

## FIRE PROTECTION WATER SUPPLIES

Any facility or building constructed in a jurisdiction that has adopted the IFC requires a fire protection system water supply capable of delivering the required fire flow for manual firefighting operations. The source of the water supply can be a public water distribution system, an underground well supplied from a fire pump, a water storage tank, a reservoir, or private fire service mains connected to a public water system. [Ref. 507.1]

Fire flow is defined in IFC Appendix B as *the flow rate of a water supply, measured at 20 pounds per square inch (psi) residual pressure that is available for firefighting*. The acceptable method used to determine fire flow rests with the fire code official. Many jurisdictions chose to adopt IFC Appendix B because it specifies the required fire flow based on the building's height, area, and construction type. The jurisdiction may use the fire flow methods developed by the National Fire Academy or Iowa State University. In rural jurisdictions where a conventional water supply system is unavailable, Appendix B permits the fire code official to use mobile tankers as the mechanism for water supply delivery provided the tankers and the delivery mechanism complies with the *International Wildland-Urban Interface Code* or NFPA 1142, *Standard on Water Supplies for Suburban and Rural Firefighting*. [Ref. 507.3, B103.3]

When a municipal or private water supply system is the source for fire flow, a flow test is performed to demonstrate that the system is capable satisfying the water supply. A flow test uses a test fire hydrant and a flow fire hydrant to measure the static pressure and residual pressure of the water supply system as well as the available flow rate, expressed in gallons/minute (GPM). (See Figure 5-8) Static pressure is the available pressure of the water supply system with the water at rest. The static pressure can be developed by water pumps or the pressure of water in elevated tanks. Residual pressure is the available pressure when water is discharged from the flowing fire hydrant. The residual pressure is measured at the same time water is flowing from the flow hydrant. These three values are used to calculate the available fire flow. The IFC requires the fire flow be calculated at a residual pressure of 20 PSIG. 20 PSIG is the lowest residual pressure allowed by many state health departments and water regulatory authorities. Pressures below this value introduce the possibility of a water main collapse or worse, backflow of untreated sewage or wastewater into the potable water supply. [Ref. 507.4]

Fire protection water supplies are commonly supplied from private hydrants and private fire service mains are constructed on private property to supply the required fire flow. The IFC requires the construction of private fire protection water mains be in accordance with NFPA 24, *Standard for Fire Service Water Mains*. A building must be located within 400 feet of a fire hydrant on a fire apparatus access road. The distance is measured along an approved route using the same method prescribed by the fire code for locating buildings in relation to fire apparatus access roads. The distance is measured using a



**FIGURE 5-8** Flow testing of a fire hydrant to determine its available water supply

### Code Basics

The static pressure, residual pressure, and flow rate (measured in gallons/minute) are required to determine the fire flow. Fire flow is calculated at a residual pressure of 20 PSIG. ●

path that fire apparatus will unload water supply hoses on the roadway instead of a straight line measurement from the fire hydrant to the building. When a building is protected by an automatic sprinkler system installed in accordance with NFPA 13 or NFPA 13R, the fire code official can increase the distance requirement to 600 feet. For Group R-3 and U occupancies, the travel distance is also 600 feet. [Ref. 507.5.1]

A fire protection water supply system requires annual maintenance to ensure the system will deliver the required fire flow. (See Figure 5-9) The IFC references the requirements in NFPA 25, *Standard for the Maintenance of Water-Based Fire Protection Systems* and specifies the following frequencies for inspection, testing, and maintenance:

- Private fire hydrants: annual flow test and maintenance
- Private fire protection water mains: a flow test every 5 years
- Strainers installed in private fire protection water mains: inspection and maintenance after each use. [Ref. 507.5.3]

To ensure that fire hydrants are always accessible, the IFC prohibits their obstruction and requires a minimum 3-foot clearance around their circumference. When a fire hydrant is located in an area subject to impact by motor vehicles, a means of vehicle impact protection complying with the IFC is required. (See Figure 5-10) [Ref. 507.5.5 and 507.5.6]



**FIGURE 5-9** Flushing of a private fire hydrant to remove and discharge any sediment or debris in the private fire protection water main



**FIGURE 5-10** A fire hydrant with vehicle impact protection