

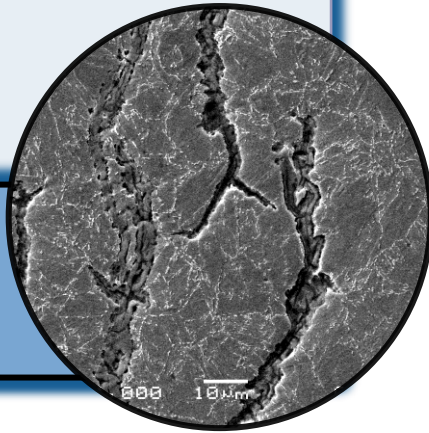
Environmentally Assisted Cracking in Upstream Oilfield



In oilfield metallurgy, Environmentally Assisted Cracking (EAC) takes place when the combination of a corrosive environment, a susceptible microstructure and stress result in catastrophic cracking. EAC can take different forms depending on the production environment. This infographic provides basic EAC definitions for upstream oil & gas as well as guidance for further reading.

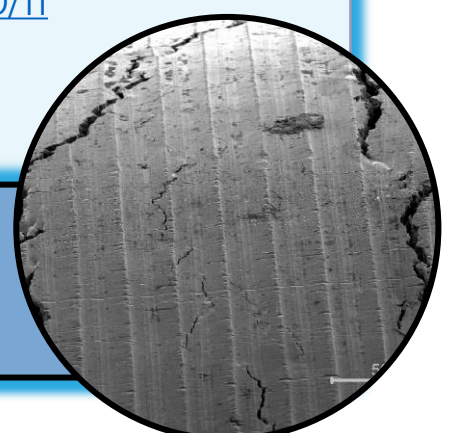


- **Description:** Sulfide Stress Cracking (SSC) is the cracking of metal under tensile stress and corrosion in the presence of water and H₂S.
- **Materials at risk:** Carbon and low alloy steels, CRAs.
- **Mitigating Actions:** Materials need to comply with NACE MR0175 and operate within the safe limits.
- **Further reading:**
 - [NACE MR0175](#)
 - [NACE 1F192](#)
 - [Corrosion 97041](#)
 - [EFC 16 and 17](#)



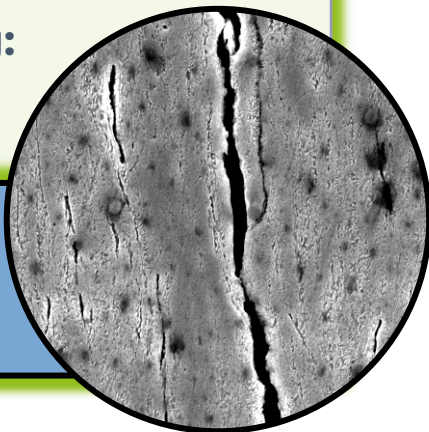
SSC

- **Description:** Stress Corrosion Cracking (SCC) is the cracking of metal involving anodic processes of localised corrosion and tensile stress.
- **Materials at risk:** Carbon and low alloy steels, CRAs.
- **Mitigating Actions:** Select suitable materials for the specific environment and design to controlled stress.
- **Further reading:**
 - [Nickel Institute TS No 10073](#)
 - [UKHSE ES/MM/10/11](#)
 - [Jones 2017](#)
 - [EFC 16 and 17](#)



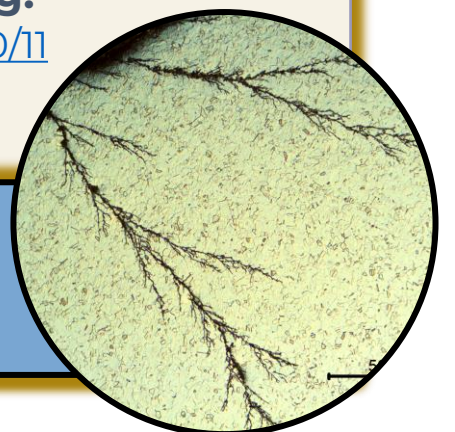
SCC

- **Description:** Hydrogen Induced Cracking (HIC) occurs when atomic hydrogen diffuses into steel and combines to form molecular hydrogen at discontinuities such as inclusions.
- **Materials at risk:** Carbon Steels (mainly flat rolled).
- **Mitigating Actions:** Control of steelmaking, segregation, inclusions and sulphur in steel. Confirm resistance by testing as per NACE TM0284.
- **Further reading:**
 - [Corrosion 99431](#)
 - [EFC 16](#)



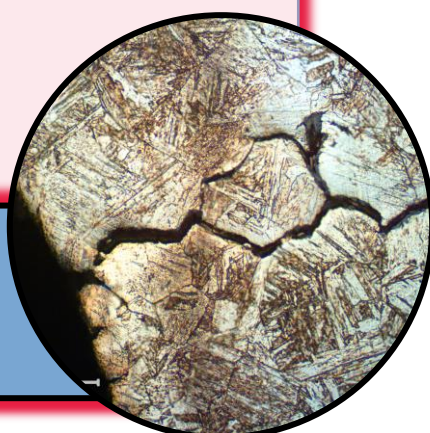
HIC

- **Description:** Chloride Stress Corrosion Cracking (CSCC) in upstream production occurs under tensile stress and in the presence of oxygen and chloride. Piping under insulation is at higher risk of CSCC.
- **Materials at risk:** Mainly austenitic stainless steels.
- **Mitigating Actions:** Select suitable CRA and insulation avoid chloride contamination.
- **Further reading:**
 - [UKHSE ES/MM/10/11](#)
 - [Corrosion 02423](#)



CSCC

- **Description:** Hydrogen Induced Stress Cracking (HISC) is the cracking of metal under stress due to hydrogen embrittlement where a cathodic protection system is the source of hydrogen.
- **Materials at risk:** 13Cr, Super 13 Chrome, duplex and super duplex stainless steel.
- **Mitigating Actions:** Design loads and CP for HISC and microstructure control.
- **Further reading:**
 - [Corrosion 2016-6981](#)
 - [DNVGL-RP-F112](#)



HISC

All EAC images courtesy of www.materials.life



OGC Energy provides expert advice to the oil and gas industry to meet regulatory compliance, assure business continuity and optimise expenditure by managing the risks associated with corrosion.

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