

Incident:

During the initial commissioning of a new tank, a spill of 600 liters of nitric acid occurred. The spill came from a leaking gasket on a valve flange. The isolation valve actuator did not close the valve completely resulting in a continuous small product flow. Manual intervention was required to tighten the bolts of the leaking flange connection and stop the leak after 25 minutes. Due to the reaction with the oxygen in the air, yellowish and brownish vapors were formed.

What: Nitric acid leak in a tank pit

When: 15-Jun-22

Where: NNOAT, Antwerp, BELGIUM

Summary:

In a newly built tank pit, a tank was filled with Nitric Acid 68%.

The tank valves and their automation still had to be tested as part of the tank commissioning. For the first time at the terminal, this test had to be done with product (instead of water usually) as the tank was already filled with product prior to completion of all construction and commissioning activities.

Prior to testing, blind plates had been removed on the tank valves to allow product flow. The removal of the blinds had proven to be difficult specifically on the high suction valve due to bending of the lines leading to misalignment of the flanges. After this operation, no pressure test had been performed to confirm the absence of leaks on the gasket.

During the commissioning, when opening the high suction valve, a leak immediately appeared on its flange, at the bottom position. The operator and contractor present at that time evacuated everyone from the premises and alerted the control room operator who attempted to close the high suction valve and stop the leak, but the valve automation did not close the valve completely. The nitric acid vapors caused colored fumes to quickly appear, and firewater was rapidly used to neutralize them, successfully.

The intervention team with adequate protection removed the nitrogen from the valve actuator to get the valve in the fail-safe close position which must happen in case of nitrogen pressure loss but this did not work, and the team had to stop the leak by tightening the bolts. The actuator was then disassembled, and the valve was closed manually without a problem.

After the spill clean-up, it appeared that joints in the tank pit and the collecting gutter were affected as they were not resistant to Nitric acid.

Nobody was injured in this incident.

Why did this happen?

- The removal of the blind was not done according to recommended practices:

- To facilitate flange alignment and prevent future leaks, a supporting hoist should have been used
- A pressure test should have been performed to confirm the absence of leak
- Instead of commissioning the tank with water, it had been decided to use the tank earlier than expected and to perform the commissioning of the tank in product
- As the throttling of the valve was in a fully closed position, no extra manoeuvring space was left on the thread for the valve to close completely
- The requirement for the open throttling position of the valve was not communicated by the project to the supplier

Related essentials / Directives / Procedures:

- Blinding procedure
- Project specification procedure
- Risk assessment for commissioning of tank in product

Lesson learned and follow-up for each site

- For similar valves located in the same tank pit, the tightening of the flanges was verified and corrected where needed
- is required to perform blinding or line breaking
- Requirements concerning line supporting and pressure test were included in the maintenance procedures
- Signage was installed where the use of supporting hoist
- Local practice will be reviewed to avoid commissioning of tank in product for harmful products
- The project specification procedure is to be updated to include requirements for
 - Valve throttling position to be specified and checked against a certificate from the supplier
 - Resistance joint compatibility need to be specified

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