Effect of a two-step solution heat treatment on the microstructure and mechanical properties of 332 aluminium silicon cast alloy

ABSTRACT

This paper investigated the effect of a two-step solution heat treatment on the mechanical properties and silicon-rich phase of 332 aluminium alloy. Traditional single-step T6 solution treatment (495 °C/6 h) increased the hardness value of the alloy by 5.96%, increased the tensile strength by 20.42% and reduced the elongation by 3.97%. Two-step solution treatment of the alloy (495 °C/2 h followed by 515 °C/4 h) increased the hardness value by 6.64%, increased the tensile strength by 16.01%, and reduced the elongation by 4.67% compared to the as-cast samples. Both solution treatments were followed by hot water quenching (75ï 90 °C) and artificial aging at 250 °C for 4 h. The difference in mechanical properties after heat treatment can be linked to the refinement and the spheroidisation of the silicon-rich phase in the alloy.

Keyword: Heat treatment; Mechanical properties; Aluminum; Aluminum alloys