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Study on the Effect of Direct Reduced Iron on the Nitrogen Content in Electric Arc Furnace Steelmaking

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As a typical harmful element in steel, the presence of nitrogen can seriously affect the performance of steel materials. Restricted by raw materials, equipment and process conditions, the nitrogen content of electric furnace steelmaking is high, which cannot meet the quality requirements of high-grade sheets such as automobile sheet and silicon steel. The use of direct reduced iron to control the nitrogen content in electric furnace steelmaking is a feasible technical route. In this study, a pilot experiment was carried out in a 10t electric furnace using direct reduced iron (HBI in this study), and the results showed that: for the heats without hot heel, the total HBI ratio increases to 40%, and the nitrogen content of steel can reach 40 ppm or less when it is completely melted, and for the heats with hot heel, the nitrogen content of steel when it is completely melted is more obvious with the change of the total HBI ratio, and it can reach nearly 35 ppm when the total HBI ratio increases to more than 30%. In the experimental process with the oxygen inject, the carbon content of steel continues to decrease, while the nitrogen content of steel shows a trend of decreasing and then increasing, the inflection point occurs in the carbon content of 0.20% to 0.56%, indicating that under the process conditions of this equipment, for the carbon content of more than 0.56%, oxygen injection decarbonization will be effective in denitrogenation, and when the carbon content is less than 0.20%, attention should be paid to avoiding the increase of nitrogen content.

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