Description of incident : Gas leak 2014

The leak occurred during a functional test of a blowdown valve in a metering package. To execute the test, a part of the metering package was isolated, the blowdown valve was opened and the isolated part of the package was depressurised through the blowdown valve. A gasket between a flange and a spade in the part of the metering package which was not isolated was leaking. This gasket was damaged as the pressure differential over the spade became equivalent to the operating pressure (150 bar) and a leakage occurred. See the figure below.

The gas leak had a rate of 0,2 kg/s, with a duration of about 50 minutes. Approximately 600 kg of gas was released.

Figure: Meetering package with manifold on top. Location of blinding is indicated by red vertical line and gas stream into the metering lines are indicated by white arrows. The leakage was to the right of the red line.

Causes

Direct cause:

A gasket between a flange and a spade was damaged and started leaking when the pressure differential over the spade became equivalent with the operating pressure.

Root causes:

- Incorrect width of the ring groove in the spade. This led to the gasket not getting the correct contact with the ring groove, and the gasket pressure was lost.
- Unilateral pressure from one side of the spade (caused by depressurisation) caused a minor displacement of the gasket.
- The spade that was ordered, had the correct specification, but it was not verified that the correct type was received prior to installation.
- Confusions regarding the applicable requirements for leak testing.
- Leak test with N_2He was executed with only 70% of the operating pressure and the system was not tested for different states of operation (differential pressure over spade).

Learning points and recommendations:

- Impose requirements regarding documentation of measurement of ring groove on blinds, spades and similar components which will be used in HC equipment.
- Check routines for quality assurance and follow-up of this type of vendor.
- Execute leak tests as close as possible to the various operating states the system will be experiencing.