Article



# SELECTION OF DUPLEX STEEL WELDING PROCESS USING LOW CYCLE FATIGUE TEST

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## Abstract

Duplex steels are an austenitic-ferritic type of stainless steel. They have better mechanical strength, corrosion resistance, and fatigue strength in aggressive environments compared to traditional stainless steels in the food industry such as AISI 316 or 304. However, duplex steels have poorer weldability because of the inability to achieve higher welding speeds due to the poor weld penetration and fluidity in the weld pool. That is why the responsible selection of the welding process is important for manufacturing components and structures made of duplex steels.This paper presents the investigation of three different welding processes (BW.141, FW.136, and FW.141) for duplex steel LDX 2101 tee joints. For investigation x-type (cruciform) specimens were tested. The initial static tension experiment has not shown a significant difference in the strength of specimens with different welding processes. Therefore, it was decided to conduct a low-cycle fatigue experiment. Stress controlled fatigue test with pulse type cycle loading was chosen for this analysis. Three specimens for each welding process were tested. Low cycle fatigue results have revealed that the x-type specimen with FW.136 welding process has held out the highest number of cycles to failure. Compared to BW.141 and FW.141 welding processes the durability of the x-type specimen with FW.136 welding was accordingly 1.2 and 1.9 times higher.

**Keywords:** Duplex steel, welding, low cycle fatigue, x-type specimen test

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