
# Technological Processes Of Dust Cleaning At Ginneries

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ABSTRACT

The performance and efficiency of the dust holders analyzed indicate that the efficiency of cleaning these dust holders is much lower, and the main reason for this is in the uncertainty of how the content of the dust air being cleaned is associated with the efficiency of cleaning dust holders.

**Keywords:** Inertial dust holders, productivity, cyclones, dust deposition chambers.

The first equipment used to catch dust in cotton ginning businesses was the dust sink chambers. Their advantage is the simplicity of the construction. But they are not used because of their disadvantages such as large size, low efficiency, fire hazard [1].

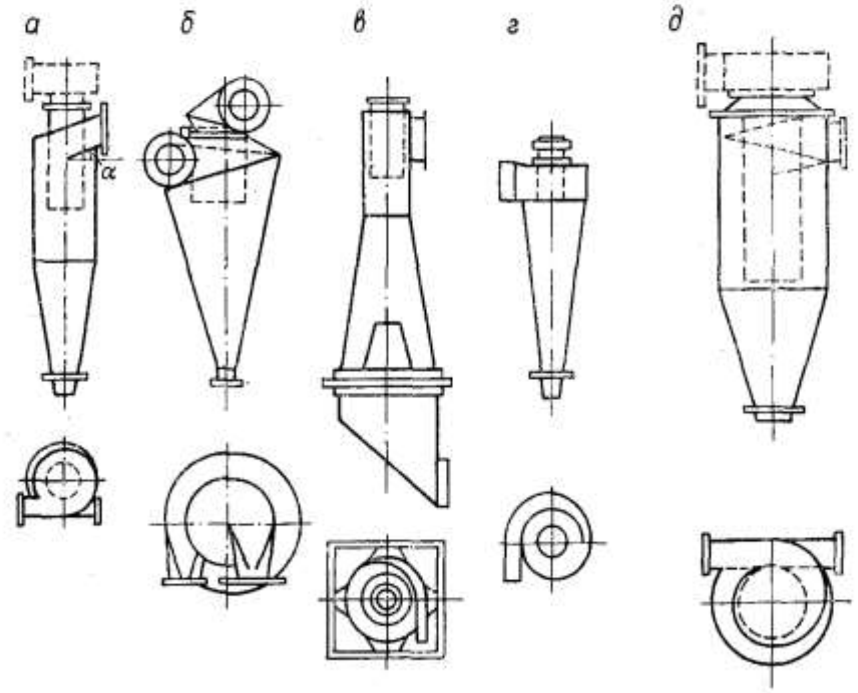
In the modern overseas industry, dust holders of various structures are used. Niogaz's most common dust holders are SN, skti and vtsniiot, LIOTH and SIOTH dust holders, with figure 1.2.1 schematizing some of them.

Along with the creation and improvement of inertial dust holders, a number of new inertial dust holders have been created in gas purification techniques in recent years [2,3].

The performance as well as the efficiency of the dust holders analyzed above indicate that the efficiency of cleaning these dust holders is much lower, and the main reason for this is in the uncertainty of how the content of the dust air being cleaned is associated with the efficiency of cleaning dust holders.

To do this, it is necessary to study dust holders both from the theoretical and practical side, studying the physical, mechanical and chemical properties of the dust being cleaned, taking into account them, as a result of which it is necessary to create their devices based on resource-efficient technology.

One of the promising types of inertial dust holders is the confuser diffuser (KDP) dust holder. The two-speed dust holder created by circular transverse cross-sectional (soplo) diffusion channel is visible, with a small size soplo located in the diffuser part. Based on calculations of the trajectory of movement of particles in the dust holder Channel, the authors [3] came to the following conclusion, that is, particles with a size greater than 3 μm in dust are captured. The speed and absorption coefficient of 22 M/s at the entry of pollinated air into the dust holder is 10%, the hydraulic resistance is 550 Pa. In this case, the degree of purification of air from thin dust particles in the order of 0 to 8 μm is 80÷84%, and the degree of purification from coarse particles in the order of 0 to 20 μm is 92÷94%.




a) NIIOGAZ (SN-11, SN-15, SN-24, EQ 110, 150); B) SIOT; v) VTSNIIOT; g) SDK-SN–33 and SK–SN– 34; d) LIOT.

Figure 1.2.1. Scheme of powder holders applied abroad

[4,5] - the results of research carried out on improving the level of purification in the reduction of hydraulic resistance are presented in scientific work. High-performance dust holders of simple construction are widely used to purify pollinated air from dust particles greater than 6 µm [6,7].

As noted above, dust capture in dust holders is based on the application of particle inertia (centrifugal forces).

Under the influence of the centrifugal force generated in this, dust particles are pushed out of the air stream into the dust holder housing. Approaching the dust holder body, the air flow turns and moves upward towards the exhaust pipe, forming an internal rotating coil [8,9].

One of the tasks of grinding dust holders is to partially expel the airy phase from the bunker and transfer fresh air to the central zone of the equipment [10]. Such dust holders are promising in capturing fine dispersion dust.

The efficiency of cleaning contaminated airflow can be increased especially at the expense of passing high-dispersion dust through barriers and applying other filtering materials.

The main conditions for the operation of cyclones are as follows: It is necessary to monitor that dust does not accumulate in the conical part of the cyclone. A special bunker is envisaged to collect it under the cyclone.

Air absorption is not allowed at the bottom of the cyclone. To collect dust, the bunker must be hermetic. Dust discharge valves from the bunker are carried out through a patrubka with a double flickering stopper, which is intended for alternating operation.

Standard structures of cyclones can operate at a temperature of no more than 400 °C of gas and a pressure of no more than 2.5 kPa.

When working on high-temperature gas, cyclones are futerized from the inside with fire-resistant tiles, while the exhaust pipe is made of heat-resistant steel or ceramic. At low external temperatures, the minimum temperature of the cyclone wall should not exceed the dew point temperature by less than 20-25 °C. To ensure these conditions of the cyclone wall, it is covered with thermal insulation from the outside. In cyclones with a diameter of 800 mm, the initial concentration for non-stick dust will be up to 400 mg/m3, in cyclones with dimensions less than it, the amount of dust should be less than 2-4 times.

The cyclone should work with constant gas pressure. Groups of cyclones should be marked with the possibility of disabling individual elements when spending fluctuates significantly.

In order for cyclones to work on purified gas and not cause abrasive dust, it is recommended to install them next to fans.

If productivity becomes insufficient, it will be necessary to reduce the size of the cyclone, that is, increase its speed and aerodynamic resistance. In this case, the level of gas purification in the cyclone increases. If this is also not enough, it is necessary to switch to another, more efficient type of Cyclone. In this case, it is necessary to return the productivity account, just like the aerodynamic resistance account.

When the laws of inertia play a key role in the properties of parameters in the gas stream in which dust particles are circulating, these are the cause of the overall productivity of the apparatus high enough (see Table 1.1), therefore, for fractions with a large size of more than 5 μm, in addition to the final stage of cleaning.

**Table 1.**
**The efficiency of dust flow particle capture in cyclones is the dependence of Cyclone diameter and dust particle size**

| Cyclone | | Dust capture rate for particle sizes ( % ), mkm | | |
|---|---|---|---|---|
| **Type** | **diameter, mm** | **5** | **10** | **15** |
| Ts-3 | 450 | 55 | 87 | 92,0 |
| | 500 | 69 | 89 | 90,6 |
| | 550 | 77 | 93 | 88,4 |
| Ts-6 | 500 | 40 | 81 | 89,1 |
| | 550 | 70 | 91 | 87,4 |
| | 600 | 84 | 78 | 90,2 |
| Ts-9 | 550 | 50 | 70 | 90,2 |
| | 600 | 54 | 79 | 87,0 |
| | 650 | 66 | 68 | 89,6 |
| Vzp-1200 | 500 | 65 | 90 | 88,0 |
| | 550 | 86 | 97 | 89,8 |
| | 600 | 81 | 84 | 91,3 |

Apparently, on the basis of the theoretical calculations obtained, when the effect of centralized dust collectors was studied with some accuracy, interest in the development of a new technical solution of this type of apparatus almost disappeared.

Cyclones belong to a pre-cleaning device, and therefore, in our opinion, cannot completely eliminate the problem of dust capture, but the cleaning device can be used, first of all, as a means of a new construction in a wet hole.

A practical interest is that the centralized mechanism of dust capture is combined with the filter surface filtration process and is carried out in devices called filter-cyclones. They similarly have a two-stage dust collection device, facilitating the process of recovering dust in high dust concentrations. It is known from this that it requires the development of technical solutions of secondary efficient dust catcher equipment for cleaning systems, as well as methods for calculating and effective recovery of filters made of resource-efficient materials in dust removal to create industrial filters.

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