Flashing of Hydrocarbons

EPSC Learning Sheet, November 2018

What Happened:
A carbon steel heat-exchanger reached -40 °C due to flashing of propylene. It was depressurized after a trip, and restarted (pressurized). It ruptured open and an explosion and a serious fire took place.

Aspects:
- Depressurising (flashing) of C2, C3 hydrocarbons can result in low temperatures, where plain carbon steel becomes brittle.
- Never pressurise equipment when being below its design temperature: due to the stress of the brittle steel at low temperature it can break catastrophically (see picture).
- Include flashing scenarios in the PHA and define measures.
- Measure impact strength at low temperature of the specific steel batch used (in design phase), in case the equipment can auto-refrigerate by flashing.
- Validate the mechanical integrity by an inspection expert when equipment has gone below its design temperature, before using it again.
- Train auto-refrigeration scenarios with operators.

Avoid brittle steel due to flashing.