Collapsed Railway Tank

EPSC Learning Sheet November 2025

What Happened:

A railway tank containing butane, collapsed during a cold night.

Aspects:

- Below the butane boiling point of -0,5 °C, the pressure in the closed railway tank becomes below atmospheric: 0,72 bar at -15 °C and 0,57 bar at -20 °C.
- Although the metal looks strong, the force (F) can be high due to the large surface area (A) : $F = \delta P \times A$.
- The inherent safe solution and best practice is to design and built the tanks full vacuum resistant (thicker wall).
- Vacuum breakers should be avoided with flammable content such as butane, to avoid the explosion hazard.
- Other solutions are to maintain a certain temperature (e.g. by heat tracing). In an emergency: inject an inert gas.

Avoid that tanks collapse due to low ambient temperature