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Research Article

SANITARY AND HYGIENIC ASSESSMENT OF THE ANALYSIS OF THE INFLUENCE OF ARTIFICIAL MICROCLIMATE ON THE HUMAN BODY IN TEXTILE ENTERPRISES

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ABSTRACT

This article is devoted to the analysis of the need to use automated air conditioning systems in textile factories. The article discusses the sanitary and hygienic assessment of the analysis of the influence of an artificial microclimate on the physiological functions of the body of workers .

KEYWORDS

Temperature, humidity, microclimate, work area, physiological process of the body.

INTRODUCTION

The microclimate of industrial premises is a factor that has a significant impact on the physiological state of workers and their labor productivity. Therefore, one of the main tasks of scientific researchers in the field of textile production is to determine, on the basis of existing research by hygienists, close to comfortable parameters of the artificial microclimate in the working area, in relation to the production premises of textile enterprises. The production microclimate standards are established by a system of occupational safety standards. The microclimate of industrial premises is characterized by temperature t , relative humidity φ

and air mobility v air, as well as the temperature on the surface of enclosing structures, pieces of equipment, the vertical and horizontal temperature gradient of the room and thermal radiation from internal surfaces. The value of the microclimate parameters in the work area t , v and φ must be taken taking into account the time of year, the intensity of the work performed and the nature of heat release in the work room.

Optimal and permissible microclimatic conditions can be established in the working area of the production premises. However, the technological requirements of

spinning and weaving production of textile enterprises do not allow for optimal standards. In this case, it is recommended to establish permissible microclimate standards at workplaces, which, with prolonged exposure, can cause stress in the thermoregulation reaction, but this does not impair the health of workers.

Currently, the basis for choosing comfortable microclimatic conditions for human activity is determined by the conditions of heat exchange between the surface of the body and the environment, while the human body is considered as a thermostat that maintains a constant body temperature of 36.6 °C. The heat exchange process is carried out on the basis of the general thermophysical laws of heat transfer from the human body to the environment through convection, radiation and evaporation. To experience complete thermal comfort, climatic conditions must ensure equality between the individual types of heat transfer. Violation of these ratios or deep redistributions lead to a sharp change in physiological processes in the body and cause irreversible processes in the cardiovascular and nervous systems that worsen a person's well-being and reduce labor productivity.

The production departments of modern textile enterprises are characterized by high heat tension in the air, reaching over 120-150 kJ, and high temperatures in the working area up to 30°C or more. In addition, the average surface temperature of textile machines rises to 35-37°C. In terms of intensity and energy expenditure of the body, energy consumption is 600-1000 kJ/h. Significant intensity of industrial activity contributes to an increase in heat generation in the body, especially in combination with increased ambient temperature. This causes an increase in body temperature already with an increase in air temperature from 20°C to 32°C even when doing light

work. People who work for a long time in a heating microclimate experience dystrophic changes in the myocardium, arterial hypertension, and a decrease in the immunological reactivity of the body, which contributes to an increase in the incidence of acute respiratory diseases, sore throat, bronchitis, myositis, etc. when the body overheats, the adverse effects of dust, noise, fatigue occurs quickly. Consequently, with an increase in the intensity of work activity, heat transfer from the body to the environment should also increase due to the creation of artificial microclimatic conditions in the work area.

Heat transfer by convection for an adult with a good thermal sensation ranges from 14 to 35% and depends on the difference between body temperature and t and v in the work area, since moving air, even at low speeds, has a greater cooling effect on a person than stationary air.

Most hygienists consider 28°C to be the upper limit, without taking into account the intensity of work activity. Although it is known that at 28°C, with increasing intensity of the labor process, heat accumulation in the body increases. At the same time, there is every reason to believe that the recommended high temperature is not acceptable for textile enterprises, since a decrease in labor productivity and an increase in injuries have been noticed, starting from an air temperature of 22°C, due to the occurrence of sleepy inhibition in female workers, which reduces reaction and speed performing basic work operations and at an air temperature of 26-28°C due to the occurrence of sleepy inhibition in female workers, which reduces the reaction and speed of performing basic work operations, and at an air temperature of 26-28°C. For example, spinners have experienced a decrease in productivity of 5-20%. Temperature exposure that goes beyond the required limits causes

changes in the tone of muscles, peripheral blood vessels, the activity of sweat glands, etc. in workers. In this case, tension in thermoregulation arises, which negatively affects labor productivity and health. In addition, to restore full performance of female workers under these conditions, it will be necessary to increase rest time by 20%

Despite this, technologists still tend to maintain a high t , believing that elastic coatings on fibers and threads soften better at 28-30°C, and the quality of the yarn improves. At the same time, there is information in the literature that at high temperatures the highest coefficient of nervousness and increased thread breakage are observed, especially at 28-30°C, and the minimum number of breaks occurs at 22-24°C.

Thus, high temperatures negatively affect both the technological process and the well-being of workers and, as it turned out, the temperature in production departments should not be allowed to rise above 24°C in the summer.

Heat transfer by evaporation of moisture from the surface of the human body is caused by the difference in the partial pressure of water vapor on the surface of the skin and into the air. According to the data, the amount of heat transfer by evaporation ranges from 20.7 to 29.1% of the total amount of human heat loss. The intensity of sweat secretion from the body is greater, the higher the temperature and the temperature on the surfaces of the equipment, and the beginning of intense sweat secretion is observed at temperatures above 22°C. The evaporative capacity of sweat can be increased by increasing v and the position of φ near the body, since more moisture evaporates into less humid air. Therefore, take the value of φ no more than 30-40%, since it has been established that an increase in φ from 35 to 65% is already very noticeable for a person, and a sharp deterioration in the well-

being of workers is noticed when φ increases above 70%. At $t = 35-40^\circ\text{C}$ and $\varphi = 80-90\%$, the body's thermoregulation is generally disrupted, and irreversible changes are observed in the cardiovascular and nervous systems. As a result, people have a depressed moral state and increased irritability. Despite this, in the production departments of textile enterprises, $\varphi = 80\%$ is often actually maintained at $t = 28-30^\circ\text{C}$.

When establishing limit temperature values, it is necessary to pay attention to the fact that the human body, for its well-being, is not indifferent to what combinations of v and t heat removal by convection will occur.

When hygienically assessing the microclimate, it is very important to take into account the degree of ionization of the internal air. Heavy ions are harmful to humans, while light, negatively charged ions have a beneficial and healing effect on the body. Research has established that the maximum amount of useful ions is observed in the zone of air supply jets. As the supply air in a dusty room moves towards the workplace, the number of ions useful for humans in it decreases. Therefore, it is necessary to bring air distributors as close as possible to the area where people stay and breathe. In an ideal microclimate, the labor productivity of workers can be 100%; in addition, it is known that in unsatisfactory climatic conditions, labor productivity is reduced to 18%.

Currently, much attention is paid to the theoretical consideration of all meteorological factors affecting human well-being. The above analyzes show that the technological and hygienic requirements for the parameters t and φ are very different; this is due to the presence of two zones in production premises: technological and working, where the creation of the necessary artificial microclimate parameters is

required. To solve this problem it is necessary to develop highly efficient air conditioning systems.

Scientists believe it has been proven that the creation of a constant statistical microclimate in air-conditioned rooms can lead to a disruption of the most complex apparatus of human adaptation, environmental conditions, thereby disrupting the maneuverability of the body in natural conditions. A dynamic microclimate has a more beneficial effect on a person, since in its conditions hardening occurs and increases The body's resistance to colds.

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