

# Requirements for the selection of oxygen generators in the steel industry



Domestic oxygen generator after more than 50 years of development, starting from 50m<sup>3</sup> / h, the development of large oxygen generator, its process after the stone accumulator heat exchanger process, full low pressure plate switch type process, room temperature molecular sieve adsorption booster expander process, regular packing on the tower and full distillation argon process, oxygen generator technology with the development of steel metallurgy, chemical industry and the simultaneous development. Due to the different industries, the selection requirements for oxygen generators are also different, this paper briefly analyzes the selection requirements for oxygen generators in the steel industry.

## 1 The basis of oxygen machine selection

(1) Although the gas consumption of iron and steel enterprises varies from time to time, the average gas consumption per hour can be used as its consumption, and the low peak and peak are balanced by the storage of spherical tanks. The gas in the external integrated pipeline is transported to the customer area by medium pressure pipeline, and the pipeline is sent to the customer after regulating the pressure with the average amount higher than one level. As oxygen for blast furnace oxygen rich coal injection, basically the average amount, thus the statistics of the entire enterprise oxygen, nitrogen, argon amount, as the basis for selecting the type of oxygen generator.

(2) The gas used by steel enterprises is mainly in the gaseous state. The current oxygen generator process is divided into two kinds of gas external compression and internal compression. The internal compression process is compressed by the liquid oxygen pump to 3.0MPa to recover the cold volume, and the gas comes out of the tower. The external compression process is the recovery of cold gas oxygen out of the tower, and then compressed by the gas compressor to 3.0MPa sent out. From the purpose of energy saving and consumption reduction, should choose to produce gas-based full low-pressure, external compression process. Inside the compression process slightly higher energy consumption, investment costs and operating costs are also high.

(3) Iron and steel enterprises generally once a year overhaul, while the oxygen generator maintenance cycle is generally once every two years. During the overhaul period, the oxygen generator gas will produce emptying phenomenon. A large steel enterprise with output of tens of millions of tons has a workshop overhaul every month on average throughout the year, but considering the peak and low sales seasons of the market, sometimes there are more than two workshops overhauled at the same time. Although the emptying volume can be adjusted by the blast furnace to achieve the gas balance, the oxygen generator selection should also take into account the gas volume accurately to reduce the emptying volume as much as possible.

(4) The external supply of gas can be gas and liquid, so while selecting the oxygen generator, a part of the liquid and gas external supply should be considered. General oxygen generator can produce part of liquid oxygen and liquid nitrogen. The amount of liquid oxygen can be up to 3% of the oxygen, if you need to supply more liquid, you can choose gas liquefaction equipment to make up for it, with the storage system to supply liquid and cope with the gas when the fault stops.

(5) The production of iron and steel enterprises has the characteristics of uninterrupted, especially the blast furnace, converter with oxygen, nitrogen, argon, usually absolutely do not allow the oxygen machine to stop production, so the selection of oxygen machine must be considered to be able to long-term safe, stable and reliable operation.

(6) With the improvement of product grade and technical equipment of iron and steel enterprises, the requirements for gas quality are getting higher and higher, the original purity is a little lower can also blow oxygen, now when the oxygen purity is lower than 99.2% O<sub>2</sub> can not send oxygen; and blast furnace for the protective gas with nitrogen, the purity is required in 99.99% or more. As for argon gas, the quality of steel has a pivotal role, especially high carbon steel. Therefore, the quality of the oxygen generator products is quite important, more in line with the requirements of the external gas supply.

## 2 Oxygen generator selection characteristics

### 2.1 Oxygen concentrator selection

(1) At present, the full low-pressure large oxygen generator generally adopts the external compression process of gas with regular filling tower, full distillation argon technology, molecular sieve adsorption and booster expander, the output is equal to the demand, and the purity requirement is: oxygen 99.6% O<sub>2</sub>; nitrogen 99.999%, which contains oxygen  $\leq 5 \times 10^{-6}$ ; argon O<sub>2</sub>  $\leq 2 \times 10^{-6}$ , N<sub>2</sub>  $\leq 3 \times 10^{-6}$ .

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