

NATURAL RESOURCES CONSERVATION SERVICE
MONTANA CONSERVATION PRACTICE STANDARD

DRY HYDRANT (EACH)

CODE 432

DEFINITION

A non-pressurized permanent pipe assembly system installed into a **reliable** 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

It is required to involve the local fire department in planning, design, and construction of these structures.

Due to sediment, debris, and low water problems, hydrants placed in streams or rivers are NOT recommended, however when stream or rivers are the designated water source, the design shall address these concerns.

It is not the intent of this standard to repeat in detail, but to comply with the National Fire Protection Association (NFPA) 1142 (www.nfpa.org/aboutthecodes/AboutTheCodes.asp?DocNum=1142) standard on Water Supplies for Suburban and Rural Fire Fighting, specifically Appendix B, Water Supply. The placement technique in NFPA 1142, excavating from the riser to the water source, is the recommended technique.

The design criteria for dry hydrants on which insurance companies offer insurance premium discounts may be more stringent than those in NFPA 1142 or any listed in this standard. It is the responsibility of the landowner or operator to obtain and submit to the designer the required design criteria established by their insurance company.

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 stream bed.

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. 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.

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.

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

NOTE: This type of font (**AaBbCcDdEe 123..**) indicates NRCS National Standards.
This type of font (**AaBbCcDdEe 123..**) indicates Montana Supplement.

Water supply. The adequacy of the water supply from impoundments shall be determined in accordance to appropriate local criteria. The RESOP (**Reservoir Operations Study Computer Program, TR-19**) 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.

When site conditions do not allow the intake to be placed deep enough to meet this standard, or the water volume is limited, but the landowner is still interested in installing a dry hydrant, the limitations of the water supply shall be discussed with the landowner and local fire department.

If the landowner and the local fire department agree to a lesser minimum depth and/or volume, the limitations shall be documented in the operation and maintenance plan. In all cases, the minimum distance between the normal water level and the top of the water intake screen shall be 4 feet. The following statement shall be put on the engineering plan: *“This facility is designed to provide an emergency water supply during a fire. However, the pond depth and/or available water volume are not sufficient to meet the recommended usable depth of water source stated in Section B-5.3.2 of the National Fire Protection Association’s (NFPA) 1142 document. The available depth between the normal water level of the pond and the top of the intake screen for the facility is ____ feet, and this depth represents an estimated volume of ____ gallons.”*

Pipe. The pipe material may be iron, steel or plastic. Plastic pipe shall be schedule 40, SDR-26 or otherwise protected 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.

Know the material, size and designation of the manufacturer hydrant head before specifying the kind of pipe to be used for the system. The materials must be compatible in size and designation. PVC bell and spigot pipe with rubber gasket seals is not acceptable material. The

minimum pipe quality is Schedule 40 or SDR 26 PVC or equivalent.

Pipe Intake. The pipe intake depth shall be calculated from the design water elevation plus pipe diameter plus 2 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 **non-perforated portions of 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 below the design water level 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.

Place the hydrant head approximately 2 feet above the ground surface, but never higher than the intake of the pumper truck. Install a brace post 3 to 4 feet in front of the hydrant head on which to hang or mount the hose to bear the weight of the hard suction line between the pumper and the hydrant head. The weight of the hard suction line full of water can crack the standpipe, particularly during extremely cold weather. The brace post will also serve as a guard against accidental damage to the hydrant by vehicles or other equipment.

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 same metal as NHT connection for maximum corrosion resistance. **The hydrant head may not be tapped by screws for the purpose of mounting devices used to attach the cap to the hydrant head.**

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.

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. Drill holes shall be de-burred 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. 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. 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.

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 **Field Office Technical Guide (FOTG), Section IV, 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.

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

National Fire Protection Association (NFPA)
Standard on Water Supplies for Suburban and Rural Fire Fighting, NFPA 1142-2001.

ASTM D2466-06, Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40.