

## Steam or Water Hammer

Pressure spikes, surges or shock waves as a result of a sudden and rapid acceleration or deceleration of any liquid can cause damaging steam or water hammer to the exchanger. Pressure surges have been seen in levels in excess of 20,000 psi, which would result in the complete rupture or collapse of the tubing of a heat exchanger. As an example, drawn copper  $\frac{3}{4}$  in x 20 BWG tubing typically has a rated burst pressure of 2100 psi, along with a collapse pressure of 600 psi

Pressure surges can be a result of an interruption in cooling water flow, stagnant water heated with a resulting generation of steam, or a resumption of flow producing steam. All these processes would likely cause a pressure surge, steam or water hammer. Therefore, the flow of the cooling fluid should always start prior to adding the heat load

## Tube Damage from Steam Hammer



Control valves that open or close suddenly to control fluid flow can produce water hammer. A modulating control valve is a preferable option to “on-off” types. A vacuum breaker vents are a must if the process involves a fluid that can or may condense on either the shell or tube side. Vacuum breakers prevent steam hammer from developing and causing damage as a result of condensate accumulation. Figure (B) is an example of typical tube damage caused by steam hammer. In the example provided, condensate accumulated in the shell rapidly, producing a high pressure shock wave that subsequently collapsed the tubes and caused multiple tear holes. Correctly sized steam traps with installed return lines pitched to a receiving container for condensate or a condensate return pump should be installed as to prevent such damage.



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