

A
Dissertation report
On
**"Characterization of Hot wire Narrow-Gap TIG
Welded Austenitic Stainless Steel Pipe"**

Submitted in partial fulfilment of the requirement
Of the degree of

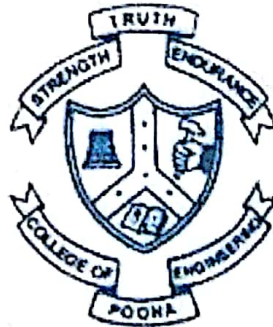
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ABSTRACT

Austenitic Stainless Steels, particularly AISI 304 have excellent corrosion resistance, good weldability and formability, good resistance to hydrogen embrittlement, in addition to high ductility and toughness. AISI 304 is widely used as nuclear structural materials for reactor coolant piping, fuel storage tanks and pressure vessels. Several attempts have been made by researchers to make the prototype models for fabrication feasibility studies for higher-thickness stainless steels toward mechanical and metallurgical properties for applications like PFBR vacuum vessel development and others. Even though the austenitic stainless steel weld metal data are well reported, data on the very thick weld metals in terms of mechanical properties and microstructures are inadequate. Narrow-gap TIG (NG-TIG) welding is one of the key welding methodology which is suitable for the welding of different types of materials. Especially for thick plate, NG-TIG welding is the most effective methodology with low cost and low heat input.

In this work the welding between 304SS pipes was executed by hot-wire narrow-gap TIG welding process using specially designed TIG torch on a narrow-groove joint preparation. The primary objective of the present work is to study the effect of narrow-gap TIG welding on the microstructure and mechanical properties of 40-mm thick 304 SS joints, and elucidate the relationships between microstructure and mechanical properties.

Keywords: 304SS, Narrow-Gap TIG welding, microstructure, mechanical properties, etc