Elimination of the negative effect of Fe-rich intermetallic phases in secondary (recycled) aluminium cast alloy

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Improved mechanical properties of secondary alloys are strongly dependent upon the morphologies, type and distribution of the second phases, which are in turn a function of alloy composition and cooling rate. In Al-Si-Cu type alloys, however, Fe showed to have the most detrimental effect on ductility of all of the common impurities. Iron impurities can either come from the original bauxite ore or be acquired during subsequent melting, remelting and casting, e.g. by contamination from the melting pot etc. The shape of iron compounds is more influential than the quantity of those iron compounds. Therefore was used heat treatment of experimental material that consisted of solution treatment for 2, 4, 8, 16 or 32 hours at temperatures 515 and 525 °C; water quenching at 40 °C and natural aging for 24 hours at room temperature. In that smaller cooling rate setting causes granular structure and lower values of mechanical properties by casting into the sand moulds (sand casting) and higher cooling rate setting causes fine-grained structure and higher values of mechanical properties by casting into the metallic moulds (chill casting), were used AlSi9Cu3 cast alloy cast in to the sand and the metallic moulds.

Keywords: sand casting, chill casting, secondary aluminium alloys, heat treatment, Fe-rich phases

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