30. Decolorization Tank

1. Functions and Applications

A decolorization tank is a piece of equipment widely used in industrial production, primarily for removing color, impurities, and odors from high-pigment solutions. It utilizes physical adsorption or chemical reactions to remove colored substances, impurities, and odor components from the solution, thereby enhancing the purity and quality of the product.

Decolorization tanks are widely used in the following fields:

- **Food industry**: Used for decolorization and purification of products such as refined sugar, monosodium glutamate, glucose, and starch sugar.
- **Pharmaceutical industry**: Used for decolorization and removal of pyrogens in pharmaceutical intermediates and liquid formulations.
- **Chemical industry**: Used for decolorization and purification of chemical additives and dye intermediates.
- **Oil and fat industry**: Used for decolorization and purification of oils and fats.

II. Working Principle

The working principle of decolorization tanks primarily relies on processes such as adsorption, chemical reactions, or physical separation. The following are several common decolorization methods:

1. Adsorption Method

Decolorization tanks are typically filled with adsorbents such as activated carbon or activated clay. When the solution passes through the decolorization tank, the microporous structure on the surface of the adsorbent can adsorb pigment molecules and remove them from the solution. This method is suitable for removing color and impurities from the solution.

2. Chemical Reaction Method

Certain decolorizing agents can react chemically with the coloring substances in the solution, destroying the chromophore groups and thereby achieving decolorization. This method is commonly used for treating high-color wastewater such as dyeing and printing wastewater.

3. Physical Separation Method

Impurities and pigments in the solution are separated using physical methods such as filtration or centrifugation.

III. Structural Characteristics

Decolorization tanks typically have the following structural characteristics:

- **Vertical fully enclosed structure**: Prevents dust contamination and ensures a clean operating environment.
- **Customized stirring device**: The stirring device is customized according to material characteristics to ensure good decolorization effects, smooth stirring transmission, and low noise.
- **Jacketed heating**: The tank is equipped with a jacket that can be heated by circulating steam or hot water, enabling activated carbon powder to mix and stir thoroughly with the material inside the tank before adsorption decolorization.
- **Insulation layer**: An insulation layer is installed outside the jacket, filled with high-temperature resistant and aging-resistant pearl cotton, providing excellent thermal insulation and heat retention.
- **Hygienic Design**: The inner tank surface undergoes mirror polishing with a surface roughness of Ra ≤ 0.6 μm. All process openings such as inlet/outlet ports, sight glasses, and manholes are seamlessly welded to the inner tank using a stretched flange process with smooth, rounded transitions, ensuring easy cleaning with no dead corners.

4. Advantages

- **High-Efficiency Decolorization**: Effectively removes color and impurities from solutions through adsorption or chemical reactions.
- **Multi-Functional Integration**: The decolorization tank not only performs decolorization but can also be integrated with filtration, drying, and other processes for multi-functional operation.
- **Energy-Saving and Cost-Effective**: Optimizes heating and stirring processes to reduce energy consumption.
- **Environmental Protection**: Reduces the use of chemical agents, minimizing environmental pollution.
- **Stable Operation**: Features a rational structural design for stable operation and low maintenance costs.

5. Application Examples

1. Oil Decolorization

In oil refining processes, decolorization tanks are used to remove pigments and impurities from oils, enhancing their purity and stability.

2. Textile Dyeing Wastewater Treatment

In textile dyeing wastewater treatment, decolorization agents remove color from wastewater through chemical reactions, reduce chemical oxygen demand (COD), and improve water quality.

6. Summary

The decolorization tank is a highly efficient, multi-functional industrial equipment widely used in the food, pharmaceutical, chemical, and oil industries. Through adsorption, chemical reactions, or physical separation methods, the decolorization tank effectively removes color, impurities, and odors from solutions, improving product purity and quality. Its fully enclosed structure, custom stirring device, and jacket heating design ensure operational efficiency and stability.