# Effect of Solid Solution and Aging Treatment on Mechanical Properties of ３０４ Stainless Steel Processed


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**ABSTRACT**

To study the effect of solid solution and aging treatment on mechanical properties of 304 austenitic stainless steels processed with PAW and/or TIG weld. In the experimental design, there are four solid solution temperatures which are 1050、1100、1125、and 1150°C, with the solution time ranging form 3 min to 120 min. After that, specimens are carried out to 650°C aging temperature and with the aging time ranging form 60 min to 600 min. Examining the microstructure and hardness, also analyzing the fracture surface and mechanical properties on every specimens. Hopefully can find the best welding and heat treatment parameters to improve and obtain the optimum mechanical properties of 304 stainless steels. From the experimental results shown that the 304 stainless steel always exists the second phases whether to carry out solid solution treatment or not. For single pass PAW weld, it has best mechanical properties at 1000°C solid solution and with short solution time. However, with solid solution temperature increased, the grain size and elongation slightly increased, but the tensile strength and toughness were decreased distinctly. At 650°C、60 min aging condition, we can observe some precipitates along the grain boundary. It also reveal that the tendency of precipitation along the grain boundary with solid solution treatment is easier than not. After 600 min long aging time, the mechanism of precipitates precipitation is similar to the short aging time. These precipitates are not only discovered on the grain boundary, but also precipitated in the flow line of second phases by SEM analysis. In exert second TIG welding pass, the mechanical properties of dual pass welds are better than the single pass welds. The mechanical properties will further increase with applying the solid solution treatment, especially at the elongation property. Therefore, suggesting the thermal treatment for 304 austenitic stainless steels, is at 1100~1125°C with short treating time, then can achieve the best combination of mechanical properties. Hopefully, from the results of this investigation can help the traditional metal working industries to advance the knowledge and technique on 304 austenitic stainless steels, with more extensively applications



Keywords : 304 Stainless Steel ; PAW Weld ; TIG Weld ; Solid Solution Treatment ; Aging Treatment ; Mechanical Properties


**Table of Contents**



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