

Corrosion cracking of strain-hardened type 304 stainless steel bolts

Safety Flash Published on 9 May 2018 Generated on 28 January 2026 IMCA SF 10/18

The International Association of Oil & Gas Producers (IOGP) has published [Safety Alert #297](#) relating to the unexpected failure of certain kinds of strain-hardened Type 304 stainless steel bolts, (ASTM A193 B8, Class 2).

IOGP Life Saving Rules:



Bypassing safety controls

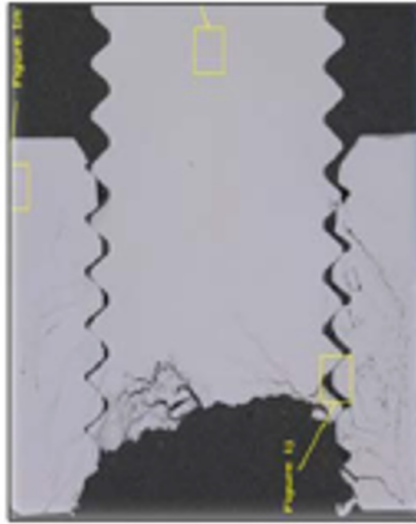
What happened?

The failure occurred at an offshore facility during a pneumatic leak test of gas piping exiting a test separator. The bolts that failed were operating at temperatures below 50°C. The failure has been attributed to chloride-induced stress corrosion cracking (CISCC).

The IOGP notes that:

“strain-hardening austenitic stainless-steel nuts and bolts to increase their strength may increase their sensitivity to CISCC and reduce their safe upper temperature limit. Other factors such as aggressive environments (e.g. offshore and coastal facilities and areas exposed to wet deluge testing) and increased stress/strain may also increase susceptibility to CISCC.”

Incident location & failed bolts



What actions were taken? What lessons were learned?

The IOGP's intent in sharing this is to help mitigate the risk of such failures occurring elsewhere in new or existing facilities. The following corrective actions and recommendations were made:

- Consider undertaking a desktop review to identify the number and location of Type 304/304L(B8) stainless steel nuts and bolts exposed to the marine environment.
- Consider conducting a visual survey to confirm the number and location of the nuts and bolts identified through the desktop review.
- Consider developing a prioritized plan to replace the nuts and bolts identified above with suitable nuts and bolts.
- Consider arranging for the disposal of all Type 304/304L nuts and bolts held in storage, both on site and off site.

IMCA Safety Flashes summarise key safety matters and incidents, allowing lessons to be more easily learnt for the benefit of the entire offshore industry.

The effectiveness of the IMCA Safety Flash system depends on the industry sharing information and so avoiding repeat incidents. Incidents are classified according to IOGP's Life Saving Rules.

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