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Cold Agglomerated Iron Ore Briquettes for Blast Furnace: Refractory Performance of Runner and Mud Gun

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According to the World Steel Association, the steelmaking chain is responsible for almost 8% of global CO2 emissions. In this context, a new product has been developed: a cold agglomerated briquette composed of iron ore fines that significantly reduces its carbon footprint, contributing to the decarbonization of the steelmaking chain. The developed binder technology, based on sodium silicate, allows the production of a briquette with the physical, chemical, and metallurgical characteristics needed for the Blast Furnace (BF). This material has properties comparable to high-performance ferrous burdens, such as pellets and sinter, and can reduce CO2 emissions in the BF process by up to 10% when it replaces these materials. The technology has been proven through industrial trials, demonstrating the stability of sodium silicate at high temperatures and excellent sodium purge levels by the BF slag. To better understand the impact of this new technology on the behavior of the main refractories that support BF operation and process, such as mud gun and runner's refractories concrete, the present work was carried out. The study evaluates the behavior of a typical BF slag containing up to 5% Na2O in its chemical composition, representing a high level of briquettes in the BF ferrous burden mix. Firstly, a thermodynamic study was conducted to verify how this oxide could impact the corrosion ability of slag. Secondly, an experimental dynamic wear and corrosion study at lab scale was performed. The overall results showed that for different kinds of materials tested, both regular and high-performance refractories, the slags tested do not compromise their performance, providing important insights for BF operators.

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