Safety ALERT

Nitrogen Cylinder Rupture — Alert 25-3

WHAT HAPPENED:

Rig crews had just finalized positioning a rack of nitrogen cylinders/bottles nitrogen to begin the pre-charge process of the accumulator cylinders with nitrogen. One nitrogen cylinder, charged to 2,400psi, in a rack that was not connected to charge the accumulator suffered a rupture to the bottom of the cylinder. This rupture scattered the rack, debris, and the remaining 11 cylinders around the immediate area and port aft area of the rig.

Three (3) employees suffered minor first aid injuries, all were evacuated and released to return to work. The American Society of Mechanical Engineers (ASME) fatal blast zone for a single cylinder of this size pressurized to 2,400psi is calculated to be approximately 1.5 meters. The severity of the blast caused the rack to be destroyed and the other cylinders to be propelled across the deck. Minor collateral damage to a cooling water line, control umbilical, and fire water station occurred. Rig operations were ceased, and a safety stand-down was held. All crews were kept in the accommodations until all remaining nitrogen cylinders on the rig were bled down to atmospheric pressure.

CONTRIBUTING FACTORS:

Initial findings indicate the cylinder rupture was the result of exterior wall loss. Investigation is ongoing and results will be shared upon completion.

- The base of the cylinder that ruptured was heavily corroded.
- Other cylinders in the quad had evidence of similar but less severe corrosion.
- Despite compliance with the Department of Transportation (DOT) special permit regulations, deficiencies in the design and material of the racks contributed to this event. This exposed the limitations of current inspection protocols and the susceptibility of cylinder integrity to the marine environment.
- Visual pre-fill inspections were conducted prior to mobilization offshore, but the rack was ***not*** disassembled for a thorough inspection of the individual cylinders or manifold components. This type of inspection did ***not*** allow for the bottom of the cylinders to be inspected for corrosion.
- The nitrogen cylinder rack is designed to securely hold multiple nitrogen cylinders in place, ensuring safety and preventing accidents during storage and handling. However, the absence of a material barrier between the cylinders and the rack presents several significant safety concerns. This can include dents, scratches, or other forms of wear that may compromise the integrity of the cylinder, potentially leading to leaks or failures.
- The rack design does ***not*** allow for proper drainage, which caused prolonged exposure of the cylinders to corrosive elements.

LESSONS LEARNED:

The cylinders were nine (9) years into their 10-year hydrotest cycle. The cylinders had been visually inspected by the supplier in accordance with Compressed Gas Association guidance for re-filling three months before the incident, prior to being loaded out to the rig. However, the severe corrosion that caused the rupture was not spotted during this inspection.

The cylinder that ruptured was located in the middle of the quad and therefore not easy to thoroughly inspect without disassembly of the quad.

Ask yourself or your crew:

- Are the cylinders on your facility certified and in good condition?
- Are you able to see the condition of all cylinders in every rack?
- Are all cylinders located on a free draining base to minimize corrosion?
- Do you know what level of visual inspection of cylinders/quads is provided by your supplier?
- Are all cylinders on your facility stored and located in accordance with the relevant industry regulations?
- Can adding corrosion barrier materials (i.e., non-metallic, coatings, etc.) between the base of the cylinders and racks help to mitigate corrosion?