Development of solid waste-based flux with high alkalinity, high oxidation and low melting point and its application in out-of-furnace dephosphorization of low silicon hot metal

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ABSTRACT

The green production of the steelmaking process has urgent requirements for fluorine-free fluxes. In this article, a new solid waste-based slagging flux was applied in the external dephosphorization test of low silicon hot metal to replace the traditional fluorite-lime dephosphorization slag. The results show that under laboratory conditions, the new flux is used for smelting low-silicon molten iron with a phosphorus content of 0.10~0.13wt%, the temperature of the molten iron is 1350°C, and the slag amount is controlled at 2%. Within 10 minutes of smelting, the dephosphorization rate of the molten iron reaches more than 50%. When making slag with new flux, the slag melting time is about 40 seconds, and the P_2O_5 content in the final slag is higher than 8wt%. In the industrial test of a 150t molten iron ladle, under the same molten iron conditions, an out-of-furnace dephosphorization test was conducted in the KR process. The flux material consumption per ton of steel was 8~10kg. Within 15 minutes of smelting, the dephosphorization rate of the molten iron was about 30%. During flux slag making, the slag melting time is about 3 minutes, and the P_2O_5 content in the final slag is higher than 6wt%. This new solid waste-based flux has significant cost advantages and out-of-furnace dephosphorization effects and is expected to become the benchmark for a new generation of fluorine-free steelmaking fluxes.