

Article

# Slurry erosion resistance of ferritic X10CrAlSi18 and austenitic AISI 304 stainless steels

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**Abstract:** Surface degradation due to an interaction of solid particles (erodents) suspended in the liquid medium with an eroded surface is called slurry erosion. Slurry erosion causes an economic problem in many industries like maritime industry, oil and gas extraction and in mining. This type of erosion depends on factors, which are divided into three main categories: operating conditions, properties of eroding particle and target material. In the present work, the slurry erosion tests were performed using a slurry pot tester. X10CrAlSi18 ferritic and AISI 304 austenitic stainless steels were tested in as-received conditions. The erosion tests were performed at impact velocity of 9 m/s and impact angle of 90°. The solid-liquid mixture was prepared by mixing roundness steel solid particles and the concentration of erodents was 12.5%. The purpose of these tests is to compare the erosion resistance of two single-phase steels with different microstructures. The results showed, that AISI 304 steel achieved better erosion resistance than X10CrAlSi18 steel. Final mass losses were about 93% lower. The reason is higher ability of austenitic steel to strain hardening, the strain hardening effect was about 33% and 143% respectively for ferritic and austenitic steels. In both cases, the erosion rate increased to its maximum value, then decreased and remained at a similar level. Taking into account the surface roughness, parameters Ra and Rz decreased with increasing surface hardness. Furthermore, to identify the dominant mechanism of slurry erosion, the erosion efficiency parameter was used,  $\eta$ . The conducted study showed a significant influence of the microstructure and mechanical properties of the eroded material on the erosion resistance.

**Keywords:** slurry erosion; erosion; degradation, hardness, roughness; stainless steel

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