

HIGH VALUE LEARNING



High Value Learning

Brittle failure of valve body bolting on double block and bleed (DBB) valves

Who could be interested in this?

All duty holders using DBB valves on their asset

What is this all about?

A UKCS asset has revealed multiple brittle fracture failures to the body bolting on Dublok DBB valves since 2023.

None of the failures to date have resulted in process release due to the remaining bolting providing sufficient redundancy in body integrity. Had the bolting failures exceeded the available redundancy, then there is the potential for the valve body to separate completely from the body adapter and

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cause a full-bore release from the pipework.

Valves were in service for approximately 20 years. The valve type affected is the Modular Integral Double Block and Bleed ball valve, supplied by Dublok to many UK operators in the period 2000-2010. Failures have been observed on a range of valve sizes and pressure ratings, up to 2500#. All failures noted to date have been on uncoated CRA material valves where no additional paint coating was applied over the electroplated body bolting.

Visual inspection of the corroded machine screws as well as “tap-testing” them was carried out on approximately 500 valves, with multiple additional instances of brittle failure exposed. Testing of the failed cap-head bolting showed abnormally high material hardness. The cause of the failure was determined as hydrogen induced cracking (HIC), with the source of the hydrogen being the external corrosion of the bolting.

Some things to consider?

- Duty Holders with assets where Dublok DBB valves are installed should identify where affected modular valves are installed, and carry out visual inspection and tap-testing of all body bolting to identify if any failures have occurred. Prevention of external corrosion should mitigate the likelihood of HIC affecting the bolting.
- Duty Holders should consider application of strong-back clamps to both valves where bolting failures are uncovered, and also proactively, as there are no reliable NDT techniques to determine the early onset of failure (UT was found effective in lab testing, but surface condition made onsite testing ineffective). Tap testing will only reveal failures where HIC is already highly progressed.
- Prioritization of clamp installation should be by external condition of body bolting and utilisation factor for specific valve size/pressure rating.

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