

DUST CONCENTRATION MEASUREMENTS USED IN COTTON PROCESSING ENTERPRISES

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Abstract: The article describes the devices for determining the concentration of dust used by cotton processing enterprises and the principle of their operation, and analyzes their processing technology.

Keywords: Dust concentration, optical (photometric), gravimetric, piezobalance, triboelectric, radioisotope.

Dust concentration device - a device designed to measure the mass concentration of dust in the exhaust gases of combustion devices, work and living areas, ambient air. A specific type of device must be used for each task [1].

Today there are several methods of measuring dust: optical (photometric), gravimetric, piezobalance, triboelectric, radioisotope [2].

The optical method of dust measurement is the photometric and nephelometric methods. The optical principle of the technological process is to detect a decrease in the intensity of light radiation when passing through a dusty environment. The concentration of dust particles is proportional to the value of optical density, which is determined automatically [3]. The main disadvantages of these measuring devices are:

- low sensitivity when measuring low concentrations of aerosol particles (less than $30 \text{ mg} / \text{m}^3$), as well as the inability to control high concentrations (more than $10 \dots 12 \text{ g} / \text{m}^3$).

- high effect of physicochemical properties of aerosols on the measurement result (size, composition and color of the aerosol). To reduce the measurement

error, the device should be calibrated or enter a correction factor for a particular type of aerosol - there is always the need for periodic cleaning of optical elements (optics, reflectors, etc.) [4]. Figure 1.

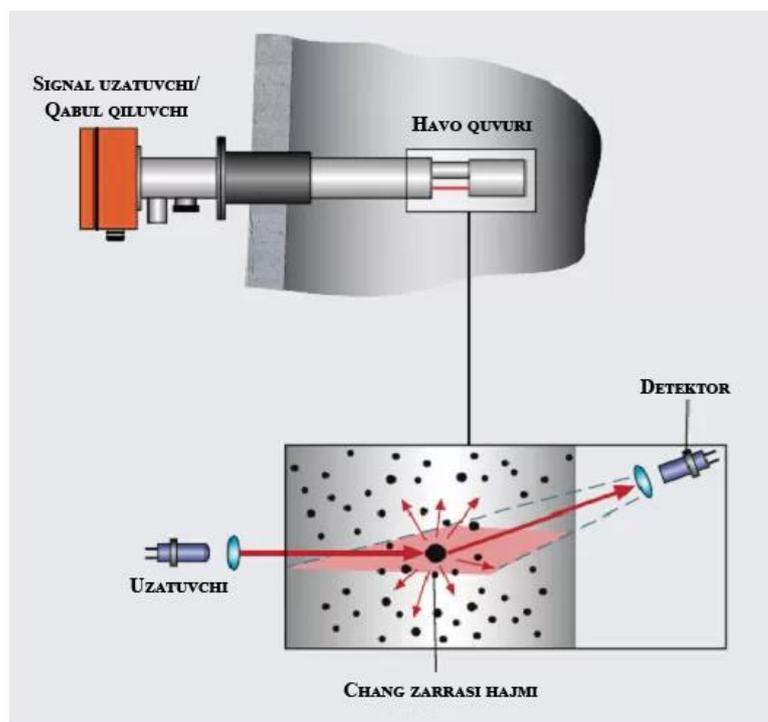


Figure 1. Schematic diagram of devices for optical measurement of the concentration of dust particles in the air

Dust particles in the air are circulated through a special tube. The signal transmitter sensor sends an IR type signal. This light signal reaches the detector when the intensity of the dust particles changes to a certain extent. Information is generated based on the data received by the detector. The nephelometric method based on recording direct, lateral, and backlighting light radiation is much more effective in measuring low concentrations of aerosol particles [5]. This method is performed on SICK, AEROKON (NPO EKO-INTECH LLC), Cassela CEL 712, Kanomax 3443 devices, as well as using TM-data, TM-digital, TM-F and TM-M (HUND) devices. The nephelometric method is based on the control of the weight concentration of industrial powder aerosols with a wide content. Disadvantages of the nephelometric method are a sharp loss of sensitivity when measuring the concentration of particles larger than 8 μm in diameter. In industrial plants, it consists mainly of dust particles of up to 10 microns, and the use of such devices

significantly reduces or even excludes the possibility of use in many industries. Therefore, these devices are mainly used in areas where fine aerosol particles are emitted and at the exit from the filters of gas treatment plants to control their efficiency [6]. Recently, more and more large factories have begun to think about the exhaust gases they produce. In addition to environmental monitoring using stationary gas analysis stations, dust emissions are also monitored.

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