

Tube Compression Fitting Failure

What happened?

A recent near miss incident has identified that compression fittings associated with high pressure tubing lines have the potential to fail by working loose under certain conditions.



Potential failure will not be evident without adequate post-assembly inspection and may not become apparent for a number of years due to a range of factors including operating conditions and the material of the tube and fittings. Even during regular pressure testing, it is not uncommon for these 'compromised' fittings to pass the initial and subsequent tests prior to the main failure event.

In relation to this recent incident, subsequent inspections by the operator determined that approximately 50 per cent of similar fittings required attention as a result of:

- incorrect insertion depth with ferrules set at the end of the tube (see above photograph); or
- ferrules had worked loose over a period of time because of improper fitting assembly at installation followed by exposure to vibration or pressure pulsations.

Materials such as MP35N alloy, used for ferrules for some compression fittings, are of a very high yield and tensile strength. This quality however, can prevent the ferrule from "biting" into the parent tube material if insufficient pressure and torque is applied when assembling the fitting.

What could go wrong?

Compression fitting ferrules exposed to vibration and pressure pulsations could work axially along the tube over a period of time if incorrectly installed or the tube compression fittings are composed of incompatible materials.

This event can potentially lead to a loss of containment of high pressure flammable vapour or fluid and subsequently result in a dangerous occurrence or major accident event.



Key lessons

A manufacturer of any plant has a general duty of care under the *OPGGGS Act 2006* to take all reasonably practicable steps to ensure the plant is designed and constructed to be safe and without risk to health. In addition, the manufacturer is responsible for carrying out the research, testing and examination necessary to identify, and eliminate or minimise, any risk to health and safety that may arise from the use of the plant.

Operators should carry out an audit of compression tube fittings and ensure that these fittings have been installed in accordance with the manufacturer's recommendations and that the ferrules remain in the correct location.

Operators are to ensure installation and inspection competency in personnel including contractors and third parties undertaking the fitting and maintenance of compression fittings. This may include the implementation of a maintenance audit regime that routinely inspects compression fittings subjected to vibration and pressure pulsations, with comprehensive and complementary training and procedures.

Recommended guidelines are available in the Oil and Gas UK publication HS016 *Management, Design, Installation and Maintenance of Small Bore Tubing System*.

Contact

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