

**Incident description: Gas leak 2016**

A double expanding gate valve was used as a barrier during work on a compressor train. During isolation, the valve was incorrectly secured to prevent unintended operation. The process operators and instrument technician were unsure of how to secure the valve in a closed position, and decided to de-energized the valve control panel to prevent unintended operation. The decision was based on an assumption that the barrier valve was fail close as shown on the P&ID, but this was not the case: The actuator needed an active pressure to ensure the barrier valve to be sufficiently sealed. According to company procedures, the barrier valve should be leak tested before the work on the compressor train was initiated, but no leak test was performed.

The above resulted in a gas leak. The leak went on for approximately 38 seconds, and stopped suddenly when the pressure became lower than the pressure generated by the sealing force in the valve. The initial leak rate has been estimated to 0.57 kg/s with a total discharge of 21.66 kg.

**Causes**Direct cause:

- The barrier valve was not secured and leak tested properly.
- Insufficient procedure for establishment of barriers.

Root causes:

- Lack of training on how the valves work and how to establish a barrier.
- No known documentation of how to secure the valve as a barrier.
- It was not explicitly stated in the isolation plan that the operator shall leak test the valve according to procedure.
- Insufficient communication and understanding of important information and risk.

**Learning points and recommendations:**

- Ensure it is explicitly explained in the procedures how the valves shall be isolated and leak tested.
- Establish mandatory barrier course for all relevant personnel.
- Update P&ID to reflect functionality of barrier valves upon loss of power and loss of signal.
- Ensure suitable bleed arrangements are installed on all valves with cavity bleed.

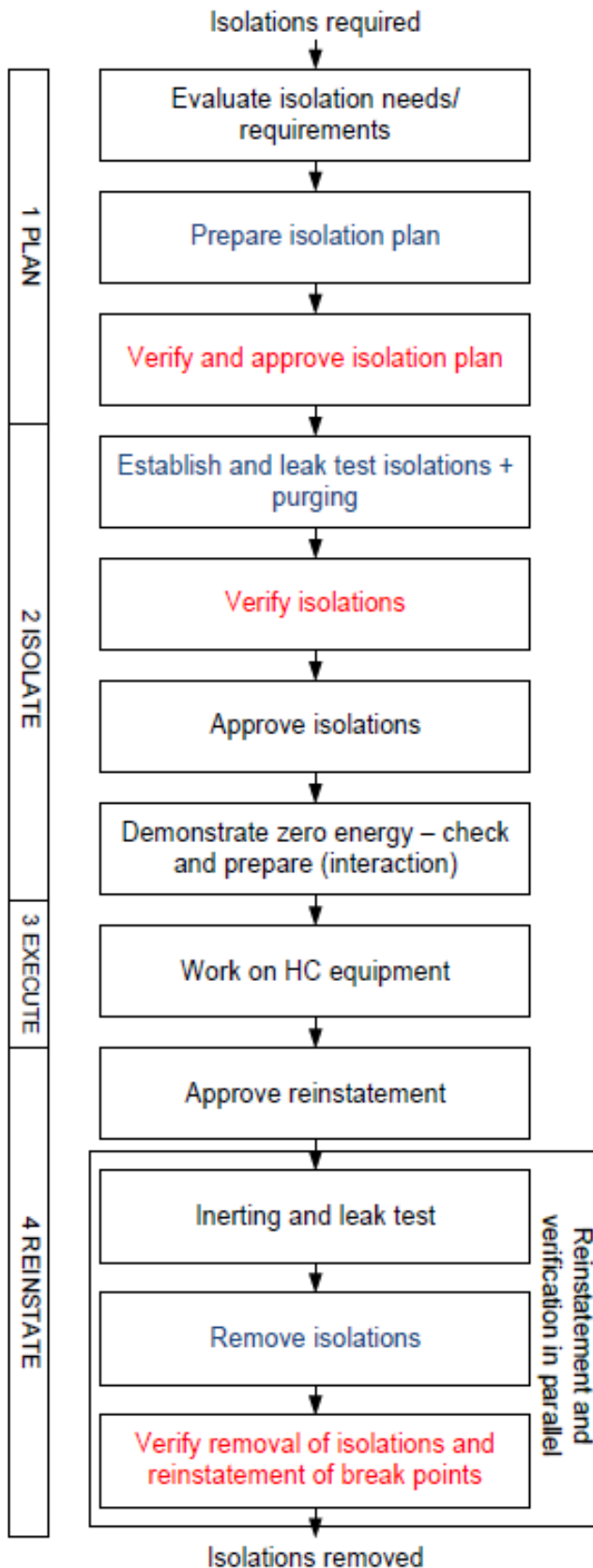
Description:

Blue and red text indicate roles which are to function as independent barriers.

Description:

- 1 Was executed, functioning as intended
- 2 Was executed, but failed
- 3 Was not executed
- 4 Uncertain whether executed

**Status for steps in best practice document**



Status during the incident:

- 1 Executed
- 1 Executed
- 1 Executed
- 2 Error in isolation of valve (wrong method)
- 3 Leak test not performed
- 1 Executed
- 1 Executed
- 4
- Gas leak 0.57 kg/s, 38s, 21.66 kg