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PEOPLE'S REPUBLIC OF CHINA**

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Code for design of steelmaking engineering

炼钢工程设计规范

(English Translation)

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1 General

1.0.1

This specification is formulated in order to make the design of steelmaking projects conform to the provisions of various standards of current national and industry technical policies, improve the quality of engineering design, and achieve advanced technology, reasonable economy, energy saving, environmental protection, safety and reliability.

1.0.2

This code is applicable to the design of new and reconstructed steelmaking projects with converters and electric furnaces as the main smelting equipment.

1.0.3

The design of steelmaking projects should implement the national iron and steel industry development policy, adhere to the principles of clean production and circular economy, improve the level of environmental protection and comprehensive utilization of resources, save energy and reduce consumption, and should actively Adopt mature and reliable new technologies, new processes, new materials and new equipment to improve the level of design technology and reduce project cost and operating cost.

1.0.4

In addition to conforming to this specification, the design of steelmaking engineering shall conform to the provisions of relevant current national standards.

2.0.1 Consteel electric arc furnace

An ultra-high-power or high-power electric furnace that continuously feeds scrap steel preheated by high-temperature exhaust gas into the electric furnace.

2.0.2 VD vacuum degassing

A vacuum degassing device for molten steel, which places the ladle with molten steel in a closed vacuum tank connected with a vacuum pump, and argon gas is introduced from the bottom of the ladle to stir the molten steel, so that the molten steel undergoes a degassing reaction in a vacuum state.

2.0.3 VOD vacuum oxygen decarburization

A vacuum oxygen blowing decarburization refining device mainly used for refining stainless steel. It adds a top gun to the vacuum tank cover of the VD, blows oxygen to the liquid steel surface in the vacuum tank, and "decarburizes" the molten steel containing chromium in a vacuum state. It can also be used to smelt ultra-low carbon steel.

2.0.4 CAS composition adjustment by sealed argon bubbling

A device that increases the temperature of molten steel by adding metal aluminum or silicon to oxidize and release heat in the ladle, and realizes adding alloys in the immersion hood to adjust the composition of molten steel under the condition of argon blowing at the bottom of the ladle to stir the molten steel.

2.0.5 CAS-OB composition adjustment by sealed argon bubbling with oxygen blowing

A device for increasing the temperature of molten steel by blowing oxygen through an oxygen lance and adding metal aluminum or silicon to oxidize and release heat in the ladle, and realizing the adjustment of the composition of molten steel by adding alloys in the immersion cover under the condition of stirring the molten steel by blowing argon gas at the bottom of the ladle.

2.0.6 RH ruhrstahl-heraeus degasser

A refining method for vacuum circulation and degassing of molten steel. It uses two circulating pipes (immersion pipes) at the bottom of the vacuum chamber to insert into the molten steel in the ladle, fills the rising pipe with argon as the lifting gas, and uses the principle of the bubble pump to make the molten steel continuously flow into the vacuum chamber from the ascending pipe, and then flow back to the ladle from the descending pipe, forming a circular flow, so that the molten steel can achieve deep degassing treatment in the vacuum chamber.

2.0.7 RH-TB ruhrstahl-heraeus degassr-top blowing

A top gun is inserted on the top of the RH vacuum chamber, and it is used to refine ultra-low carbon steel by blowing oxygen to the surface of molten steel for decarburization or powder spraying for desulfurization.

2.0.8 Ladle furnace (LF) ladle furnace

A device that blows argon from the bottom of the ladle under normal pressure and heats the molten steel with an electric arc to refine the molten steel and uniform the composition and temperature of the molten steel.

2.0.9 AOD argon oxygen decarburization

A decarburization refining furnace that blows oxygen and argon into the molten steel in different proportions on the side of the molten steel pool of the converter, mainly used for smelting stainless steel.

2.0.10 Wire feeding (WF) wire feeding or cored wire feeding

A device and method for refining molten steel by feeding metal wires or cored wires into molten steel in a ladle at a certain speed under normal pressure.

2.0.11 Two step method two step process

A basic process of stainless steel production. It mainly refers to the melting of solid raw materials such as chromium, nickel, and scrap steel by electric furnace, and the coarse decarburization of the charge, and then the "decarburization and chromium preservation" refining by AOD or VOD refining furnace to achieve the required composition.

2.0.12 Three step process three step process

A process for the production of stainless steel. It mainly refers to the melting of solid raw materials such as chromium, nickel, and scrap steel by electric furnace or converter, followed by rough decarburization by re-blowing converter (or AOD furnace), and then deep decarburization by VOD refining furnace, which can produce various ultra-low carbon varieties. A stainless steel.

3 Basic Regulations

3.0.1

The setting of steelmaking plants should comprehensively consider the conditions of raw material resources, energy, water resources, transportation, environmental capacity, market distribution and utilization of external resources.

3.0.2

The selection of electric furnace steelmaking should have reliable scrap steel or direct reduced iron and other solid iron raw materials supply conditions, as well as sufficient power supply conditions.

3.0.3

Newly built and rebuilt steelmaking workshops should adopt the basic process route of the "trinity" of primary smelting furnace-external refining-continuous casting.

3.0.4

The design of the converter steelmaking workshop should adopt the basic process route of "four in one" molten iron pretreatment-top-bottom combined blowing converter-outside furnace refining-full continuous casting.

3.0.5

The design of electric furnace steelmaking workshop should adopt the basic process route of ultra-high power electric furnace-outside furnace refining-full continuous casting.

3.0.6

The converter and continuous casting machine in the newly-built converter steelmaking workshop should adopt one-to-one configuration.

3.0.7

Stainless steel smelting should adopt "two-step method" or "three-step method" process according to specific conditions.

3.0.8

A slag treatment device should be installed in newly built and reconstructed steelmaking plants.

4.2.1 The pretreatment reagent can use the following powders.

1 Desulfurization can be carried out with a mixture of lime powder and fluorite powder, or a mixture of passivated magnesium powder and lime powder, or a mixture of calcium carbide powder and lime powder, or a mixture of calcium carbide powder and fluorite powder, or passivated magnesium powder, or calcium carbide powder;

2 The mixture of lime powder, fluorite powder and iron oxide powder (iron oxide scale, ore powder, sintered ore powder, steelmaking furnace dust) can be used for dephosphorization and desiliconization.

4.2.2 Lime powder using the injection process shall undergo fluidization treatment.

4.2.3 The desulfurization agent shall not use sodium desulfurization powder such as sodium carbonate which seriously pollutes the environment.