

U.S. Fire Administration / National Fire Academy

# Coffee Break Training

## Topic: Fire Pump Suction Line Considerations

**Learning objective:** The student shall be able to describe the potential effect of valves, fittings, and other impairments on fire pump suction lines.

**F**ire pumps play an important role in fire protection. They boost pressure for sprinkler, water mist, water spray, and standpipe systems, and may serve as the sole water delivery means from static water supplies such as ponds, reservoirs, or tanks.

The pump intake, or suction line, must be carefully designed to provide adequate flow and avoid excessive turbulence in incoming water supplies. Turbulence can cause dangerous cavitation and overheating that destroys the pump.

The installer's goal is to create laminar flow in the suction side of the pump, a smooth homogeneous water flow without excessive turbulence or entrained air. To minimize these disruptions, there should be no valves or equipment other than an outside stem and yoke (OS&Y) on the suction line. Check valves are permitted when they are required by the authority having jurisdiction (AHJ) or when multiple pumps are installed in series, such as in a highrise building.



The strainer shown at the far right-hand side of the picture constitutes a potential water supply impairment that could cause excessive turbulence. To minimize its influence and to allow the water stream to return to a laminar flow after passing through the strainer, obstructions like this must be installed at least 10 “pipe diameters” upstream of the pump intake. (Note the suction gauge on the pump intake immediately to the left of the OS&Y valve.) In this example, the suction pipe is 4 inches in diameter, so the strainer must be at least 40 inches ahead of the pump intake.

For additional information, refer to NFPA 20, *Standard for the Installation of Stationary Pumps for Fire Protection*, and the Hydraulic Institute at [www.pumps.org](http://www.pumps.org).