

When could you have unforeseen pressure or vacuum conditions in tanks in your factory?

Companies in the process industries should fully consider the possibility of unlikely but foresee-able and possible unforeseen pressure or vacuum conditions arising during operations and not make a conclusion that the tank is a pressure tank *only* if the tank is specifically designed for pressure or vacuum service. The notes which follow below are a summary of such conditions that can arise from process changes or other events during tank operation, as observed by E4A Engineers and that should be carefully considered in all future tank designs.

1. *Inadequate or 'no vent' designs.*

Comments: We noted the reported catastrophic failure at Rossing from inadequate vent outlets and rapid tank loading. We have also observed vacuum collapse in smaller tank sizes. These failures result when tanks are emptied with such low or no vent in-feed facilities that air cannot enter fast enough to break the vacuum formed by rapid product discharge.

2. *Vent blockages during tank or vessel service.*

Comments: Vents can be easily blocked by well-intended people. They often put plastic bags over tank vents or other openings during maintenance or shutdowns to keep rain out of the tank or to prevent debris from entering the tank. There have also been bird nests built in vent pipes. Left in place at start-up time, this can lead to a tank collapse when product is discharged, as a vacuum can easily follow. Special vent designs can be discussed with E4A Engineers on your request.

3. *Under design for Specific Gravity (SG)*

Comments: Our observations include 'dairy grade' wall thicknesses in paint manufacturing services where SG regularly reaches 1.5 and higher; tank legs with thin material 'box legs' but used on high SG services.

4. *Hot solvent cooling overnight under closed cover.*

Comments: We noted the reported catastrophic failure at Rossing from inadequate vent outlets and rapid tank loading. We have also observed vacuum collapse in smaller tank sizes.

5. *Press on thicker paste using standard floor pot or tank.*

Comments: When thicker pastes are to be discharged from a process tank by a press and press plate, the tank in which the plate is pressed downwards must be designed for the full pressure.

6. *High air pressure used to discharge residual product from closed vessel such as gear box.*

Comments: Where vessels are not designed to be emptied with high pressure, very dangerous conditions can arise with thin wall designs or brittle materials used.

We provide several tank-design services for our valued clients. This list is not exhaustive and must be treated as guidelines only. There may be other important design and operational considerations that clients should consider.



These guidelines and notes are presented as general guides only and no warranty is implied or provided.