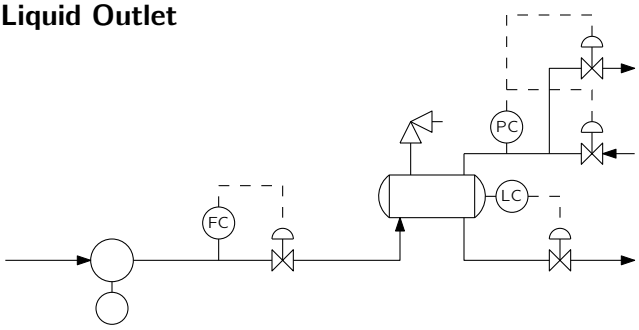
14.8.6 Blocked Liquid Outlet



- Assumptions (API 521 4.3.2 and 5.10.4)
  - Liquid outlet flow stops.
  - Vent control valve remains closed.
  - Liquid inlet control valve opens to maintain feed flow rate.
  - Relief valve back pressure = 0 psig (confirm and change later).
- Scenarios
  - Vessel is designed for maximum feed pressure (pump shutoff). No relief case, as the MAWP cannot be exceeded (Interpretation VIII-1-86-33 allows 110% of MAWP).
  - Vessel is *not* designed for maximum feed pressure. Determine load as shown below.
- Accumulated Pressure

  Accumulation = 10% for single valve, non-fire case
  P_{set} = P_{design} = 50 psig
  P_{acc} = 1.1×50
  = 55 psig (69.7 psia)
- Normal outlet flow (PFD)

  Flow = 448.7 USgpm (101.9 m3/h)
  SG = 0.708
  Viscosity = 0.408 cP
- Relieving rate

  Q_{relief} = Normal outlet flow
- Relief valve size (API 520 3.8/9)

  A_{eff} = $\frac{Q_{relief}}{38 K_d K_w K_c K_v}\sqrt{\frac{SG}{P_{acc}-P_{backpres}}}$
  = $\frac{448.7}{38\times0.65\times1.0\times1.0\times1.0}\sqrt{\frac{0.708}{55-0}}$ with all Ks from API 520 3.8.1
  = 2.061 in^2 (or 3.378 in^2 based on non-certified eqn)
  Selected valve = 4L6 balanced bellows (to common flare with P_{set} < 250 psig)