By Greg Metz, KRWA Circuit Rider

Fire Hydrant Maintenance Best Practices

Fire hydrants are so commonplace that they barely register in the public's perception. But if hydrants are not properly maintained, they could be useless in an emergency.

Many essential tasks for good maintenance of fire hydrants require the attention of water system staff – and fire officials. Regular testing and inspection of hydrants help ensure good operability of hydrants. That helps maintain a favorable rating from the fire department and insurance providers and adds to the community's perception of good preparedness.

The NFPA Standard . . .

The National Fire Prevention Association (NFPA) is a global, non-profit organization that promotes safety standards, education, training, and advocacy on fire and electrical-related hazards. Established in 1896 as a way to standardize the use of fire sprinkler systems, the NFPA's scope grew to include building design, rescue response, electrical codes, and other safety concerns.

The Fire Extinguisher Guide recommends that "fire hydrants shall be provided for detached one- and two-family dwellings in accordance with both of the following: 1) The maximum distance to a fire hydrant from the closest point on the building shall not exceed 600 feet; and, 2) the maximum distance between fire hydrants shall not exceed 800 feet.

NFPA 291 Guidance (2022 edition) recommends that fire hydrant flow tests be performed every five years and fire hydrant inspections be performed annually.

Earlier water supplies for firefighting had to be kept in buckets and cauldrons ready for use by "bucket-brigades" or brought with a horse-drawn fire pump. From the 16th Century, as wooden mains water systems were installed, firefighters would dig down to the pipes and drill a hole for water to fill a "wet well" for the buckets or pumps. This had to be filled and plugged afterwards. That is the origin of the terminology "fire plug".

In those early days, a marker would be left to indicate where a "plug" had already been drilled to enable firefighters to find ready-drilled holes. Later wooden systems had pre-drilled holes and plugs.

When cast iron pipes replaced wooden pipelines, permanent

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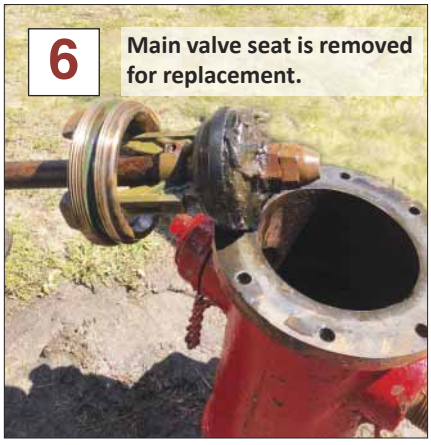
Pressure testing fire hydrant with bleed valve.

Painted puppy dog hydrant with Red top indicating less than 500 GPM flow.



[1] Misachi, J. (2018, May 17). Who invented the fire hydrant? WorldAtlas. Retrieved October 1, 2022, from https://www.worldatlas.com/articles/who-invented-the-fire-hydrant.html

Orange ring under cap indicating a flow of 500 to 999 GPM

This hydrant was buried too high. It was hit by a truck; shifting the lower barrel. It did not break away because it hit the flange.

Hydrant buried too low.

Hydrants should be flow tested at least every five years. If there is concern about stirring the water in the main lines up, flush enough to clear out discolored water from the barrel and supply line.

underground access points were included for the firefighters. Some countries provide access covers to these points. In contrast, others attach fixed above-ground hydrants. According to "justia pattens", the first cast iron hydrants were patented in 1801 by Frederick Graff, then chief engineer of the Philadelphia Water Works. Invention since then has targeted problems such as tampering, freezing, connection, reliability etc.[1]

There are presently eight major fire hydrant manufacturers that are most commonly used in the U.S.

There are two types of hydrants: 1) wet barrel; and, 2) dry barrel. The dry barrel is what is used n Kansas. It has the main valve below ground. Drain holes valve drain the water out of the barrel when not in use. Wet barrels are commonly used in warmer climates where freezing is not a problem.

Proper maintenance is necessary for any waterworks device buried in the ground for long periods such as fifty or more years. But unlike many of other appurtenances, a fire hydrant that does not work when required can have grave consequences. Too often, due to the lack of staff, fire hydrant maintenance is neglected in smaller communities.

The best way to keep a fire hydrant in working order is to have a minimum annual testing and maintenance program. A good fire hydrant maintenance program should include the following.

Exercising, lubrication and flushing

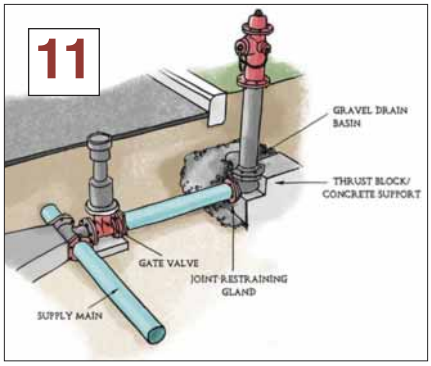
Exercising a fire hydrant will ensure the hydrant will work properly when needed. It is a good practice to exercise the main valve on the feed line at the same time, if it has one. The caps and outlet nozzles should be inspected. Over time, corrosion can make nozzle caps difficult to remove. Remove caps during each inspection and clean them. Adding food-grade lubrication or anti-seize to the nozzle and cap threads can help because of less effort in the future. I have seen nozzle caps stuck so bad they would not have been operable in an emergency. After exercising the hydrant, check it to ensure it is properly draining. This is especially important in cold climates. A high water table or clogged drain holes can cause water to accumulate in the fire hydrant. This accumulated water can freeze, causing damage to the hydrant. This inspection can be done after flushing by holding your hand over the exposed nozzle to feel for small amounts of suction. This signals that the fire hydrant is draining correctly. Some fire hydrants in areas with a higher water table may have plugged drains. These need to be pumped after use. A plumb bob can be lowered down the nozzle outlet to see if the water level drains adequately. A well sounder will also serve this purpose.

The lubrication of the fire hydrant differs with the brand. Fire hydrants are typically greased or oil-filled. Without proper lubrication, corrosion can occur, making the hydrant difficult or, in some cases, impossible to operate. Follow the manufacturer's instructions on

It is a good practice to flush the hydrant to clear any debris in the feed line. KRWA staff members have seen many issues with large objects in the lines and obstructing the flow of hydrants. Hydrants should be flow tested at least every five (5) years. If there is concern about stirring the water

Hydrant would probably break away but it would be difficult to repair without digging it out.

in the main lines up, flush enough to clear out discolored water from the barrel and supply line. Open the hydrant only a few turns for a short time to clear the hydrant before pressure testing. Always be aware of flow direction when flushing and use a diffuser when necessary not to cause unnecessary damage to yards or landscaping. See photo 5.



Common proper fire hydrant installation graphic.

Pressure testing and checking for leaks

A fire hydrant can be pressurized to inspect for leaks. This is achieved by removing a hydrant cap and operating the hydrant for a few turns. Another way I like to do it is to install a cap with a small valve to let the air escape with a pressure gauge. See photo 3.

Allow the hydrant barrel to fill until a small amount of water comes out of the nozzle. This allows for as much air to escape as possible. Replace the cap and fully open the hydrant. With the hydrant pressurized and all visible

Bury depth marking on a fire hydrant.

joints can be inspected for leaks. A leaking hydrant can cause many issues, including soil erosion in areas with poor drainage, accelerated corrosion, and groundwater contamination. During the inspection, double check that the breakaway devices are not damaged. Depending on the age and type of the fire hydrant, this feature could be breakaway flanges or breakaway bolts. Some fire hydrant models do not have a breakaway design. It is also important to inspect the fire hydrant surroundings. Make sure there are no obstructions hiding the fire hydrant, like bushes or debris, from firefighters. Homeowners sometimes landscape around the hydrants to hide it from their view or with the best intentions of beautifying, but with no maintenance, it can quickly become difficult to find.

Bury depth of the fire hydrant

Most fire hydrants have a bury depth marked on them. See photo 12. This is very important to monitor. A fire hydrant that has the incorrect height above the groundline can result with serious consequences if hit by a vehicle. A hydrant buried too low can result with the hydrant not breaking as designed, and to minimize damage to the water system and to what collided

with the hydrant. See photo 9. Most all fire hydrants are designed to break at a specific point and then be able to be repaired at a minimal cost. A hydrant that is set too high may allow for a vehicle to impact the lower barrel. Improper fire hydrant height can cause not only more damage to the vehicle during a collision but also damage water piping systems. See photos 8 and 11. A fire hydrant should be buried so the breakaway flange is just above the ground, allowing room to get a wrench on the bottom bolts. This hydrant shown in the nearby photo would have to be dug out around the flange to work on it. See photo 10.

Colors – what do they signify?

I have seen all sorts of different paint jobs on fire hydrants. See photo 4. Although there is nothing wrong with this it should have a marking of what flow it is capable of. There are many options like this one, for example, just an orange ring under one of the caps. See photo 7.

NFPA code 291 is designed so that any firefighter can go anywhere in the United States and know how much water they should expect from a particular fire hydrant based on its color.

Colors are guidelines – not law

Unfortunately, this code is only a guideline and not the law. This means that the agency or service that maintains fire hydrants in each district is not required to paint them in this manner. In fact, it is estimated that only half of districts paint hydrants according to the code. Any hydrant that is not operational or no potable should be covered and or marked properly.

Hydrant Class	Color	Gallons per Minute (GPM)
Class AA	Blue	1500 or more
Class A	Green	1000–1499
Class B	Orange	500–999
Class C	Red	Less than 500

Purple is the color for non-potable but I would also make sure it is signed.

Maintain good records!

Record keeping can impact the Insurance Service Organization (ISO) rating in your city. A good rating can help reduce fire insurance costs. A municipality must know which hydrants have been repaired/inspected or need to be repaired/inspected or be replaced. This is an essential part of any maintenance and inspection program. It is also imperative that any issue discovered during an inspection is repaired promptly.

No shortcuts to safety

Firefighters need to access fire hydrants quickly. The delay can be catastrophic if their wrenches and hoses do not fit. Municipalities also need to ensure that when buying new hydrants, they have the similar threads and operating nut size as other hydrants in the area. Hydrants with stainless steel components will last longer and are better protected against corrosive soil (hot soil). Proper thrust blocking and installation of a drain field will also help with the performance and longevity of the hydrant.

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No shortcuts should be taken when it comes to maintaining fire hydrants because they have a critical function and need to perform at a moment's notice. Still, the most common cause of failure is the lack of a proactive preventative maintenance program. Municipal crews with solid maintenance programs will have fewer repairs and more reliable hydrants.

Generally speaking, the mechanics of fire hydrants have not changed that much, so once an operator has a good grasp of the basics, the operator will be set for a long time. Most manufacturers have a step-by-step document that walks operators through their model's fire hydrant maintenance and inspection. Also, the "AWWA M17: Installation, Field Testing, and Maintenance of Fire Hydrants" is an excellent resource, It can be found on their website www.awwa.org.

Greg Metz joined KRWA as a Technical Assistant in July 2009. He previously worked at the city of Washington for 13 years where he was involved in city utilities including the power plant, streets, water and wastewater. Greg holds a Class II Water Operator and a Class I Wastewater Operator Certification.