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CCEWOOL®
INSULATION FIBER

Metallurgical - Hood-type furnace

A hood-type furnace is a piece of equipment used for the bright annealing and heat treatment of workpieces. It falls under the category of intermittent variable-temperature furnaces, with operating temperatures typically ranging from 650 to 1100°C, following prescribed heating profiles over time. Depending on the loading configuration, hood-type furnaces are classified into two main types: square hood-type furnaces and round hood-type furnaces. The primary heat sources for hood-type furnaces are usually gas, followed by electricity and light oil. They typically consist of an outer hood, an inner hood, and a furnace base, with the combustion system often located on the outer hood. The outer hood is equipped with insulating and heat-retaining layers, while the workpieces are typically placed inside the inner hood for heating and cooling.

Hood-type furnaces exhibit excellent gas tightness, minimal heat loss, and high thermal efficiency. Moreover, they do not require furnace doors, lifting mechanisms, or various mechanical drive systems, making them a cost-effective choice. Consequently, hood-type furnaces find widespread applications in the heat treatment of workpieces. Achieving lightweight and energy-efficient hood structures is crucial, with refractory fiber materials playing a fundamental role.

The fundamental attributes of CCEWOOL refractory fiber, such as low thermal conductivity, low heat storage capacity, and low bulk density, make it highly suitable for use in heating hoods. Specific performance characteristics are as follows:

1. Broad temperature range and versatile applications:

With advancements in refractory fiber production and application technology, refractory fiber products are now available in various grades to meet temperature requirements ranging from 600°C to 1500°C. This versatility caters to the diverse needs of industrial furnaces across different sectors.

2. Low bulk density:

The bulk density of refractory fiber blankets typically ranges from 96 to 160 kg/m3, approximately one-third of lightweight bricks and one-fifth of lightweight refractory castables. This not only saves steel materials for new furnace designs but also facilitates handling and transportation, contributing to the internationalization of industrial furnace technology.

3. Low heat capacity and minimal heat storage:

Refractory fiber products exhibit significantly lower heat capacity compared to refractory bricks and insulation bricks. The heat capacity of refractory fiber products is approximately 1/14 to 1/13 that of refractory bricks and 1/7 to 1/6 that of insulation bricks. This reduction in heat capacity can result in significant fuel savings for intermittent operation in hood-type furnaces.

4. Easy construction and short installation cycles:

Due to the excellent elasticity of fiber blankets and blocks, compression can be predicted, and there is no need to leave expansion joints during construction. The construction process is straightforward and can be performed by skilled workers.

5. Immediate use without the need for curing:

When using a full fiber lining, and if not constrained by other metal components, the furnace can be quickly raised to the required process temperature after construction. This not only improves the effective utilization of industrial furnaces but also reduces fuel consumption for non-production purposes.

6. Extremely low thermal conductivity:

Refractory fiber exhibits an exceptionally low thermal conductivity. For instance, at a density of 128 kg/m3, high-alumina fiber blanket has a thermal conductivity of only 0.22 (W/m·K) at a hot face temperature of 1000°C.

7. Excellent chemical stability and resistance to gas flow erosion:

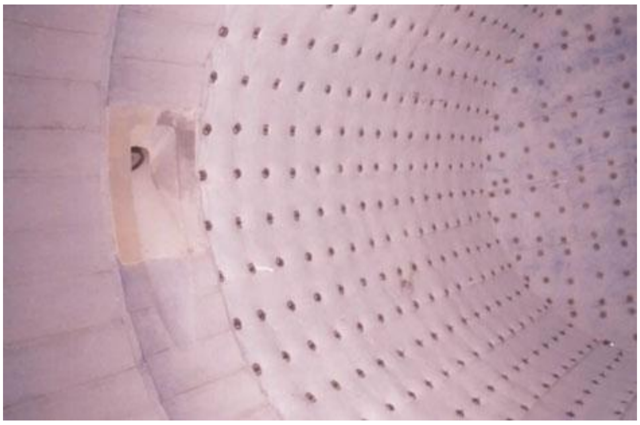
Refractory fiber is an ideal choice for high-temperature and chemically aggressive applications. Additionally, refractory fiber modules, formed by continuous folding of spun fiber blankets while maintaining a certain compression ratio and surface treatment, can withstand gas flow erosion at speeds of up to 30 m/s.

The application structure of ceramic fiber

The common lining structure of the heating cover

The burner area of the heating cover: It adopts a composite structure of CCEWOOL ceramic fiber modules and layered ceramic fiber carpets. The material of the back lining blankets can be one grade lower than the material of the layer module material of the hot surface. The modules are arranged in “a battalion of soldiers” type and fixed with angle iron or suspended modules.

The angle iron module is the easiest way for installation and use as it has a simple anchoring structure and can protect the flatness of the furnace lining to the greatest extent.



Above-the-burner areas

A layering method of CCEWOOL ceramic fiber blankets is adopted. Layered furnace lining generally requires 6 to 9 layers, fixed by heat-resistant steel screws, screws, quick cards, rotating cards, and other fixing parts. High-temp ceramic fiber blankets are used about 150 mm close to the hot surface, while the other parts use low-grade ceramic fiber blankets. When laying blankets, the joints should be at least 100 mm apart. The inner ceramic fiber blankets are butt-joined to facilitate construction, and the layers on the hot surface take the overlapping method to ensure the sealing effects.

The application effects of ceramic fiber lining

The effects of the full-fiber structure of the bell-type furnaces' heating cover have remained very good. The outer cover that adopts this structure not only guarantees the excellent insulation, but also enables easy construction; therefore, it is a new structure with great promotional values for cylindrical heating furnaces.