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IMPROVEMENT OF CYCLONE INSTALLATION

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Abstract
Cyclones for cleaning dusty air flow are one of the main equipment for cleaning air from small impurities, fibrous waste, they are widely used in cotton and textile enterprises.

Keywords: Small impurities, fibrous waste, storage bin, cotton drying and cleaning, scutching and carding production, spinning, weaving production, dust, air flow.

Introduction

The modern development of the economy of the Republic of Uzbekistan is closely connected with the growth of industrial sectors, among which the textile industry occupies a key place. Being a strategically important sector, textile production provides export revenue, employment of the population and the development of small and medium-sized enterprises. However, the intensive growth of production capacity is accompanied by an increase in the volume of emissions of harmful substances into the atmosphere, especially dust generated during the mechanical processing of cotton raw materials and textile materials.

One of the most pressing environmental challenges faced by textile industry companies is air pollution with fine dust, which is harmful to both the health of workers and the environment. Increased dust contamination is typical for such technological processes as cotton drying and cleaning, scutching and carding, spinning, weaving, and also for finishing fabrics. In this regard, ensuring an effective dust collection system is an essential requirement for modern cotton and textile production.

The most common type of equipment for cleaning air from dust in the cotton and textile industry remains cyclone units. Cyclones are used at enterprises due to their simple design, reliability in operation, low maintenance costs and the ability to effectively capture large and medium particles. In recent years, Uzbekistan has been actively working to modernize existing air purification systems, including replacing outdated cyclonic systems with more efficient and environmentally friendly analogues.

Since 2020, the republic has adopted a number of regulatory legal acts aimed at tightening environmental control and stimulating the introduction of energy-efficient and environmental technologies. In particular, as part of the implementation of the Strategy for the transition to a "green" economy until 2030, approved by the Decree of the President of the Republic of Uzbekistan No. UP-6024 dated October 4, 2020, textile industry enterprises are recommended to introduce innovative solutions for dust capture and filtration. In addition, according to the Resolution of the Cabinet of Ministers No. 732 of November 2, 2020 “On measures to improve the environmental regulation system”, enterprises are required to comply with the established

standards for maximum permissible emissions (MPE) and undergo an environmental assessment.

Guided by these requirements, textile enterprises in Uzbekistan have begun to introduce modern, new-generation cyclone units capable of achieving air purification levels of over 90–95%. Some of them operate in a combined system with fine filters and electrostatic precipitators, which is especially important in the presence of highly dispersed dust. Automation of cyclone cleaning and loading control processes is also used, which reduces the workload on operators and increases operational efficiency.

The dust cyclone is one of the main devices for cleaning the air from small impurities, fibrous waste, which are formed as a result of the activities of cotton ginning, textile and other manufacturing enterprises. Due to the simplicity of the design, the absence of moving parts and mechanisms, and the possibility of increasing productivity by combining into groups and batteries, dry cleaning cyclones are widely used in technological and preparatory production processes [1].

Depending on the conditions of use and types of contamination of the working environment, different types of cyclones for air purification are distinguished, and a specific design is selected, manufacturing material and methods of additional dust collection unit. High cleaning efficiency is achieved in the range of contaminated particle sizes from 5 μm to 40 μm.

The operation of the cyclone for air cleaning is based on the use of centrifugal and inertial forces. Dusty air under the action of the fan passes through the air ducts and enters the inlet pipe of the device at a speed of up to 20 m/s. The branch pipe has a spiral shape, which gives the flow a rotational movement along the walls of the housing. In the narrowing part, the speed of the dusty air increases, The particles of impurities continue to fall into the lower part of the cyclone by inertia. The purified air suddenly changes direction by 180° and enters the vertical exhaust pipe, through which it exits to the outside.

The dust, under the action of inertia, continues to fall to the bottom and gets into the storage bin, from which it is regularly removed. For unloading, there is a damper or a gate with a mechanical or electrical drive. The entire structure is located on a steel frame with a small platform, which provides the device with stability and access for service personnel to the unloading device [2].

The relevance of the study is due to the need to ensure sanitary and environmental safety of production processes, compliance with international and national standards, as well as the need to optimize dust collection systems based on advanced technologies and scientific developments.

In this direction, specific decisions were made, in order to achieve the above measures, a settling chamber was installed inside the cyclone, in which louvers were installed to reduce the air flow speed, which makes it possible to settle the remaining dust from the air flow [3].

References:

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