

Have you heard a pressure relief valve chatter?

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In the November 2012 *Beacon* many readers correctly identified one safety issue with the relief valve in the picture at left – potentially closing a block valve, isolating the relief valve so it cannot provide protection against excess pressure. A second possible problem, a piping system which may cause the relief valve to chatter, was not identified by nearly as many people.

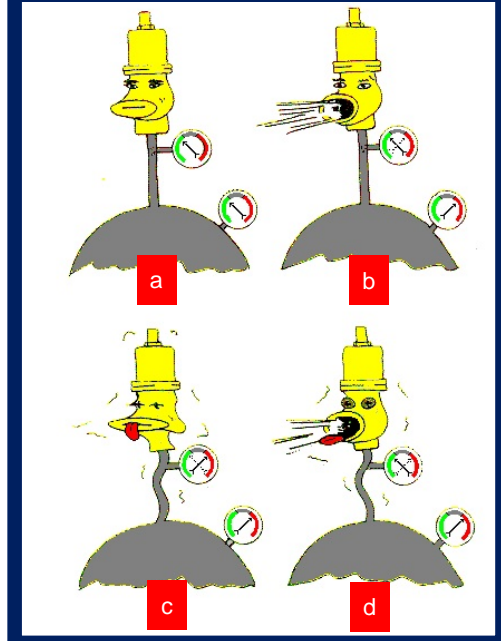
What is “chattering”?

Chattering is the rapid opening and closing of a pressure relief valve. The resulting vibration may cause misalignment, valve seat damage and, if prolonged, can cause mechanical failure of valve internals and associated piping.

Why does a relief valve chatter?

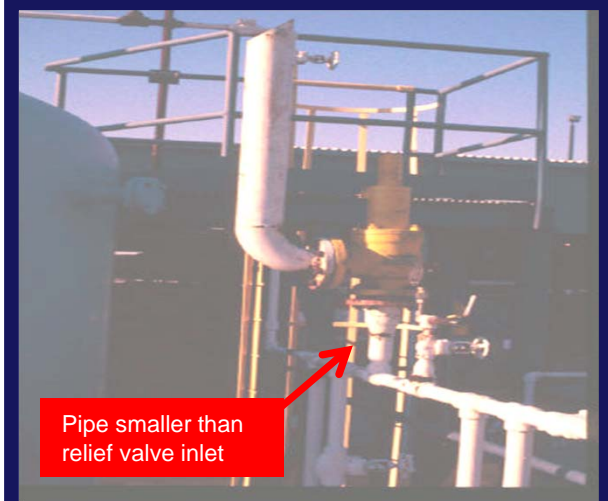
Some causes of chattering include excessive inlet pressure drop, excessive back pressure, an oversized relief valve, and a relief valve which must handle widely varying flow rates. We will explain the first of these in more detail.

Look at the picture above on the right. Under normal process conditions the vessel pressure is below the set pressure of the relief valve, and the pressure at the relief valve is the same as the vessel pressure (a). If a process upset increases the vessel pressure, the pressure at the relief valve increases by the same amount, and if the pressure exceeds the relief valve set pressure the valve opens (b). As soon as the valve opens, flow begins through the pipe to the relief valve, and the flow results in a pressure drop between the vessel and the valve. If this pressure drop is large enough, the pressure at the relief valve can be low enough that the relief valve closes (c). The flow stops, the pressure at the relief valve increases back to the vessel pressure because there is no flow to cause pressure drop, and the relief valve opens again (d)! This happens over and over, and can be very rapid, causing vibration and damage to the relief valve, pipes, and equipment.



What can you do?

- ➔ If you observe a relief valve chattering, inform somebody qualified to identify and correct the problem.
 - ➔ Look for potential problems in relief valve piping design, and ask an engineer to determine if they could cause relief valve chattering.
- Some things to look for:
- Inlet pipe to a relief valve which is smaller than the valve inlet (see picture at right)
 - Many valves, fittings, and other obstructions between a process vessel and a relief valve, as in the picture above
 - A very long pipe between a vessel and relief valve, or piping with a lot of bends
 - Evidence of line plugging from corrosion or process materials observed when removing a relief valve for maintenance



Don't let your relief valves chatter!