



HSE BULLETIN

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WATER HAMMER

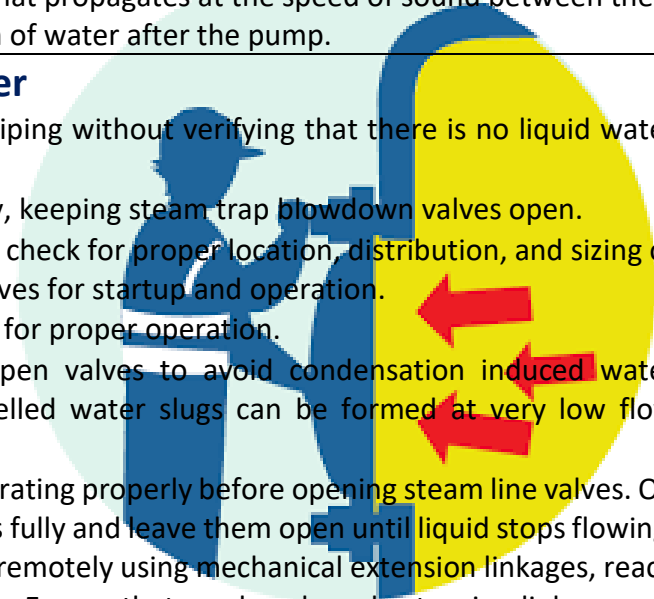
What Is Water Hammer?

Water hammer is a phenomenon that can occur in any piping system where valves are used to control the flow of liquids or steam. Water hammer is the result of a pressure surge, or high-pressure shockwave that propagates through a piping system when a fluid in motion is forced to change direction or stop abruptly. This shockwave is also commonly referred to as a hydraulic shock or hydraulic surge and may be characterized by a marked banging or knocking sound on the pipes immediately after shutoff.

Water hammer can occur when an open valve suddenly closes, causing the water to slam into it, or when a pump suddenly shuts down and the flow reverses direction back to the pump. Since water is incompressible, the impact of the water results in a shock wave that propagates at the speed of sound between the valve and the next elbow in the piping system or within the column of water after the pump.

Preventing Water Hammer

- Do not introduce steam into piping without verifying that there is no liquid water present.
- Warm cold steam piping slowly, keeping steam trap blowdown valves open.
- Walk down steam systems and check for proper location, distribution, and sizing of steam traps and blowdown valves for startup and operation.
- Inspect steam traps frequently for proper operation.
- Be cautious when cracking open valves to avoid condensation induced water hammer because steam-propelled water slugs can be formed at very low flow conditions.
- Verify that steam traps are operating properly before opening steam line valves. On startup, open blowdown valves fully and leave them open until liquid stops flowing. When feasible, operate valves remotely using mechanical extension linkages, reach rods, or power-operated valves. Ensure that reach rods and extension linkages are properly maintained.
- Inspect piping systems for sagging. If necessary, install steam traps at low points or repair the sag. Installing steam traps at regular intervals and at the low points. This ensures removal of condensate from the steam system as soon as it is formed. Sagging of pipes should be avoided by providing proper support. Sagging pipes can form pool of condensate in the pipework, increasing the chances of water hammer.
- All isolation valves should have bypass systems. Remember that bypass operations do not prevent water hammer if condensate is present.

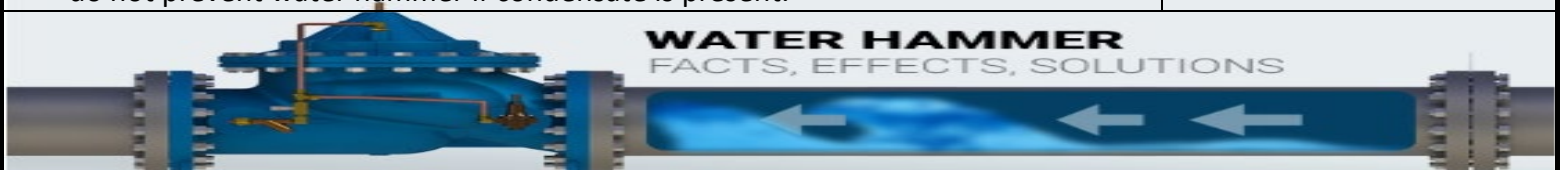


HAZARD

Water hammer is a phenomenon that can be either a mild nuisance or a severe problem. It is usually considered a safety hazard. The extreme pressure caused by water hammer can blow out gaskets and cause pipes to suddenly rupture, causing serious injury to anyone nearby.

Accidents

Pipeline rupture can also endanger the health and safety of employees and maintenance personnel. Depending on the industry and specific facility, unmanaged leaks can also increase the risk of slips, falls, and electrocution.



Quench the Thirst - Safety First!!

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