EXPERIMENTAL DETERMINATION OF THE GAS CONSUMPTION SENT TO THE DEVICE FOR WET DUSTING IN THE HUMID MODE.

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ANNOTATION

This article covers the unique features of a completely new device that is proposed to be created to ensure the safety of humanity, nature and the environment, where the number of industrial enterprises is increasing day by day. The article proposes an effective method of purifying air or gas as a result of the mutual contact of water and dusty gas.

Keywords: dusty gas, sludge, wet method, toxic gas, industrial plants, environment, cleaning, contact element, gas consumption.

Today, as the manufacturing industry develops, pollution of the environment with toxic gases and dusts is also increasing. Therefore, protecting the environment and finding solutions to industrial problems is the only way to ensure that humanity can live on Earth for another few thousand years and breathe fresh air. There are several types of dust and toxic gases emitted from industrial plants, and the unfortunate one is the presence of toxic substances among them that have toxic properties. At present, enterprises use devices of various structures to clean dust and toxic gases.

One of the most effective methods of cleaning dust and toxic gases is wet cleaning, which uses several designs of devices of this type. The devices used use various contact elements to humidify the dust gases. However, the consumption of the contact element, hydrodynamic resistance, low efficiency of dust removal from the formed sludge does not allow optimal use of the device.

The efficiency of this type of device is only 70-90%. In order to achieve 100% results in wet dust removal, it is advisable to ensure the interaction of water and dust with each other and to select the optimal options of hardware hydrodynamics [1]. In order to solve these problems, we conducted experimental studies to determine the coefficient of resistance of the device through the consumption of liquids and gases in the device for cleaning wet and toxic gases in the wet method, designed and created by us. [2,3]

Ventilator- ВЦ-14-07 centrifugal type fan to supply dusty gas to the working part of the device; working productivity Q_{max} =400 m^3/hour; electromotive force N_{engine} =1.5 kW; number of revolutions n=1200 rotation/min; Pito Prandle tube 100 mm in size; According to Gosreestr №50123-12; It consists of a metal tube with D= 100 mm, L=1200 mm, which determines the gas velocity. Prandle tubes with an internal diameter of 7 mm, which detect static and dynamic forces in the pipe, were selected as the experimental model, respectively.

The coefficients of resistance were determined depending on the change in gas velocities and the angles of rotation of the condensers (zavichritel) due to changes in the gas consumption supplied to the device. The experiments on the created device were carried out in the following order. When determining the gas velocity, an angle-forming master of 0^0, 30^0, 45^0, 60^0, 90^0 was installed on the suction pipe of the fan. The main reason for this is to determine the resistance coefficients of the device at different velocities of the gas and thus to conduct experimental studies. Each experiment was performed five times. The arithmetic mean of the determined quantities was selected. (The kinematic viscosity of the air was assumed to be $1.51 \cdot 10^{-5}$ m^2/sec. In the experimental determination of gas consumption, each experiment was repeated several times, and the square dimensions of each point and the resulting errors were determined. It was found that the gas consumption varied to Q=248,7÷400 m^3/hour when the dusty gas was supplied to the device through the shaft forming angles 0^0, 30^0, 45^0, 60^0, 90^0 in the absence of condenser (zavichritel).

Also, when 30^0 condensers were installed in the device and the dusty gas was supplied through the angle shaft 0^0, 30^0, 45^0, 60^0, 90^0 in the fan, the gas consumption changed to Q=124.3÷330.6 m^3/hour. When 45^0 condensers were installed in the device and the dusty gas was supplied through the 0^0, 30^0, 45^0, 60^0,

90^0 angle shafts in the fan, the gas consumption changed to Q=152.6 ÷ 353.2 m^3/h. When 600 condensers were installed in the device and the dusty gas was supplied through the 0^0, 30^0, 45^0, 60^0, 90^0 angle shafts in the fan, the gas consumption changed to Q=175.2 ÷ 395.6 m^3/h.

Experimental studies have shown that the average change in gas consumption for each indicator increased by a step of 44.5 m^3/h. As a result of experimental studies, the change in gas consumption depending on the slope dimensions of 30^0, 45^0, 60^0 condensers (zavichritel) installed in the device was determined and a connection graph was constructed based on the obtained results. (Figure 1)

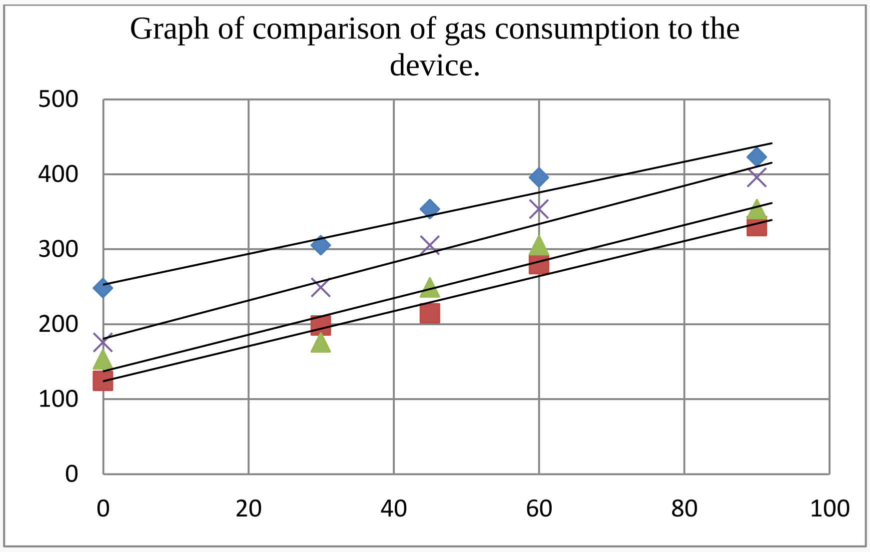

Figure 1.

Graph of comparison of gas consumption to the device As a result of experimental studies, changes in gas consumption and resistance coefficients depending on the slope size of 30^0, 45^0, 60^0 condensers (zavichritel) installed in the device were determined and a correlation graph was constructed based on the obtained results. (Figure 2) [4]

$$\xi_1 = \frac{0.400}{0.330} = 1.25\,; \quad \xi_2 = \frac{0.400}{0.353} = 1.1\,; \quad \xi_3 = \frac{0.400}{0.395} = 1$$

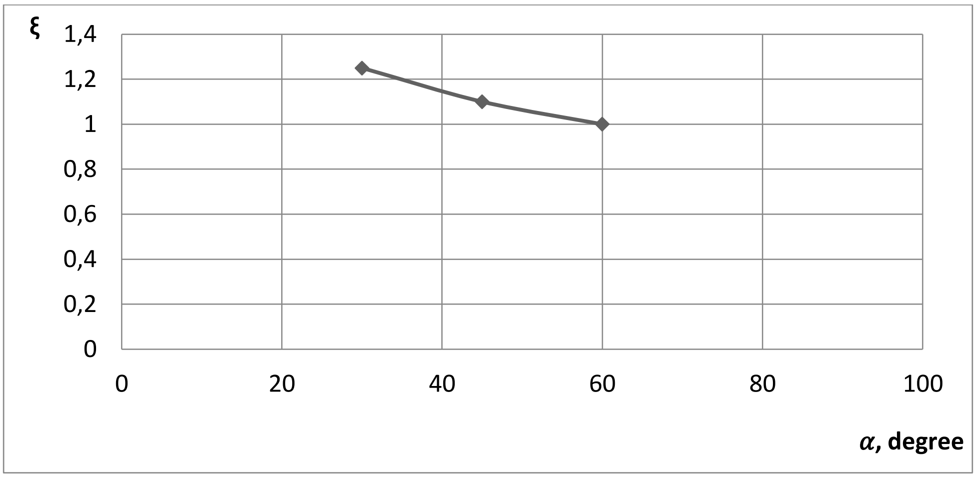

Figure 2.

Graph of the change in the coefficient of resistance depending on the change in the angle of rotation of the condensers (zavichritel) mounted on the device. Experimental results show that the higher the gas consumption in the presence of 30^0, 45^0, 60^0, 60^0 condensers installed in the device, the higher the length of the liquid film and the higher the efficiency of dust removal. In this case, the angular shaft, through the condenser (zavichritel) and using the correlation of the resistance coefficient, determined experimentally whether the device is suitable for selecting the optimal gas consumption, gas velocity and liquid film length based on overall size, gas velocity.

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