

Article Overview

Steel ladle needle pigtails are used in molten steel ladles to inject inert gases, such as argon, for stirring, degassing, and temperature control during secondary metallurgy.

Function in Steelmaking

Steel ladle needle pigtails are specialized components installed in the bottom of steel ladles. They serve as conduits for inert gas injection, typically argon, into the molten steel bath. This process, known as argon purging, is essential for:

- o Homogenizing temperature and composition of the molten steel
- o Removing dissolved gases such as hydrogen and nitrogen (degassing)
- o Floating non-metallic inclusions to the slag layer for cleaner steel
- o Enhancing heat transfer within the ladle to maintain optimal casting temperatures

Placement and Design

Needle pigtails are often connected to porous plugs at the ladle bottom. The design allows controlled and uniform gas flow into the steel bath. The term "pigtail" refers to the coiled or bent shape of the gas delivery tube, which helps distribute gas evenly and withstand thermal stresses .

- o Porous plugs: Provide fine gas dispersion to avoid turbulence and splashing
- o Needle pigtails: Direct gas precisely into the molten steel, often in multiple locations for uniform stirring

Applications in Ladle Metallurgy

Steel ladle needle pigtails are primarily used in treatment ladles or Ladle Metallurgy Furnaces (LMFs), where secondary metallurgy operations occur. These operations include:

- o Deoxidation and alloying: Ensuring uniform chemical composition
- o Inclusion removal: Improving steel cleanliness
- o Temperature control: Maintaining the steel within critical windows for casting They are also used in transfer ladles during transportation of molten steel to continuous casting machines, ensuring the steel remains well-mixed and free of gas pockets .

Summary

Where are steel ladle needle pigtails used

In essence, steel ladle needle pigtails are critical for precise gas injection in molten steel ladles. They enhance steel quality, temperature uniformity, and inclusion removal, making them indispensable in modern steelmaking processes, particularly in secondary metallurgy and ladle treatment operations .

Ladles are most commonly made of fabricated steel. The most common shape is a vertical cylinder, but other shapes are possible:

This book seeks to provide a comprehensive coverage of the important and growing field of ladle metallurgy, including theory,

Fundamentals of Ladle Metallurgy Ladle metallurgy is a critical process in the production of high-quality steel. It

Ladles are also required in steel foundry work, and one of these for the Siemens-Martin process is illustrated by Fig. 1. These ladles

This article provides a comprehensive examination of the ladle within a steel plant, including its structural

The Steel Ladle refractory system is typically composed of multiple functional layers, each

The ladle is a crucial vessel in steelmaking, used for transporting, refining, and pouring molten steel to ensure quality

The steel ladle refractory is also called the ladle refractory lining, which is used to hold molten steel. Molten steel is also subjected to

Located at the bottom of the steel ladle, the ladle nozzle serves as the primary outlet through which molten steel is

This article provides an in-depth explanation of the structure and function of Steel Ladle refractory, covering lining

Concept The concept of modern steelmaking is to make use of the steelmaking vessels like converter, ladle and tundish of a

A Ladle Metallurgy Furnace (LMF), is used to refine molten steel into specialty grades. This relieves the primary steelmaking furnace

Where are steel ladle needle pigtails used

Descriptions according to Classification of Refractory Materials under the Unified European Norms (PN-EN)

Porous plugs are used in ladle bottoms for rinsing with inert gas mainly argon. Plugs having cross-sections with

Hotter steel from the ladle tends to go up in the tundish, whereas colder steel goes closer to the bottom. In addition,

Worldwide steel production in 2019 reached 1869 million tons, with China as the largest producer at 996 million tons. India was the

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