

TECHNICAL BULLETIN

BULLETIN 11

WATER HAMMER

GENERAL	<p>Water hammer is the destructive forces, pounding noises and vibration in a piping system when water flowing through a pipeline is stopped abruptly. When water hammer occurs, a high intensity pressure wave travels back through the piping system until it reaches a point of some relief. The shock wave will then surge back and forth between the point of relief and the point of stoppage until the destructive energy is dissipated in the piping system. The violent action accounts for “banging”, “thumping”, and/or intense vibration in the pipe line. Although noise is generally associated with the occurrence of water hammer, it can occur without audible sound or noise. Quick closure always causes some degree of shock with or without noise. The common cause of water hammer is single lever faucets (sinks/lavatories) or automatic solenoid valves (dishwashers, washing machines, etc.). The speed of the valve closure time is directly related to the intensity of the surge pressure.</p>
EFFECTS	<p>The damage from water hammer can manifest itself in a number of ways. The most common are:</p> <ul style="list-style-type: none">• <i>Expanded Tank Shell</i> - This can be demonstrated by measuring the circumference at various locations along the shell. Pressures in excess of the maximum design working pressure can cause permanent deformation of the shell.• <i>Collapsed Flue Tube</i> - This will choke off the ability to vent the products of combustion causing the flame and/or combustion to spill out from the combustion chamber. Often this will occur where thinning of the flue tube walls has occurred due to contamination of the combustion air or because of excessive condensation.• <i>Inverted or Deformed Tank Heads</i> - Often this accompanies collapsed flues, but one or both heads can be deformed.
THE FIX	<p>The only effective means of control is to install water hammer arrestors. These devices have diaphragms which separate an air chamber from the water in the piping system. As the shock wave reaches this device, the air chamber absorbs the shock. Arrestors should be located as close as possible to the source of the shock wave.</p>
NOTES	<p>Since water hammer exposes the equipment to pressures in excess of its design limits, failures caused by water hammer are not eligible for warranty consideration.</p>