

Iso-Butylene Gas Explosion

EPSC Learning Sheet April 2024



What Happened:

A Y shaped strainer (filter) in a three-inch pipe, ruptured. The failure occurred after pressure cycles, induced by thermal expansion. The released isobutylene resulted in a gas-cloud explosion and bankruptcy of the company.



Photo from CSB report

Aspects:

- When a closed system that is filled with a liquid hydrocarbon, raises in temperature, the pressure can rise above design.
- Here a brittle fatigue failure occurred in the strainer made from iron cast. More ductile materials are recommended for systems that handle hazardous materials under pressure.
- Sometimes valves are made locked open, to allow for expansion.
- Thermal relief valves can be added to system that might be liquid full and blocked in by closed valves.
- Establish criteria for each plant when thermal relief valves have to be included – depending on volume, liquid, construction material, expected temperature changes.

**Avoid equipment failure due to
thermal expanding liquid**