Investigating the factors affecting microstructure of A356 alloy EPC illumination

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ABSTRACT

In this study, the effects of EPC process parameters including coating, vacuum extraction and temperature of solid solution treatment on the microstructures of A356 alloy illumination cover casting were evaluated to acquire the optimal producing condition for EPC A356 aluminum alloy castings. The results of this study are listed by the following：The microstructures of EPC A356 aluminum alloy illumination cover casting were significantly changed by different producing condition. Through OM or SEM+EDS observations and analyses, the microstructure show that the eutectic remelting zones were significantly increased to decrease the mechanical properties of castings as the solid solution temperature was increased to above 530°C. The EDS analyses also show that the eutectic remelting zone contains compositions of Al、Mg and Si, which Al is from eutectic Al, Si is from eutectic Si and Mg is from Mg2Si. Therefore, the eutectic remelting zone is the ternary eutectic mixture. In addition, the aluminum dendrite, the eutectic silicon, the porosity, the Fe-rich or Mg-rich intermetallic compounds are varied for different solid solution temperatures; the influences on the mechanical properties of EPC A356 aluminum castings are obviously dissimilar. The amounts of porosity and inclusions in the EPC aluminum castings would be largely reduced when the vacuum extraction power was changed from 7.5 hp to 30 hp. Compared with the original Ashland coating carried on the PS pattern, the amounts of porosity and inclusions in the castings are greatly decreased and the mechanical properties of EPC aluminum castings are increased as the PS pattern was covered with the coating added with wood fibers in the Ashland refractory.

Keywords : EPC process、A356 aluminum alloy、solid solution temperature、coating、vacuum extraction、microstructure

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