

External Cryogenic Liquid/Gas Spilled onto Cold Box

External liquid sprayed onto cold box panel may cause structure cracks during plant operation mode change, e.g. liquid dump, defrost, re-start and cool down.



Crack through carbon steel
Perlite leak



Corner column/structure cracked and penetrated.
Perlite leak



Perlite leak



Perlite leak

Some of common causes are listed below:

- Liquid dump valves being too close to the cold box structure, instead of safe location.
- Venting valves was not used properly. For example, cooling down by opening venting valve.
- The local drain/vent valves were not closed fully after use.
- SOPs does not cover some of the normal operation, such as discharge reboiler liquid via pump's drain, open venting valve for purging and so on.
- Open the local drain/vent valves without monitoring. If there is potential liquid drainage, continuous field monitoring is mandatory.
- Temporary/urgent operations have no Job Safety Analysis (JSA) or other risk assessment.
- The checklist of valve position was not strictly implemented.

Did You Know?

- Plant must clearly indicate the "vent valves" and "liquid drain" valves in the SOP.
- Even a small amount cryogenic liquid spilled onto carbon steel can cause crack.
- Any deviation should be escalated and assessed.
- There are potential risks during the equipment operating mode changed.
- Do you know the hazard of operating LOX/GOX drain, vent, control, and isolation valve?
- Any abnormal leakage at cold box area must be escalated immediately and recorded as incidents.

What Can You Do?

- Identify and list all the field vent/drain valves at ASU cryogenic enclosure (e.g. cold box, pump casing, FBT etc.)
- Review above list with process engineer and process safety engineer. Retrofit the vent pipe to safer location.
- Route cryogenic liquid drain line to proper dumping points where maintaining safe distance away from cold box and other equipment.
- Review the SOP related to cryogenic liquid/gas drain and vent, ensure the SOP cover all types of operations. Update the SOP if required.
- Any temporary/urgent operation not included in the SOP must be assessed with Job Safety Analysis(JSA).
- Ensure these venting valves are opened/closed within their designed function.
- Do NOT leave the valve open unless there is continuous field monitoring.
- The operation checklist of valve position is strictly followed.
- Whenever there is equipment operating mode change, both control room and field operator need to check if relevant to cryogenic liquid/gas discharge.
- Record any abnormal condition in the shift log and inform control room timely.

**Cryogenic liquid spilled onto carbon steel can cause crack, even it is just a small amount!
This would cause structural instability of the cold box and its collapse !**