Atmospheric Field Exposure of Duplex Stainless Steel to Marine – Offshore and Onshore – Environments

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This study was done as a collaboration between Kvaerner and Outokumpu. The aim of this study has been to gain knowledge about the atmospheric corrosion resistance of selected duplex stainless steels for two marine exposure sites in Norway, one offshore (partly sheltered at an offshore platform) and one onshore (open condition in a yard close to splash zone).

Offshore exposure site was found to have the most aggressive atmospheric exposure conditions. The investigated duplex stainless steels showed excellent resistance to pitting corrosion. However, super duplex stainless steel (2507) was the only grade that was resistant to crevice corrosion under offshore exposure conditions.

Selecting suitable stainless steel grade for marine environments in the North Sea depends on relevant parameter for the specific application. For structural applications max corrosion attack depth could be considered. For aesthetic use of stainless steel the appearance rating method could be considered instead.

Finally, a discussion on the influence of warmer tropical marine climates typically encountered in South-East Asia with both dry period with high temperatures and humid rain period compared to the much colder North Sea, a division of the northern part of the Atlantic Ocean.