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Assessment of Mechanical Properties and Corrosion Resistance of Low Ni Austenitic Stainless Steels for Application in LNG Carrier Pipes

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300 series austenitic stainless steels, which are composed of 9~12% Ni content, have been utilized principally as pipes in LNG carriers due to their outstanding corrosion resistance and cryogenic mechanical properties. However, since the increase in the price of Ni has led to a rise in steel prices, the development of low Ni stainless steel has been continuously required. In this study, the mechanical properties and corrosion resistance of 304L and 201LN austenitic stainless steels were investigated according to classification rules to assess their applicability for LNG carrier piping. Mechanical properties were evaluated through tensile test and Charpy V-notched impact test at -196 degree. Corrosion resistance was assessed via potentiodynamic polarization tests in 3.5% NaCl solution and marine atmosphere simulated solution. As a result, the mechanical properties of 304L and 201LN were indicated to be equivalent and satisfied the classification standards. Commercial 201LN showed inferior corrosion resistance compared to 304L, but through compositional modification, equivalent corrosion resistance to 304L could be achieved.