



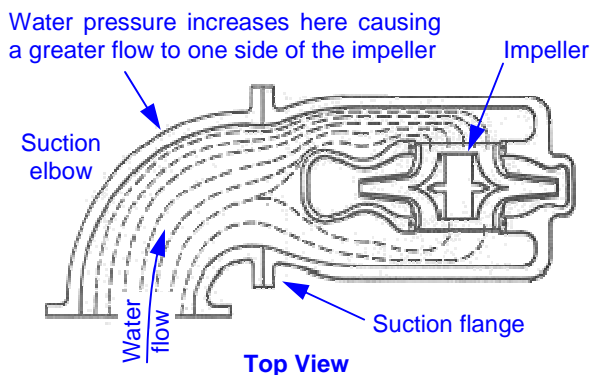
# QUICK RESPONSE

Saving life and property through effective licensing, plan review, and inspection of fire protection systems.

June 2008

## FIRE PUMPS – SUCTION PIPING ARRANGMENT

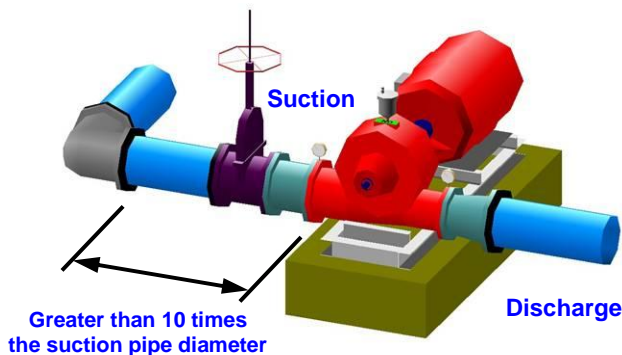
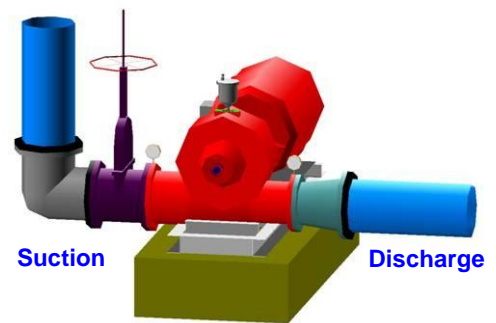
Horizontal turns into a horizontal fire pump are problematic. It is important that the water entering a horizontal fire pump load the fire pump impeller evenly. As water goes around a turn, momentum



pushes the water to one side. If the water entering the suction flange does not even out, more water will push to one side of the impeller. The extra load of that water will cause the impeller to spin out of balance and damage the pump. The figure to the left is a plan view section showing the unbalanced loading of a double suction impeller due to uneven flow through an elbow adjacent to the pump. It is extremely important that turbulence and changes in water flow direction are carefully controlled close to the pump suction flange.

The ideal arrangement is when the water flows directly into the pump suction flange. This direct entry minimizes the turbulence of the water and allows the impeller to load evenly. Unfortunately, it is not uncommon that the water supply does not line up directly with the pump suction flange. This requires alternative piping arrangements.

Vertical changes in direction do create some turbulence. However the region of instability is in the vertical plane thus having no effect on the loading of the fire pump impeller. As the water goes into the impeller it crosses evenly across the horizontal axis of the impeller. **NFPA 20 - Standard for the Installation of Stationary Pumps for Fire Protection**, allows vertical direction changes directly on the suction flange of a horizontal fire pump.



As stated earlier, horizontal turns into a horizontal fire pump are problematic. To allow the water flow to straighten out, **NFPA 20 section 5.14.6.3.2** requires a straight run of pipe prior to the suction flange. The length of this straight run shall be greater than 10 times the diameter of the suction pipe. This is measured from the end of the fitting to the fire pump suction flange. The suction control valve and eccentric reducer, if installed, are allowed to be included as part of the straight run measurement.