

EFFECT OF δ -FERRITE ON THE MECHANICAL PROPERTIES OF 17-4 PH STAINLESS STEEL

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ABSTRACT

17-4 PH Stainless steel is a well-known martensitic precipitation hardenable stainless steel (equivalent to ASTM/AISI 630) which is generally used for the nuclear, chemical, aircraft and naval industrial applications, as those applications demands good mechanical properties with corrosion resistance. 17-4 PH Stainless steel generally used after solution annealing followed by ageing or hardening conditions. The annealing condition imposes ductility and softness within the material which possesses many desirable characteristics for austenitic stainless steel. On the other hand the hardening condition imposes the high strength and hardness within the material which possesses many desirable characteristics for martensitic stainless steel. The current work is focused on solution annealing followed by hardening. Two different solution annealing conditions are taken into consideration and each solution annealing conditions is further carried out for two different hardening conditions. During the evaluation of 17-4 PH stainless steel for mechanical properties, large stringers of delta-ferrite was observed in one of the heat supplied. The current project is focused towards evaluation of delta ferrite on the mechanical properties of 17-4 PH stainless steel. Two different heats as mentioned above were taken for comparison purposes, out of those two conditions one heat does contain large stringers of delta ferrite and the other does not contain the same. By performing several mechanical tests it is clearly shows that the presence of delta ferrite results a little effect on the Ultimate tensile strength, impact toughness and hardness of the material, but certainly there is no effect on the Yield properties of the material.

Keywords: 17-4 PH stainless steel, precipitate hardening, delta-ferrite, mechanical properties.

