

Article

# The comparison of cavitation erosion resistance of austenitic stainless steels 1.4541 and 1.4301

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**Abstract:** The one of the common causes of damage of water turbines, marine propellers, pumps or other components of hydraulic machinery, which contribute to their faster failure, is the cavitation erosion. The cause of cavitation erosion is the phenomenon of cavitation which is caused by formation and collapse of bubbles in liquids that are subjected to frequent pressure change. Cavitation bubbles with the possibility of several times of growth and imploding arise from cavitation embryos, which are insoluble gases contained in the liquid. The cavitation tests were performed in cavitation tunnel equipped with system of the barricades. The following flow velocity values were obtained:  $2.30 \text{ m}\cdot\text{s}^{-1}$ ,  $2.49 \text{ m}\cdot\text{s}^{-1}$ ,  $2.67 \text{ m}\cdot\text{s}^{-1}$  and  $2.83 \text{ m}\cdot\text{s}^{-1}$ . The tested materials were two types of the austenitic stainless steels—1.4301 and 1.4541 after heat treatment. The study compares the impact of mechanical properties, the chemical composition of steel and the flow velocity on cavitation resistance. The test results showed that steel 1.4301 had better cavitation erosion resistance than 1.4541 steel at all set flow rates. The differences in weight loss and roughness (Ra parameter) were about two times higher for 1.4541 steel compared to 1.4301 steel. Moreover, the similar mechanisms of surface degradation were observed. The conducted tests showed a significant influence of the fluid flow, chemical composition and mechanical properties on the cavitation erosion resistance.

**Keywords:** cavitation erosion; austenitic stainless steel; surface degradation

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