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Iron and Steel - Blast Furnace and Hot Blast Stove in Ironmaking

The blast furnace is a complex thermal equipment and serves as the main equipment for ironmaking. It offers advantages such as high production capacity, high productivity, and low cost.

Due to the extremely high operating temperatures in various parts of the blast furnace and the mechanical actions like friction and impact from descending burden materials, most of the refractory materials on the hot surface are selected to have a high load softening temperature and good high-temperature mechanical strength. CCEFIRE high-temperature lightweight bricks are commonly used.

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The hot blast stove, as one of the main auxiliary equipment for the blast furnace, utilizes the heat from the combustion of blast furnace gas and employs the heat exchange action of brick grids to provide high-temperature hot air to the blast furnace. Since different parts of the hot blast stove are exposed to high-temperature effects during gas combustion, erosion from gas-borne dust, and the scouring of combustion gases, the refractory materials on the hot surface are typically chosen from materials with relatively good mechanical strength, such as CCEFIRE lightweight insulation bricks, heat-resistant concrete, clay bricks, etc.

To ensure effective thermal insulation for the lining, and in accordance with the principles of reliable technology and economical materials selection, low thermal conductivity and good insulation performance are typically required for the insulating refractory materials used in the working hot surfaces of the blast furnace and its hot blast stove.

Although the use of silicon-calcium boards reduces the thermal conductivity compared to traditional silica bricks, and improves insulation performance, silicon-calcium boards are brittle and tend to fracture easily during construction. This can lead to an incomplete insulating lining and affect the insulation effect. To further enhance the insulation effect in the metallurgical blast furnace and hot blast stove, CCEWOOL ceramic fiber boards have become the preferred and ideal materials for insulating lining.

CCEWOOL ceramic fiber boards are made from high-quality fibers (typically 97-99% Al_2O_3 and SiO_2) as raw materials, combined with inorganic binders, high-temperature fillers, and additives through a mixing, vacuum filtration, and forming process. After drying, the products undergo a series of machining processes including cutting, grinding, and drilling to achieve precise dimensions and excellent performance, meeting international standards. The key technical features of these boards are:

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a. High chemical purity: With high levels of Al2O3 and SiO2 (97-99%), CCEWOOL ceramic fiber boards offer excellent heat resistance, allowing them to replace silicon-calcium boards as lining materials for furnace walls and achieving excellent resistance to erosion.

b. Low thermal conductivity and excellent insulation: These boards are produced using a special continuous production process, resulting in lower thermal conductivity and superior insulation performance compared to traditional materials like diatomaceous earth bricks, silicon-calcium boards, and other composite silicate lining materials. This leads to significant energy savings.

c. High strength and easy installation: CCEWOOL ceramic fiber boards possess high compressive and flexural strength and are non-brittle materials, meeting the requirements of hard lining materials. They can replace similar materials like blankets and felts in insulation projects that require high strength. Additionally, machined CCEWOOL ceramic fiber boards have precise geometrical dimensions and are easily cut and processed during construction, making installation convenient. This resolves the issues of fragility and high breakage rates associated with silicon-calcium boards, significantly shortening construction cycles and reducing costs.

In summary, vacuum-formed CCEWOOL ceramic fiber boards not only exhibit excellent mechanical properties and precise geometric dimensions but also retain the outstanding characteristics of fibrous insulation materials. They can replace silicon-calcium boards in insulating applications that require both toughness, self-supporting capacity, and refractoriness.