

Incident description: gas leak 2015

The transmitter in the export gas system was replaced as preventive maintenance. It was installed on the valve block. A new teflon gasket was installed in the annular groove on the valve block. A torque wrench was not used to tighten bolts between the valve block and the transmitter. Joints were leak-tested after installation. About three months later, the gasket failed on the high-pressure side between the valve block and the transmitter and caused a gas leak.

Production was stable and no activities related to the export gas system were under way when the leak occurred. ESD, deluge with foam, blowdown and disconnection of main power were activated automatically. The emergency response organisation mustered and other personnel mustered to the lifeboats. The leak site was identified after about 40 minutes. The damage was repaired and production resumed the same evening.

The initial leak rate was put at 0.28kg/s, duration about 14 minutes and total emission roughly 100kg.



Figure: Destroyed teflon gasket between transmitter and valve block.

The investigation showed that the gasket failed because bolts between transmitter and block lost their pretensioning as a result of creep in the teflon gasket. Given the shape of the gasket, this creep probably reflects faulty tightening when installing the instrument on the valve block.

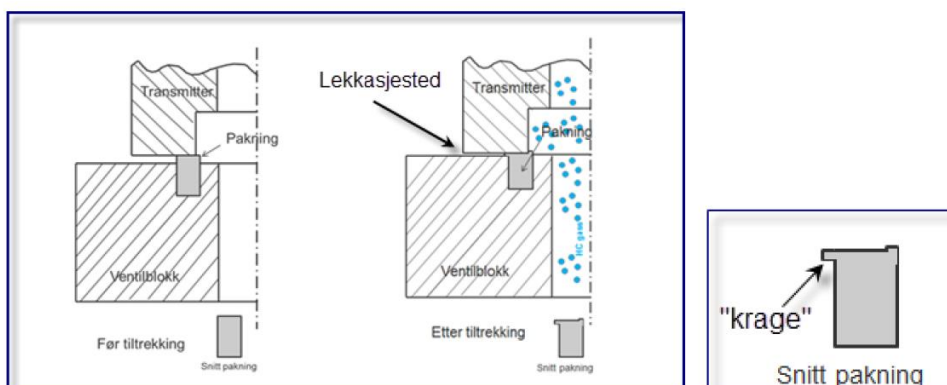


Figure: Tightening method

Causes

Direct cause

- The teflon gasket between transmitter and valve block failed.

Underlying causes

- Bolts between transmitter and block lost their pretensioning because of creep (cold flow) in the teflon gasket.
- Wrong torque used when tightening bolts between transmitter and valve block.
- Use of a torque wrench for such tightenings was not normal practice on the installation – nor was it used for tightening bolts when the instrument was replaced.
- One of the bolts may have been too long for the transmitter or lacked a washer, meaning it could not be tightened fully.
- The importance of using a torque wrench was not picked up by the technical discipline on board.
- Giving automation technicians training which qualified them for bolt tightening, gaskets and use of torque tools was not established practice on board.
- The description of the tightening method was imprecise – no torque was specified in the user manual.
- No expertise requirements were specified in the management system related to bolt tightening and gaskets when replacing the relevant transmitter.

Lessons and recommendations

- A risk exists that teflon gaskets will creep over time – this can give rise to leaks. On that basis, it is therefore recommended that an assessment be made of whether IEC 61508 should be implemented by the companies. The importance of using torque wrenches when tightening bolts must also be highlighted on a general basis.
- Include the user manual with specific torque in the management system and make this known to everyone on board.
- The calibration contractor should mark calibrated instruments with a reminder to use a torque wrench when the instrument is returned.
- Training in tightening methods and bolt tightening could help to boost risk understanding. Requirements for relevant training on tightening methods, bolt tightening and the use of torque wrenches should be established for automation technicians, with verification of the level of competence attained.