

**Effect of welding parameters on residual stress in type 420  
martensitic stainless steel**

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Abstract

The effect of welding parameters on residual stress induced by shrinkage of weldment and metallurgical phase transformation in type 420 martensitic stainless steel has been investigated. In this study, type 1018 low carbon steel was adopted as the base metal and type 420 martensitic stainless steel was used for the filler metal during submerged arc welding. The thermal cycles at various locations were recorded and dilatometry was used to examine the martensite phase transformation temperatures. The experimental results show that the residual stress increased with the heat input during welding. Using a higher welding heat input increased the amount of heat going into the weldment and elevated the martensite phase transformation temperature. Residual stresses could not be significantly reduced by increasing preheat (interpass) temperature while welding. Using higher preheat temperature conditions could elevate the equilibrium temperature and the martensite phase transformation temperature and increased the heat input to the weldment.