S³P IN OIL & GAS APPLICATIONS

AVOID GALLING
REDUCE WEAR SIGNIFICANTLY
MAINTAIN CORROSION RESISTANCE
PROVEN REPRODUCIBILITY
Kolsterising®: Resistance against galling and corrosion

Natural gas and oil inherently contain a certain amount of hydrogen sulphide (H₂S). In combination with increased temperatures and pressure in environments containing chloride, sulphide stress cracking (SSC) can occur. Typically these conditions occur in oil and gas extraction, predominantly off-shore. Due to their corrosion properties, corrosion resistant alloys (CRA) are suitable for use in sour gas environments, but the wear properties can be insufficient. With Bodycote S³P, featuring Kolsterising®, it is possible to achieve the required wear resistance of CRAs whilst retaining the resistance to sulphide stress corrosion.

S³P processes, featuring Kolsterising®, are suitable for many austenitic, martensitic, and duplex stainless steels as well as nickel-based alloys relevant in the oil and gas industry. The surface hardness of these materials can be increased to >1000 HV0.05, while the martensitic grades can exceed 1400 HV0.05. The wear and galling resistance is thus significantly increased.

SSC resistance achieved

Compared with other diffusion processes such as nitriding, Kolsterising® does not impair the corrosion resistance. Furthermore, the cavitation resistance, galling resistance and fatigue strength is significantly improved by Kolsterising®.

The investigations were carried out and certified by independent laboratories. For application in sour gas environments, the S³P treatment of three materials is qualified according to NACE MR0175 (resistance against sulphide stress cracking). Numerous positive customer experiences and qualified applications exist. However, as this thermo-chemical surface process is currently not mentioned expressly in the corresponding standards (e.g. NACE MR0175), the corresponding treatment should be qualified before application. The results of these qualifications do not indicate negative influence on the SSC resistance in any of the materials and processes tested.

If you want to know more, we can help you! Please contact us for further information and certificates on other corrosion tests such as ASTM A262 or G48.

<table>
<thead>
<tr>
<th>Material</th>
<th>Treatment</th>
<th>SSC-resistant according to NACE MR 0175</th>
</tr>
</thead>
<tbody>
<tr>
<td>AISI 316L (1.4404)</td>
<td>K 33</td>
<td>✓</td>
</tr>
<tr>
<td>Duplex 2205 (1.4462)</td>
<td>K Duplex</td>
<td>✓</td>
</tr>
<tr>
<td>15-5PH (1.4545)</td>
<td>S³P M</td>
<td>✓</td>
</tr>
</tbody>
</table>

Overview of the alloys and processes tested by Bodycote S³P for resistance to sulphide stress cracking. We would be happy to supply you with the certificates.