Recreation
Tech Tips

United States Department of Agriculture
Forest Service
Technology & Development Program
March 1991
2300 9123 1303

Update— Sanitary, Frostproof Hydrants for Recreation Sites

COLD WEATHER INSTALLATIONS

Most Forest Service recreation and administrative sites are located in areas where freezing weather occurs during a significant portion of the use season. Hydrants (water faucets) located outdoors can be damaged by the water freezing in the barrel of the hydrant. Some hydrants have been rendered "frostproof" by the installation of a drain that empties the water, remaining in the barrel, into the surrounding soil when the hydrant is turned off. Since the drain is open, it provides a route through which ground water, insects, and dirt can enter the barrel; possibly contaminating the water supply. In those cases where a simple standpipe is used—i.e., there are no means of draining the barrel—site managers have had to either leave the hydrant on (water flowing through a hydrant normally will not freeze), or shut off and drain the water system prior to the onset of freezing weather. Some of these actions are costly, inconvenient to the manager and the user, and dangerous to public health.

This ***Tech Tips*** provides the recreation and administrative site manager with updated information on available frostproof hydrants, how they operate, and what they cost. It replaces ***Equip Tips*** No. 7723 1302, May 1977. Three methods of frostproofing the hydrants were found back in 1977: Draining the water out of the barrel into the surrounding soil (fig. 1); draining the barrel into an internal reservoir (fig. 2); and heating the barrel with an immersion heater. (Of course, any pipe or hydrant can be made frostproof with the use of electrical heat tape.) Actually, there has been very little change in the technology of sanitary, frostproof hydrants in the intervening years.

AVAILABLE UNITS

In a recent market search, San Dimas Technology and Development Center (SDTDC) personnel identified five hydrants that appear to be sanitary and frostproof: American Foundry model 126-SC; Clayton Mark model 5441; Murdock model BFMH-175-SC; Woodford model MK 6B (formerly a Modern Kelly Corp. model); and

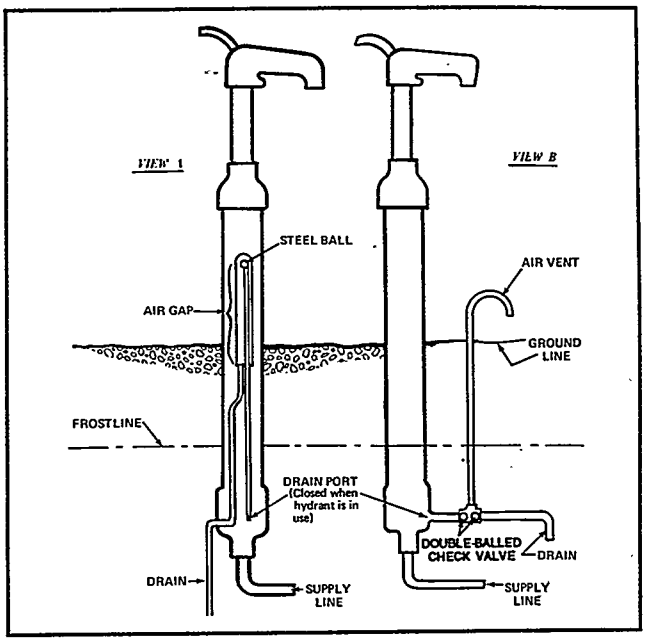

Figure 1. Hydrants that drain water in the barrel into the surrounding soil. (Clayton Mark model 5441, view A; Murdock model BFHM-175-SC and Woodford model MK 6B, view B.)

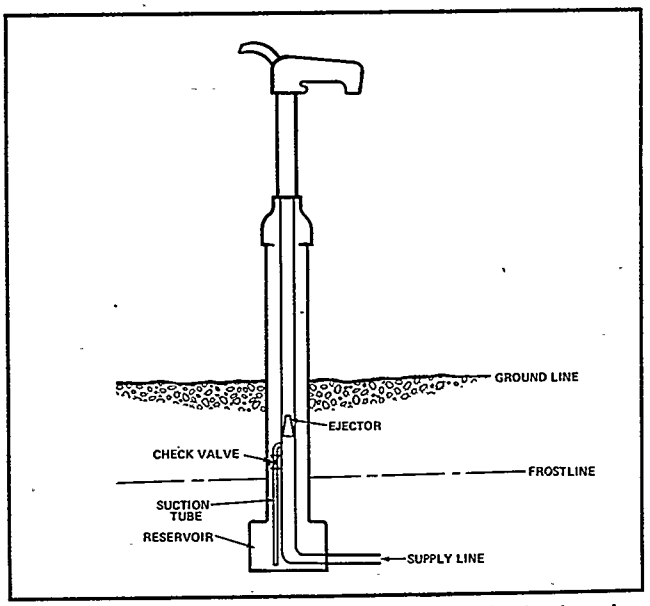

Figure 2. Hydrant that drains the water in the barrel into an internal reservoir. (American Foundry model 126-SC and Woodford model S1.)

Woodford model S1 (formerly a White Water Mfg. model). Some of these manufacturers have other frostproof models with more specialized applications; however, they were not included due to their cost and special application beyond the general scope of this ***Tech Tips.***

Manufacturer and Cost Data

The manufacturer and the cost data for each hydrant are shown in the table that follows. (*NOTE*: The manufacturers should be contacted for additional information on installation, plumbing specifications, current prices, and replacement parts.)

Manufacturer	Model	Cost ($) [1] Bury Depth 2-ft	4-ft	6-ft	Fig. No.
American Foundry & Mfg. Co. 920 Palm St. St. Louis, MO 63147 314/231-6114	126-SC [2]	475.00	575.00 [3]	575.00	3
Clayton Mark, Inc. 1203 N. 6th St. Rogers, AR 72756 501/636-1800	5441	502.46	549.49	581.62	4
Murdock, Inc. 2488 River Rd. Cincinnati, OH 45201 513/471-7700	BFHM-175-SC [2]	356.00	367.00	379.00	5
Woodford Mfg. Co. P.O. Box 888 Colorado Springs, CO 80901 719/574-1101	MK 6B [2] [4]	76.00	84.00	92.00	6
Woodford Mfg. Co. P.O. Box 888 Colorado Springs, CO 80901 719/574-1101	S1 [2]	438.55	473.40	509.25	7

[1] These are manufacturer's suggested list prices for 1990 and are subject to change without notice. The prices may not reflect special discounts allowed for Government purchases or large quantity orders.
[2] Self-closing valve.
[3] Hydrant is available in two bury depths, 1.5- to 3.5-ft and 4- to 7-ft.
[4] Must be used with a "anti-vermin" backwater valve. This item is included in the prices listed.

Technical Data—Models That Drain Into Soil

The Clayton Mark model 5441 (fig. 1, view A); Murdock model BFHM-175-SC (fig. 1, view B); and Woodford model MK 6B (fig. 1, view B) units allow the water to drain into the surrounding soil. The Clayton Mark and Woodford hydrants incorporate one or two stainless steel balls, plus some type of syphon-breaker, to prevent the entry of contaminated water and insects into the hydrants. The Murdock hydrant uses Teflon balls instead of stainless steel. The various balls provide extra protection in the event the water level around a hydrant were to rise above the drain. The pressure of the exterior water on the balls tends to force them securely against their seats.

A concern with these units is that the balls could lose their seal due to (a) accumulation of material on them or (b) deterioration of either the Neoprene collar on which the steel ball rides (in the case of Clayton Mark 5441) or the brass fittings (in the case of Woodford MK 6B). According to the manufacturer, the Teflon balls used on the Murdock hydrant seats better against back pressure, and the 0 percent absorption rate of Teflon does not provide a surface for the growth of bacteria.

When the hydrants are installed, visual inspection of the ball and seal is impossible without removing the units (check valves) from the ground. To date, no Forest Service approved method for testing the integrity of the seals has been developed. Until the effectiveness of the backflow prevention device can be conveniently checked, the possibility of water contamination (cross connection) must be considered when using this type of hydrant.

Technical Data—Models That Drain Internally

On both the American Foundry model 126-SC and the Woodford model S1, there is no drain to the outside. The water in the barrel drains into a reservoir built into the hydrant and installed below the frostline. When the handle is turned on, the water is evacuated from the reservoir by the flow of the supply water passing by an ejector plumbed into the supply line within the barrel.

The self-contained reservoir method of frostproofing hydrants appears to have merit; however, certain problems could arise. (*NOTE:* Frequent monitoring of hydrant performance is recommended in those sites where water quality is known to be poor; i.e., highly mineralized, recurring iron bacteria, excessive sedimentation, etc.). It takes about 6 to 13 sec of full flow to evacuate the reservoir of the American model 126-SC, and 6 to 9 sec for the Woodford model S1. The reservoirs are not completely evacuated when small amounts of water are drawn off. However, hydrant use in recreational sites normally provides adequate recharge or exchange of water in the hydrant reservoir.

A potential problem does exist, however, if the water quality at a site is poor and the hydrant receives little or no use for an extended period of time (i.e., one season or 1 year). Bacterial growth can develop in the reservoir and result in stagnated water. This is important to keep in mind if the water system is shut down for repairs and recharged some time later. There is no simple method of completely removing water from the internal reservoir once water has passed through the hydrant. If the site has poor water quality, there is also the potential of the ejector valve malfunctioning and preventing the complete evacuation of the reservoir. An indication of a functioning ejector valve is the appearance of bubbles in the water when the hydrant is turned on. When the hydrant is turned off, water should be heard rapidly draining out of the barrel and into the reservoir.

An indication that an ejector valve is malfunctioning is either a barrel that drains slowly when the hydrant is turned off or the instantaneous flow of water out the spout when the hydrant is turned on. To date, there have not been any reported cases to support the occurrence of these problems; however, the potential for their existence should be kept in mind when conducting field inspections or selecting these types of hydrants—specifically at sites where water quality is questionable.

Technical Data—Leakage Problems

Inspection of several hydrants (Clayton Mark model 5441 and Woodford model MK 6B) installed 7- to 10-yr ago showed the presence of water leaks around the rod bushing/packing. These leaks signify the presence of a possible entry point for contaminants (i.e., bacteria, bird feces, dirt) if the bushing seals are allowed to deteriorate. This suggests the seals need to be inspected frequently and the repair or replacement of the seals must be made when necessary. The American Foundry, Murdock, and Woodford (model S1) hydrants have a shroud enclosing the handle to rod linkage. This shrouded design helps reduce the possibility of exposure to contaminants. However, wear between the operating rod and packing seals may eventually cause leaks to develop. The wear is unavoidable, but on the shrouded designs (such as the Woodford model S1), forces on the rod stem are vertical and result in very little lateral pressure against the bushing.

ACCESSIBILITY

The aging American population and the enactment of new laws securing the rights of people with disabilities emphasizes the need to make all facilities accessible to all people. The Uniform Federal Accessibility Standards (UFAS) were written to be used as a guide for making facilities accessible. The UFAS criteria for accessible controls and mechanisms require that they be operable with one hand and not require grasping, pinching, or twisting of the wrist. The force required to activate the control shall be no greater than 5 lb.

Of the five sanitary frostproof hydrants reported here, one—the Woodford model S1, which requires 2- to 3-lb of force—meets this standard. (*NOTE:* The Murdock hydrant can be adapted with lighter spring tension to meet this standard; however, the modification may not be compatible with some water systems as the hydrant will require reduced service line pressure. The installation of pressure regulators or flow restraints in the water line can overcome this problem. The manufacturer requests they be contacted for further information on specific applications.)

For additional information contact: Recreation Program Leader, San Dimas Technology & Development Center, 444 E. Bonita Ave., San Dimas, CA 91773 Phone: 714-599-1267; FTS: 793-8215; FAX: 714-592-2309; DG: WO7A

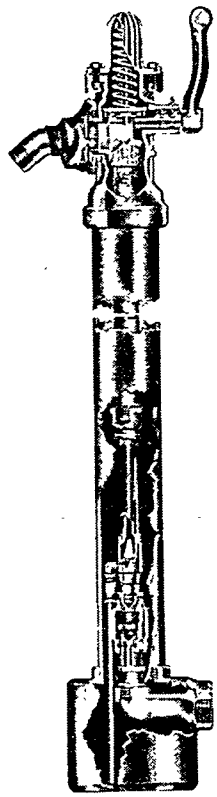

Figure 3. American Foundry model 126-SC.

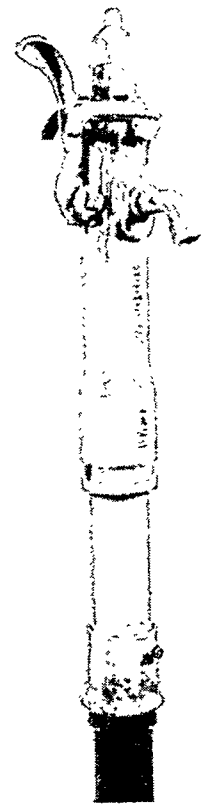

Figure 5. Murdock model BFHM-175-SC. Included in this unit is a vacuum breaker permanently attached to the spout and a double-ball check valve attached to the drain (both not shown).

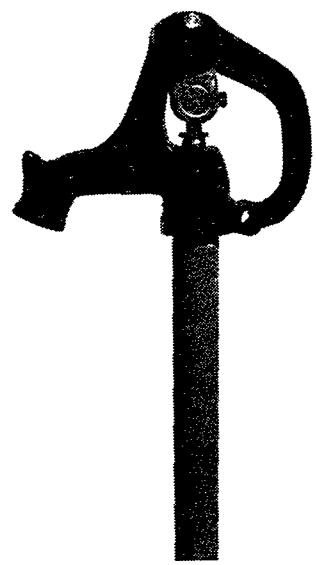

Figure 4. Clayton Mark model 5441.

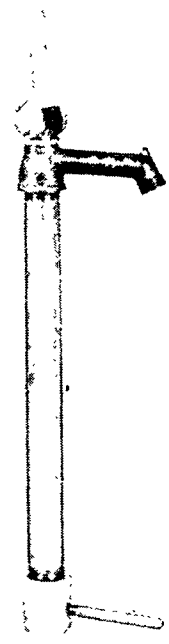

Figure 6. Woodford (formerly Modern Kelly) model MK 6B. This hydrant includes a "anti-vermin," double-ball check valve (not shown).

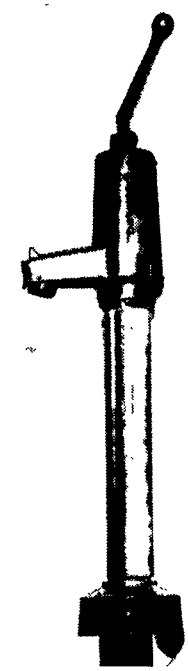

Figure 7. Woodford (formerly White Water) model S1