

선급 극후물재의 취성균열 전파 정지 인성에 미치는 용접변수의 영향

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Effect of welding variables on the crack arrest toughness of thick steel plate

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Abstract

As the size of containership increased over 14,000TEU, thick steel plate with high strength has been used. The plate thickness increased over 70mm and yield strength of the steel plate was around $47\text{kg}_f/\text{mm}^2$. Many researchers reported that the thick welded plate has low crack arrest toughness. They noticed the crack arrest ability is dependent on the plate thickness. In other words, brittle crack propagates straightly along the welded line and make abrupt fracture in the thick plate which causes low K_{ca} .

In this study, the other factors, especially welding heat input, to cause low crack arrest toughness was investigated for thick steel plate welds. EH grade steel plates were used in this study and 50 to 80 thick plates were tested to confirm thickness sensitivity. Electro gas welding (EGW) and flux cored arc welding (FCAW) were adopted to prepare the welded joints. Temperature gradient ESSO test was performed to measure K_{ca} values with the variation of welding variables.

As a result of this study, regardless of plate thickness, welding heat input to cause welding residual stress around crack path is a key factor to control the brittle crack propagation in welded joints.

Key Words : Crack arrest toughness, EH grade, ESSO, Welding heat input, Crack path, Electro gas welding, Flux cored arc welding, Residual stress