

1. Buildings and Environment

Indoor Environment

- **The indoor environment** is an environment without direct connection to the outdoor environment.
- The indoor environment of buildings can be divided into:
 - **Residential environment**
 - **Work environment**
 - **Civic amenities**
 - **Other premises** (Vehicles and other constructions, ...)

Sick Building Syndrome

- In 1983, WHO defined these health problems such as Sick Building Syndrome (SBS). Today, it is already almost 85 %.
- **Sick Building Syndrome can be described as a group of more or less serious diseases and health problems that occur during a long stay in closed rooms. Common symptoms are:**
 - Development of allergies
 - Asthma, repeated airway inflammation
 - Headache, eye irritation
 - Increased blood pressure, cholesterol
 - Cardiovascular diseases
 - Depression, neurosis, impaired immunity ...

Factors of the Indoor Environment

- Factors affecting the quality of the indoor environment or the internal microclimate of buildings include:
 - **Physical factors** - temperature, humidity and air circulation, lighting, radiation, electromagnetic field, noise
 - **Chemical factors** - inorganic substances, organic substances and fibrous materials
 - **Biological factors** - bacteria, viruses, mites, molds, pollen, parts of plants, hair dust and domestic animal excrements

Microclimate

- **Microclimate** is the climate of a very small or restricted area, especially when this differs from the climate of the surrounding area.
- The microclimate depends on the conditions prevailing in the area and its surroundings.
- Components of the indoor air environment of buildings intentionally created for human stay in confined spaces can generally be characterized as **internal (indoor) microclimate**.

Microclimate

- **Microclimatic parameters are affected:**
 - External climatic conditions and air quality
 - The way of ventilation and heating
 - Heat load due to technology, quantity and activity of people, machines, devices and lighting
 - Thermal-technical properties of the building

Mass Agens and Energy Agens

- **Agens** are substances of a mass or energy nature acting on the subject:
 - **Mass agens:** toxic gaseous substances, solid aerosol, toxic gases, microbes, toxic liquids, liquid aerosol, odors, air movement, water vapor.
 - **Energy agens:** heat, light, UV radiation, laser radiation, ionizing radiation, ions in the air, static electricity, sound, vibration.
- **Pollutant** is gaseous, liquid or solid chemical, which has a harmful effect on living organisms at certain concentrations and duration of action.

Components of Indoor Environment

- The **indoor environment** is made up of a variety of different components:
 - Thermal - humidity microclimate
 - Odor microclimate
 - Microbial microclimate
 - Light microclimate
 - Acoustic microclimate
 - Ionization microclimate
 - Aerosol microclimate
 - Toxic microclimate
 - Electrostatic microclimate
 - Electromagnetic microclimate
 - Electro-ionic climate
 - Psychic microclimate

Sources of Pollution and Pollutants:

- **Outdoor air:** Carbon, nitrogen and sulfur oxides, ozone, solid particles, volatile organic compounds, polycyclic aromatic hydrocarbons, allergens (pollen)
- **Outdoor environment:** Soil gas, water
- **Building:** Formaldehyde, Benzene, Asbestos, Toluene, Solids, Volatile Organic Compounds
- **Electrical devices:** Volatile organic substances
- **Garages:** Carbon oxides, nitrogen oxides, solid particles, volatile organic compounds, polycyclic aromatic hydrocarbons
- **Heating, hot water, cooking:** carbon and nitrogen oxide, solid particles, volatile organic compounds, polycyclic aromatic hydrocarbons
- **Activities in the building:** Volatile organic substances, solid particles
- **People:** Cigarette smoke, solid particles, volatile organic compounds, odors (biofeeds), (micro) biological contamination, allergens