

Pipe Goes Bang!

Executive Summary

Any noise beyond liquid simply flowing in a pipe is likely not a good thing. Two potentially dangerous noises in pipes/pumping systems are water hammer and cavitation.

What Noises are “bad” Noises?

Whether it's water in your own pipes at home, or you're in a pump station with, probably, a centrifugal pump, you may here some downright scary sounds out of your water system. Two sounds I'm familiar with are water hammer and cavitation.

What is Water Hammer?

Water hammer is the noise resulting from a valve being closed too quickly. When the flow stops too quickly, a pressure pulsation occurs and there can be a large sound which sounds like a hammer hitting a pipe or perhaps a pipe vibrating against the wall or other pipes. Thanks to [Hydraulic Handbook](#), Fairbanks Morse Pump, 1988 for this excerpt about a Russian man by the name of Joukovski who “postulated that the maximum pressure, in any pipe line, occurs when the total discharge is stopped in a period of time, equal to or less than the time, required for the induced pressure wave to travel from the point of valve closure to the inlet end of the line and return. This time he stated as:

$$t = 2L/a$$

t = time in seconds, for pressure wave to travel
the length of the pipe and return.

L = length, in feet, of the pipeline.

a = velocity, in feet/second, of pressure wave.

What is Cavitation?

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Cavitation is a phenomenon in which vapor pockets created in a liquid collapse and result in a sound similar to gravel running through a pump. It exists in a pump installation and is a result of liquid vaporizing due to increase velocity of the liquid – then as the liquid with vapor pockets flows further into the impeller, the increase in pressure collapses the vapor pockets. Then you get a sound. Here's an example of the cavitation sound. [QR]



My Story

I was on a pump station once where we had recently installed pumps for a sewer pump station. When the pumps were operating during commissioning, the sound was awful. To truly hear how bad cavitation can be, you really have to be there. The video above does not do the eeriness justice. It literally sounds like someone opened up a port in the pipeline and poured a drywall bucket of marbles in the pipe. We had the Engineer of Record opine and then a specialty engineer come in from the mainland. We had a heck of a time fixing it, and truth be known, I never heard what the solution was.

Work safe!