

Consequences of staying in buildings

Air temperature

The air temperature T_s (dry temperature) is measured with a dry thermometer (psychrometer) sensor protected against radiation . It is measured in Kelvin (K) and degrees Celsius ($0 \text{ Kelvin} = -273.15 \text{ }^\circ\text{C} = \text{absolute zero}$). Alcohol, bimetallic, mercury, thermocouple, resistance, etc. **thermometers** are used for measurement.

The evaluation of **radiant heat** is mainly used in the evaluation of the work environment in work hygiene , it is a summary of the effect of thermal radiation properties and temperatures of all surfaces in the room. The result of the measurement is the resulting temperature of the environment (**globe temperature T_g**). It is measured with a Vernon-Jokl globe thermometer (hollow metal sphere coated with black polyurethane, a thermometer is inserted into the center of the sphere, the value of radiant heat is read only after the value on the thermometer stabilizes, after standing in the room for about 30 minutes) and is given in $^\circ\text{C}$.

Air humidity

It is usually given as relative air humidity, i.e. the ratio of absolute and maximum humidity for a given temperature and pressure. The absolute air humidity indicates the content of water vapor in m^3 of air, the maximum air humidity is given by the maximum pressure of water vapor at a certain temperature. It can be found in tables because this value is constant for a given temperature. Air humidity is measured with a hair hygrometer or psychrometer - a device that simultaneously measures the so-called **dry** and **wet temperature with two thermometers**. Both thermometers must be protected from the effects of radiant heat. They are connected to the head, in which the source of air flow is located, air flows around both thermometers at a standard speed. One of them has a stocking on the container with the medium (mercury), which must be moistened before each measurement or is still in a humid environment.

Low relative air humidity has a direct negative effect on the human organism, mainly on the respiratory tract . Subjectively, insufficient moisture is felt as dryness, burning, irritation of the mucous membranes. Long-term exposure to low relative humidity leads to fluid loss.

Excessively high relative humidity also has a negative effect - at higher temperatures and high relative humidity, sweat evaporation decreases. We encounter it in the working environment of special industrial enterprises (hot operations) or in specific climatic conditions (humid tropics).

In the environment of our apartments, however, we also encounter relative humidity above 60-70% - under such conditions, bacteria, fungi, fungi and mites multiply easily.

Air flow

To measure the **air flow**, we use special types of liquid anemometers - katathermometers. Due to their sensitivity, the measurement must be repeated in order to exclude an error. "'Hill's thermometer'" is equipped with a cylindrical container filled with colored alcohol, there are 2 markings on the capillaries of the device: for $38 \text{ }^\circ\text{C}$ and for $35 \text{ }^\circ\text{C}$. We measure the time for the filling in the capillary to drop from the upper line ($38 \text{ }^\circ\text{C}$) to the lower line ($35 \text{ }^\circ\text{C}$). Air speed is determined by calculation or reading from nomograms.

Electroion microclimate

Electroion microclimate is determined by the content of free atmospheric ions in the air. Ions can be **positive** or **negative** and we divide them into **light** , **medium** and **heavy** , or also into **small** , **medium** and **large** . Ions are created by irradiating molecules with radioactive and UV radiation , during an electric discharge, but also during splashing of water (e.g. in waterfalls). Light ions are represented by ionized molecules , heavy ions are created by adsorption of these light ions on condensation nuclei (most often dust particles), possibly aggregation of ionized molecules.

Light or small **negative ions have a positive effect** on the organism . They release their charge in the respiratory tract, which has a positive effect, for example, on the activity of the ciliated epithelium and the production of mucus. Positive effects on the CNS , changes in blood pressure , basal metabolism , and subjective feeling of freshness are also reported.

Due to the positive effect on tissue respiration and the peripheral nervous system , they are used in **climatotherapy** and **speleotherapy** (for allergy sufferers - stay of allergic children in caves with an ion concentration of $5000\text{-}6000 \text{ per cm}^3$). In the indoor environment, their presence is reduced by the presence of a person and a number of his activities - for example, 1 cigarette reduces the number of light negative ions for many hours. In a neutral environment, some people experience non-specific problems such as irritability, increased fatigue, difficulty concentrating, even impaired absorption and a decrease in work performance or insomnia.

We evaluate the electroionic microclimate **by the concentration of ions in cm^3** . The mutual ratio of positive and negative ions is called **the unipolarity coefficient (P)**. Generators of light negative ions are used to adjust the electroion microclimate in interiors. Under the name ionizers, they are sold in the normal trade network. However, there is also a risk of excessive artificial production of light negative ions. This risk is posed by toxic aerosols in the work environment - the use of ionizers in such a case increases the risk of retention of these toxic aerosols in the lungs of exposed persons.

Non-ionizing radiation

According to the frequency, it is divided into low frequency (up to 30 kHz), high frequency (30 kHz to 300 MHz), very high frequency (300 MHz to 300 GHz). The effects of these fields are non-specific, as in the syndrome from the buildings: problems falling asleep, repeated headaches, impaired ability to concentrate and possibly also absorption.

General speeches

headaches, fatigue, lack of concentration.

Respiratory manifestations

irritation of the nasal mucosa, runny nose, feeling of nasal obstruction, feeling of heaviness on the chest, worsening of allergic problems, irritation to cough, loss of voice.

Eye manifestations

feeling of dryness, conjunctival irritation.

Skin manifestations

dryness, skin irritation, even allergic manifestations.

Building Sickness Syndrome

People working in modern air-conditioned buildings are most often affected, and by profession, officials (mostly women) - people who are required to be accurate, fast and reliable. People with respiratory diseases, especially allergy sufferers, are more susceptible. People suffer from this mainly in the winter season, when the air temperature in apartments or at work rises, the air humidity decreases with the simultaneous restriction of ventilation, which entails an increase in the concentration of some chemical substances and also dust in the indoor environment of enclosed spaces.

Differential diagnosis : cancer, immune deficiencies and other serious diseases, which in the beginning can also manifest themselves non-specifically.

Diagnostics : detailed anamnesis - ask about the regularity of the disappearance of difficulties, their relationship to staying in a certain place, their time course of the day and week.

Therapy : only symptomatic. If the main cause of the condition appears and it is possible to remove it (excessive dustiness of the environment, insufficient relative humidity of the air, bacterial contamination of the environment, etc.), then most likely the problems will subside after the removal of this cause. If the cause cannot be found or is irreversible, then the environment must be changed, only the symptoms can be treated. If the cause is not removed, the problems persist and return, they can be fixed permanently, even outside the so-called sick building.

Links

External links

- The internal environment of buildings on the energ.cz (<http://www.energ.cz/index.php/component/content/article/20-energ-/65-vnitni-prostedí-budov>)

References

- BENCKO, Vladimír. *Hygiena : učební texty k seminářům a praktickým cvičením*. 2. edition. Praha : Karolinum, 1998. 185 pp. ISBN 80-7184-551-5.