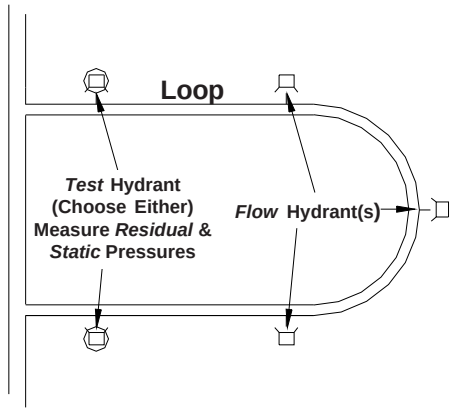
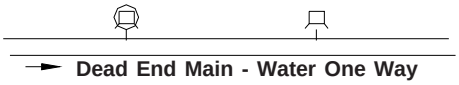
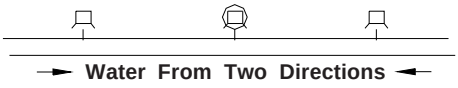
AKRON®
BRASS COMPANY

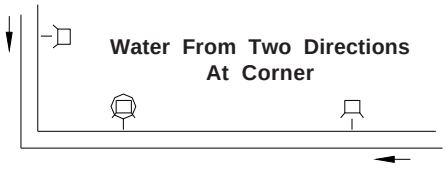
AHTK-25 OPERATING INSTRUCTIONS

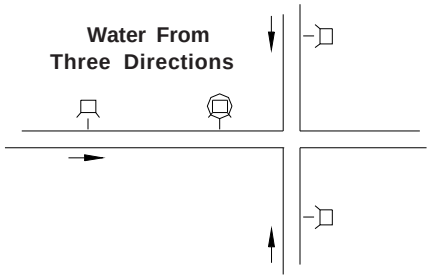
NOTE: The Hydrant in the circle is the test Hydrant. *Residual* and *Static* pressures are measured here.











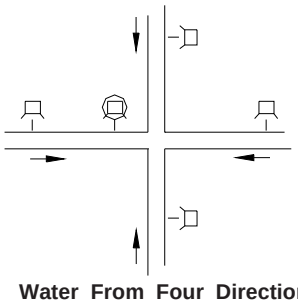


Figure 1

FLOW TEST PROCEDURES

When testing the available water supply, the number of hydrants to be opened will depend upon an estimate of the flow that may be available in the area; a very strong probable flow requires several hydrants to be opened for a more accurate test. Enough hydrants should be opened to drop the ***Static*** pressure by at least 10 psi (70 kPa); however, if more accurate results are required, the pressure drop should be the ***(Residual*** pressure) as close as possible to 20 psi (138 kPa). The flow available at 20 psi (138 kPa) can be determined by dropping the ***Residual*** pressure to exactly 20 psi (138 kPa) or can be determined at any ***Residual*** pressure by graphical analysis, or by formula calculations.

Another problem that might be encountered is that water mains may contain such low pressures that no flow pressure will register on the pitot gauge. If this is the case, straight stream nozzles with smaller than 2-1/2" (65 mm) orifices must be placed on the hydrant outlet to increase the flow velocity to a point where the velocity pressure is measurable. It must be noted that these straight stream nozzles will require an adjustment in the water flow calculation that must include the smaller diameter of the nozzle tip and its respective coefficient of friction.

Flow test are sometimes conducted in areas very close to the base of an elevated water storage tank or stand pipe and the results in flows that are quite large in gallons per minute (L/min). It should be realized that such large flows can only be sustained as long as there is sufficient water in the elevated tank or stand pipe. It is advisable to make an additional flow test with the tank or stand pipe shut off. The flow obtained from this second test is the quantity available when the tank or stand pipe has been depleted.

The ***Residual*** pressure and the ***Static*** pressure during a flow test should be taken from a fire hydrant that is located as close as possible to the location requiring the test results. This hydrant is commonly called the "***Test***" hydrant. The "***Flow***" hydrants are those where pitot reading are taken to find their individual flows, then added together to find the total flow during the test.

Six arrangements by which fire hydrants in an area can be selected for a flow test are shown on the left side of this page. The illustration (Figure 1) shows the location of the ***Test*** hydrants relative to the ***Flow*** hydrants with different hydrant and water main configurations. In general, when flowing a single hydrant, the ***Test*** hydrant should be between the ***Flow*** hydrant and the water supply source. That is, the ***Flow*** hydrant should be down stream from the ***Test*** hydrant. When flowing multiple hydrants, the ***Test*** hydrant should be centrally located relative to the ***Flow*** hydrant.

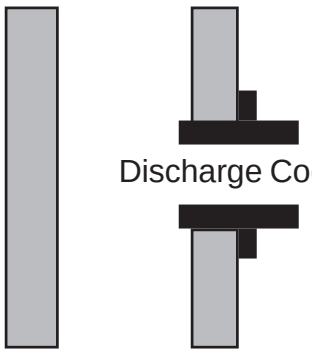
HYDRANT FLUSHING

Flushing a hydrant removes any accumulated sediment in the barrel and the valve. It is recommended that each hydrant in the system be flushed annually along with the regular inspection and maintenance. In all cases, the annual inspection and maintenance must be done before flushing.

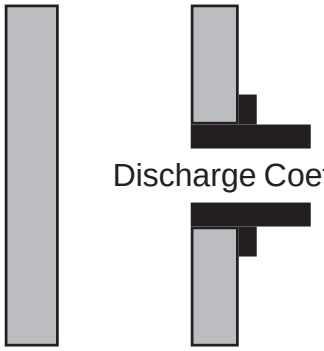
1- Contact the appropriate Water Department personal and inform them that a test is about to take place.
2- Prepare to flush hydrant. Decide if you will need a diffuser to prevent washout around the hydrant or to protect landscaping or other areas.
   a- Akron Brass 2-1/2" diffuser for attaching directly to hydrant nozzle.
   b- Akron Brass 2-1/2" Street-T diffuser or the Akron Brass 4-1/2" Street-T diffuser

   Attach diffuser to hydrant or length of hose for the Street-T diffuser.
3- Open the hydrant very slowly until it's fully open.
4- Let water flow for a minimum of 3 minutes or until water is clear. Flush only one hydrant at a time.
5- Shut the hydrant down, again very slowly.
6- Prepare to flow test, before replacing cap(s).

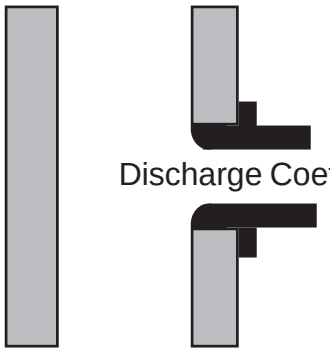
Shown are three types of hydrant discharges or outlets and their respective discharge coefficients.



Discharge Coefficient = .70



Discharge Coefficient = .80



Discharge Coefficient = .90

Figure 2

Nozzles have discharge coefficients. Some common ones are listed:

Akron Brass HYDRANT KIT	**0.84**
Short Playpipe	**0.96**
Smooth Bore Nozzle, General	**0.96-0.98**
Underwriter Playpipe	**0.97**
Deluge or Monitor Nozzle	**0.99**
Short Shut-Off Nozzle	**0.90**
Standard 1/2" Sprinkler Head	**0.75**

SETUP & FLOW

1- Decide which hydrant will be the ***Test*** hydrant and which will be your ***Flow*** hydrant. The ***Test*** hydrant will be used to measure both ***Static*** and ***Residual*** pressures. It should be closer to a feed main than the ***Flow*** hydrant.

2- Decide how many ***Flow*** hydrants to use. As a general rule of thumb, you should flow enough hydrants at the same time so that the ***Residual*** pressure drops at least 10% from the ***Static*** pressure but never allow the ***Test*** hydrant to go below 20 psi (138 kPa).

3- Contact the appropriate Water Department personal and inform them that a test is about to take place.

4- Locate and perform the following on the Test hydrant:
   a- Flush hydrant. (See FLUSHING HYDRANTS section)
   b- Install Akron Brass cap gauge with petcock open to allow air to escape.
   c- Open hydrant slowly and fully and after you have a steady stream of water from the petcock, close it.
   d- Read and record the ***Static*** pressure.

5- Locate and perform the following on the ***Flow*** hydrant.

6- Record the inside diameter of the nozzle which will be flowed; generally one of the 2-1/2" nozzles. Insert your hand into the nozzle opening and feel the entrance shoulder to determine the nozzle coefficient. (See Figure 2)

7- Flush hydrant. (See FLUSHING HYDRANTS section)

8- Install Akron Brass Hydrant Flow Test Kit on the nozzle and or have your Akron Brass Hand Held Pitot ready to get your pitot reading. You will only have this hydrant open long enough to get your Pitot reading and Residual reading for the ***Test*** hydrant. Record all readings.

COMPUTING HYDRANT FLOW:

The easiest way to determine how much water is flowing from the hydrant outlet(s) is to refer to prepared tables for nozzle discharge. These tables have been computed by using a formula for gallons per minute (L/min) flow, when the flow pressure is known.

THE FORMULA MAY BE STATED AS FOLLOWS:

Flow rate is equal to a constant, multiplied by the coefficient of discharge, multiplied by the diameter of the orifice-squared, by the square root of the pressure.

THE FORMULA IS WRITTEN AS FOLLOWS:

GPM $Q_r = 29.83 \times C_d \times D^2 \times \sqrt{P_p}$

L/min $Q_r = 0.0667766 \times C_d \times D^2 \times \sqrt{P_p}$

$$Q_f = Q_r \left[\frac{P_s - 20}{P_s - P_r} \right]^{0.54}$$

WHERE:

29.83 or (0.0667766) are constants.

"C_d" is the friction loss coefficient ***(usually 0.90 for a smooth 2-1/2" opening)***

"D" is the actual diameter (measured) of the hydrant or nozzle in inches (mm)

"P_p" is the ***Pitot*** pressure reading in PSI (kPa)

"Q_f" is the ***Fire Flow*** in GPM (L/min) **(Total System Flow)**

"Q_r" is the ***Fire Flow*** in GPM (L/min) **(Individual Hydrant Flow)**

"P_s" is the ***Static*** pressure in PSI (kPa)

"P_r" is the ***Residual*** pressure in PSI (kPa)