pit type ponds shall be documented based on water budgets, long term water table depths, soil survey data, and experience.

Pipe. The pipe material may be iron, steel, or plastic. Pipe shall have watertight joints. Plastic

Conservation practice standards are reviewed periodically, and updated if needed. To obtain the current version of this standard, contact the Natural Resources Conservation Service.

pipe shall be Schedule 40, SDR-26, or stronger. 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.

Plastic pipe exposed to light shall be painted or otherwise protected from ultraviolet rays.

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 feet unless a special design, such as the slotted strainer, is used to prevent vortex. 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 impoundment's, 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.

To avoid a vortex or whirlpool during pumping, the top of the inlet pipe shall be at least 2.0 feet (1.0 ft. for slotted strainer) below the design water level (maximum drawdown level computed from the fifty year drought pool) unless a special design is prepared to prevent vortex.

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 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, line friction, elevation (static head), and hard rubber or flexible suction hose to the fire truck.

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 must be permanently affixed inside a PVC 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.

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-off, or quick-release, 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 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, or slots, shall not exceed 3/8-inch diameter/width. 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 ¼ inch to 3/8-inch diameter holes with a minimum of one hole diameter slot width between the holes/slots in the PVC pipe. Slots shall be ¼ to 3/8 inch wide cut circumferentially around the lower half of the pipe leaving a 1-inch rib along the center bottom of the pipe. Drill holes/slots 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.

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. The access road 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, and shall conform to NRCS conservation practice standard, Access Road, Code 560. The road surface and surface at the dry hydrant shall provide adequate support for heavy vehicles at all times of the year. 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. The access road must be acceptable to the local fire department. Visibility and sight distances should be considered when locating access roads and pull off areas.

Testing. Pipe joint sealants should be given a chance to cure before testing the piping system. A 24-hour time is recommended for PVC pipe. The local fire department shall perform an initial pump test at the design capacity after installation to confirm satisfactory operation. After the initial test, tests should be performed semi-annually. Careful attention should be given to silt, debris, or other interference that may limit the full operation of the hydrant.

Markings. The dry hydrant shall be clearly marked in a manner acceptable to the fire department. Use of reflective paint on signs and connection cap will help improve visibility during emergencies. Physical barriers may be needed to protect the above ground pipe system.

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 Critical Area Planting Standard and Specification Code 342.

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. Possible effects on surface and ground water of spilled fuels and lubricants by fire trucks using the dry hydrant.
4. 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.

The dry hydrant will have minimal effect on the water quality at the site and downstream due to its anticipated use and low volumes of water pumped when used.

The quality of the water may be impacted due to erosion during construction but should be minimal due to the short construction time. The quality of water could be impacted due to spilled fuels and lubricants by fire trucks using the dry hydrant but should be minimal due to anticipated infrequent use.

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.

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.

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.

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.

REFERENCES

ASTM D 2466
NRCS Conservation Practice Standards
Access Road, Code 560
Critical Area Planting, Code 342

**NATURAL RESOURCES CONSERVATION SERVICE
CONSTRUCTION SPECIFICATIONS**

DRY HYDRANT

Code 432

GENERAL

Site specific specifications shall be developed for each dry hydrant based on site conditions. The following items should be considered in developing the specifications.

SITE PREPARATION

The dry hydrant access area and pipe location shall be cleared to the extent needed for pipe installation. Clearing and brush removal for safe, line-of-sight to the road shall be included. Debris, logs, stumps, and other trash cleared from the site shall be burned, buried, removed from the site, or otherwise disposed of in a manner that does not interfere with pipe installation or vehicle access. All burning operations shall be in conformance with existing state and local regulations.

EXCAVATION

Excavation for placement of the dry hydrant pipe and riser shall be constructed by trenching or other approved methods. Excavation should begin at the water source and proceed toward the hydrant location. Trenches, having cuts greater than 5 feet shall be sloped to a stable slope above the 5-foot cuts or braced to avoid sidewall caving and to improve backfill compaction. Care must be taken during underwater excavation to avoid ridges and valleys in the bottom grade. The bottom grade shall be sloped toward the water source.

Excavation and shaping of the site shall facilitate and enhance easy on/off road access to the dry hydrant. Such excavation and shaping shall provide a nearly level, well-drained site which will also facilitate operation and maintenance activities.

FILL PLACEMENT

If suitable, the material excavated from the pipe trench, access area shaping, or other source may be used for pipe backfill and other site filling and shaping activities. The fill material used in the trench shall be free from all sod, roots, stones over 2 inches in diameter, frozen soil, and other objectionable material. Soil placed against plastic pipe shall be free of any isolated stones. A minimum of 2 feet of cover perpendicular to the slope is required. The soil surface shall be mounded over the pipe for settlement and to divert surface water away from the trench.

The pipe riser shall be anchored in place prior to fill placement. Backfill should start at the access road and proceed toward the water source.

Fill material above water level shall be placed in layers not exceeding 9 inches thick before compaction. Compaction around the pipe above water level shall be by hand tamping or by manually directed power tampers. The sides of the trench shall be scarified so that they will bond with the fill material and minimize settlement.

Loose, sandy material or pea size gravel should be used as backfill below water level to promote drainage and anchoring. Trench confinement and compaction will be accomplished in a manner that will force excess water from the fill material. Care must be taken so that loose soil in the water will not be pushed out over the intake screen.

CONSTRUCTION MATERIALS AND METHODS

Pipe materials shall be of the specified type, size, and length as shown on the drawings. Pipe connections shall be properly cleaned and cemented so that all connections are airtight.

The pipe shall be placed in the trench to design elevations and anchored in position ready for backfill. The purpose of anchoring is to hold the pipe riser in proper position, location, and elevation until all backfill operations are completed. Anchoring may be accomplished by tying pipe to stakes, concreting in place, or by tying and placing rounded pea-size or larger gravel around lower pipe elbow.

A support shall be provided for the intake screen to assure that it has at least 2.0 feet of clearance from the pond bottom or is below the stream bottom in a 2 feet deep by 4 feet wide gravel bed.

In ponds, the end of the pipe shall be supported by cement blocks, 1-inch diameter galvanized pipe-post and strap, or other permanent supports under the pipe. The pipe shall be adequately secured to the support with corrosion resistant material. Screens or strainers may also be covered with 12 inches of crushed rock or gravel.

For streams with bedload, the intake screen or strainer shall be anchored in a 2 to 4 foot deep by 4-foot wide bed of crushed stone or gravel located below the streambed. The inlet end of the screen or strainer shall be capped to prevent entry of silt and debris. The strainer must be buried deep enough to prevent scouring action of the stream from exposing the strainer and tearing it loose from the supply pipe.

Attach quick-connect couplers acceptable to and approved by the local fire department.

Minimum size pipe and fittings shall be 6-inch nominal inside diameter. All PVC components are to be Schedule 40, SDR 26, or stronger. Pipe shall conform to ASTM D 1785 or D 2241. Fittings shall conform to ASTM D 2466 or D 2467. Solvent cement shall conform to ASTM D 2564 - Tetrahydrofurnace (THF) primer and between 800-1000 centipoise viscosity cement. (Never use all-purpose cements to join PVC pipe and fittings).

All PVC pipe and fittings exposed to sunlight shall be primed and painted with a high-grade epoxy paint. The underwater support shall be concrete or non-corrosive metal. It shall be of sufficient design to support and stabilize the strainer inlet and to provide ease of adjustment.

ACCESS

Vehicle access to and from the dry hydrant shall be provided for fire truck and pumper units. Access shall be all weather and acceptable to the local fire department. Access roads shall be at least 14 feet wide for ease of movement by personnel and equipment during an emergency. When public roads are used for access, an all weather road surface adjacent to the dry hydrant and completely off the public road is recommended for safety of emergency personnel and the public.

TESTING

The fire department shall perform a pump test at the design capacity to confirm operation of the installation after the pipe has been backfilled and glue joints have sufficiently cured (24 hours minimum).

MARKINGS

The dry hydrant shall be clearly marked with appropriate sign(s) acceptable to the fire department. Use of reflective paint on signs and on the quick-connect cap will help improve visibility during emergencies. Letters and/or numbers should be 3-inches high with $\frac{1}{2}$ -inch stroke and be reflective. Physical barriers may be needed to protect the above ground pipe system.