

Corrosion Mechanism:
CO₂ flow induced corrosion

Alloy:
Plain carbon steel, J-55

Equipment:
Gas well 2³/₈" production tubing

Corrosive Environment:
The production tubing is exposed to sweet natural gas containing 3.4% CO₂ at 2000 kPa and 5 °C. Produced brine has a low salinity.

Comments:
Carbon dioxide within the produced fluids provides an aggressive environment to the exposed steel. The gas velocity within the tubing is estimated at 9.7m/s which is high. Due to the high gas velocity, the majority of corrosion by-products that may eventually lead to a reduced corrosion rate is stripped away, providing bare steel to the corrosive well effluent. This corrosion mechanism is further impacted by the amount of solids or entrained liquids transferred with the gas stream.

Corrosion inhibitor will have limited effectiveness in reducing this type of attack.

Remedy:
Optimizing operational parameters such as increased well back pressure (reduced gas rates) or using larger diameter tubing will help to reduce severity of the issue. Changing metallurgy of the system can also improve the situation.

