

*From the desk of G. A. Aaker, Jr., PE.*

## Flashings and Cavitation

- When there is a restriction in flow, there is a corresponding decrease in pressure that causes a fluid to reach its vapor point.
- **Flashing occurs when fluid vaporizes and remains a vapor.** Metal erosion caused by **flashing appears smooth and shiny.**
- **Cavitation- occurs when a fluid vaporizes and then returns to a liquid state as pressure increases down the line. The metal damaged caused by cavitation is rough and irregular due to pitting of the surface.**
- Cavitation is a major source of damage in control valve and other components. Cavitation occurs as a liquid passes through a restriction such as a valve, the restriction causes the liquid velocity to increase and its pressure to decrease. **The point of maximum velocity and minimum pressure is called the Vena Contracta.**
- Vapor bubble form in the liquid when the pressure falls to near the level of the liquid vapor pressure. When the pressure recovers downstream, the vapor bubbles implode and return to liquid form.
- After the initial bubble formation and collapse, the bubble may reform and collapse a second time. Liquid micro-jet forms when the recovery pressure makes an indentation in a bubble, then the micro jet burst through the bubble.
- These implosions can also because local pressure waves up to 100,000 psi. The combination of the pressure wave and micro-jets can cause severe damage when locate near the material surface.
- Management of Cavitation / controlling the Intensity of Cavitation by:
  1. Control Pressure Drops (Pressure Staging)
  2. Length of Exposure to Cavitation
  3. Frequency
  4. Material- Harden Material (Valve Liners)
  5. Design of Valve and Trim
  6. Leakage when Closed