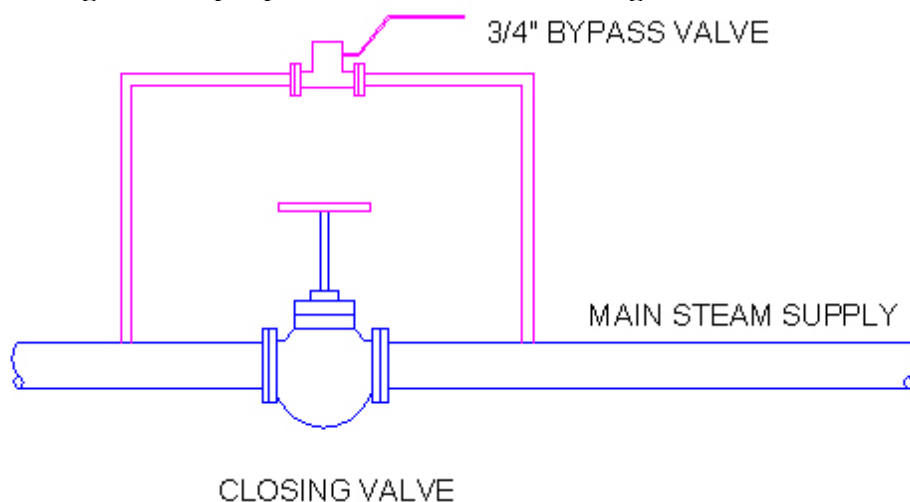


## Bypass valve – Neven Drobnjak

In this blog I will briefly present bypass valve. Although this topic is more on process side, piping designer should be familiar with it.

### Steam piping

You might see small 3/4" bypass valve installed on steam piping and you might be wondering what is purpose of it. Please see the figure below.

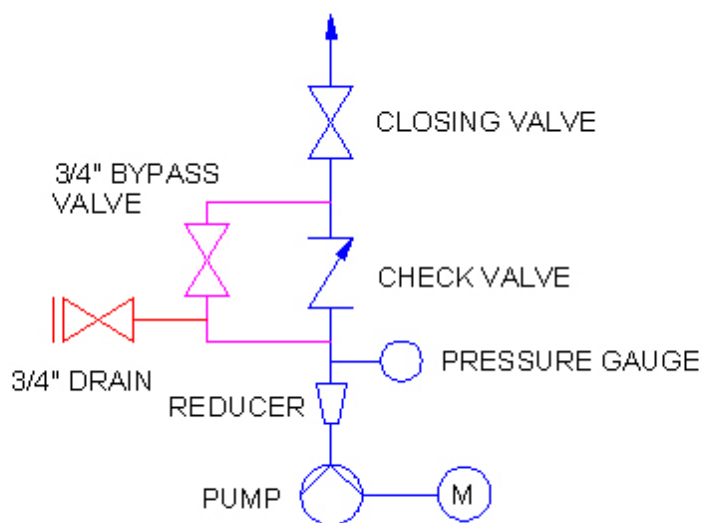


The small bypass valve is installed to warm up the pipe prior introducing the steam. If we introduce hot steam into the cold pipe, water hammer will occur and piping collapse will be instantaneous. This is small but very important detail that can be easily overlooked by piping designer. Video below demonstrates what happened when hot steam is introduced into cold environment. Omitting this small detail can have a disastrous consequences.

A good tutorial on steam piping can be found on [Spirax](#), [TLV](#) and [Piping engineering](#) sites.

### Pumps

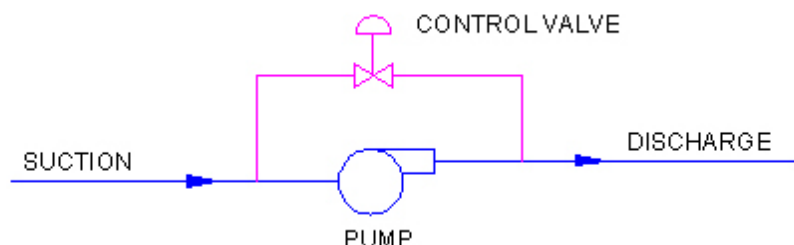
Sometimes, small bypass valve can be seen in pump discharge pipe. Please see the figure below.



This is usually the case when two pumps are installed in sets. One pump is running during normal operation and one in on stand-by. The fluid in stand-by

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pump will cool down during the stand-by phase and can cause damage to pump. A small 3/4" or 1" valve is installed around check valve to allow the discharge pressure from the run pump to back flow around check valve of stand-by pump. This small valve is not enough to cause the pump run backwards. This valve is normally open. Another way to allow back flow is to drill small hole in the disk of check valve. This might reduce water hammer force since valve will not close instantaneously, but on the other hand, water hammer force will be propagated thru pump which might cause pump damage. In many cases, pumps required quick closing check valve. The choice between two methods is up to client. Control valve can be installed by-passing centrifugal pump. Please see the figure below.



This is standard practice in chemical plants to control pressure or flow. When more flow or pressure is needed the by-pass valve is closed more. For less pressure by-pass valve is opened more. Throttling this way puts more loads on pump and draws more current. The best way to regulate the centrifugal pump is to use by-pass valve with variable frequency drive. This method has been successfully implemented in many plants.