

# Cleaning method of air separation equipment



## 1、 Air separation equipment and its performance characteristics

### 1.1 Air separation equipment

Air separation equipment is the air as raw material, through the compression cycle depth freezing method to turn the air into a liquid state, and then after distillation and gradually separated from the liquid air to produce oxygen, nitrogen and argon and other inert gases equipment.

At present, China's production of air separation equipment in various forms, a wide variety. There is the production of gaseous oxygen and nitrogen equipment, but also the production of liquid oxygen and nitrogen equipment. But as far as the basic process is concerned, there are four main types, namely high pressure, medium pressure, high and low pressure and full low pressure process. The production scale of China's air separation

equipment has developed from the early production of only 20 m<sup>3</sup> /hour (oxygen) oxygen machine to the current production of 20, 000 m<sup>3</sup> /hour, 30, 000 m<sup>3</sup> /hour and 50, 000 m<sup>3</sup> /hour (oxygen) of ultra-large air separation equipment.

## 1.2 The basic system of air separation equipment.

Air separation equipment can be divided into five basic systems in terms of process flow.

1.2.1 Impurity purification system: mainly through the air filter and molecular sieve absorber and other equipment to purify the air mixed with mechanical impurities, water, carbon dioxide, acetylene, etc.

1.2.2 Air cooling and liquefaction system: mainly consists of air compressor, heat exchanger, expander and air throttle, etc., which plays the role of making the air deeply frozen.

1.2.3 Air distillation system: mainly consists of distillation tower (upper tower, lower tower), condensing evaporator, subcooler, liquid air and liquid nitrogen throttle valve, etc. The role of separating the various components of air

1.2.4 Heating and blowing system: regenerate the purification system by heating and blowing.

1.2.5 Instrument control system: control the whole process through various instruments.

## 2. Surface cleanliness of air separation equipment and its inspection method

### 2.1 Air separation equipment is prone to combustion

Combustion or even the occurrence of an explosion must meet 3 conditions: a certain amount of combustible materials, the presence of the corresponding amount of oxidant, a minimum of energy security. The most important feature of the working environment of air

separation equipment is the oxygen cycle in low or room temperature conditions. Pure oxygen is a strong oxidant, even in the  $-183\text{ }^{\circ}\text{C}$  liquefied low temperature state, as long as the number or concentration of flammable and explosive substances exceed the explosive limit, the medium oxygen due to high-speed transport friction generated by the accumulation of energy to a certain value, it will still explode, resulting in casualties and equipment damage. Therefore, air separation equipment where the media oxygen contact parts, its surface cleanliness requirements are very high, does not allow the presence of mechanical impurities and organic substances such as grease, these substances must be removed.

Air separation equipment grease-free parts of degreasing cleaning is through physical or chemical methods, select the appropriate cleaning agent through a specific cleaning process to clean its surface to ensure that the concentration of organic substances on its surface is controlled below the explosive limit. This is a necessary condition for the safe operation of air separation equipment, and after surface treatment, it has to undergo strict inspection and testing before it can be put into use.

## 2.2 Types of air separation equipment surface dirt

The indicators for checking the cleanliness of the surface of air separation equipment should include the following four types of substances.

(1) solid substances: such as organic rust inhibitors, wood, paper, fiber, paint and other organic substances; welding slag and spatter, metal chips, welding wire and other metal substances; sand and similar particulate matter, and other substances that may dissolve under working conditions.

(2) Cleaning solution and water

(3) floating rust and oxidation skin

(4) mineral oil and grease

# Spire Doc.

Free version converting word documents to PDF files, you can only get the first 3 page of PDF file.

Upgrade to Commercial Edition of Spire.Doc <<http://www.e-iceblue.com/Introduce/word-for-net-introduce.html>>.