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Petrochemical - Hydrogenation furnace

A hydrogenation furnace, as a type of tube furnace, is a heating device used to purify and refine feedstock oil through processes like hydrogenation, cracking, and isomerization at high pressure (100-150 kg/cm2) and temperature (370-430°C). These processes help remove impurities such as sulfur, oxygen, and nitrogen from the feedstock oil while saturating olefins, resulting in the purification and refinement of the feedstock oil. Depending on the type of feedstock oil being refined, there are different types of hydrogenation furnaces, including diesel hydrogenation furnaces, residue hydrogen desulfurization furnaces, and gasoline refining hydrogenation furnaces.

The structure of a hydrogenation furnace is similar to that of a typical tube furnace and can be cylindrical or box-shaped. Each furnace consists of a radiation chamber and a convection chamber. In the radiation chamber, heat transfer primarily occurs through radiation, while in the convection chamber, heat transfer primarily occurs through convection. The furnace temperature for hydrogenation processes is typically around 900°C. Given these characteristics, refractory fiber lining is generally only used for the radiation chamber walls and roof. The convection chamber is typically lined with refractory castables.

Since the furnace temperature in a hydrogenation

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furnace is generally around 900°C, and the atmosphere inside the furnace is reducing, based on our years of design and construction experience and considering the presence of a significant number of burners distributed at the furnace bottom, side walls, and roof, the lining materials for a hydrogenation furnace typically include lightweight bricks with a height of 1.8-2.5 meters for specific areas. Other areas use CCEWOOL zirconium alumina-type fiber components as lining materials for the hot face, with CCEWOOL RCF Blanket S used as refractory fiber components and backing materials alongside lightweight bricks.

The form of fiber lining installation arrangement:

According to the characteristics of the anchoring structure of the fiber components, the furnace walls adopt "herringbone" or "angle iron" fiber components, which are arranged in the same direction along the folding direction. The fiber blankets of the same material between different rows are folded into a U shape to compensate for fiber shrinkage.

For the central hole hoisting fiber components installed along the central line to the edge of the cylindrical furnace at the top of the furnace, the "parquet floor" arrangement is adopted; the folding blocks at the edges are fixed by screws welded on the furnace walls. The folding modules expand in the direction towards the furnace walls.

The central hole hoisting fiber components at the top of the box furnace adopt a "parquet floor" arrangement.