

高质量球墨铸铁化学成分控制范围评述

刘金城, 白新社, 白佳鑫

(欣特卡斯特贸易(北京)有限公司, 北京 100027)

摘要: 自从 1940 年代发明和大批量球墨铸铁以来, 人们就一直在研究合金元素以及微量元素的影响对于球墨铸铁组织性能的影响, 探索如何选择最佳的化学成分从而获得最优的机械性能。1970 年蒂勒曼 (Thielemann) 首次考虑到对球化有害的微量元素的作用提出了关于评价铁水球化的微量元素定量的评价公式。之后不同的研究工作又根据对不同基体组织的需求提出了微量元素和合金元素的珠光体公式和铁素体公式。

近年来由于铸铁成分检测技术的进步和分辨率的提高, 以及由于对低温高冲击韧性球铁的需求, 各国对于如何选择最佳的化学成分从而获得最优的机械性能进行了深入研究, 包括微量元素对石墨生核和长大的影响, 对球化的有害影响以及抵消, 对珠光体和铁素体的影响, 以及对晶界夹杂物的影响。本文评述了国内外关于球墨铸铁合金元素和微量元素选择的判据, 根据我国情况提出了相应的化学成分选择范围。采用高纯球铁生铁对于高要求的低温高冲击韧性球铁的化学成分控制和铁水冶金质量提高都是非常有益的。

A Review of the Chemical Control Limits for High Quality Ductile Iron

LIU Jin-cheng, BAI Xin-she, BAI Jia-xin

(SinterCast Trading (Beijing) Co., Ltd., Beijing 100027, China)

Abstract: Since the invention and start of volume production of ductile iron in the 1940's people have been studying the influence of trace and alloying elements on the structure and properties of ductile iron and try to explore the optimum composition for obtaining best properties. In 1970, Thielemann considered the effect of trace elements and developed an evaluation number for obtaining good nodular graphite. Several researches also developed equations trying to predict pearlite and ferrite percentage.

Due to the technology progress and resolution improvement in cast iron test and the need for low temperature impact strength ductile iron, the influences of trace and alloying elements on the structure and properties of ductile iron have been further studied, including influence on graphite nucleation mechanisms, effects of harmful trace elements and their neutralization, effects of elements on matrix and impurities in intercellular boundaries. This paper reviews home and international criteria on chemical composition control and proposes the chemical control limits for high demand low temperature impact strength ductile iron according the home conditions. The use of high purity pig iron is beneficial for chemical control and improving metallurgical quality of iron melt