obtained emphasize the importance of accurate conversion coefficients in assessing radiation risks and informing radiation protection strategies.

The meticulous experimental design and analysis employed in this study have provided valuable insights into the complexities of radiation dosimetry and its implications for radiation protection. By investigating various exposure geometries and scenarios, including special situations such as pocket exposure, this study has advanced our understanding of the factors influencing radiation dose distribution and effective dose estimation.

Moving forward, further research is needed to refine dosimetric methodologies, improve the accuracy of conversion coefficients, and enhance our understanding of radiation dosimetry in complex exposure scenarios. By continuing to advance our knowledge in this area, we can better protect individuals and population from the potential harmful effects of ionizing radiation and ensure the safe use of radioactive materials in various applications.

REFERENCES

1.ICRP, 1996. Conversion Coefficients for use in Radiological Protection against External Radiation. ICRP Publication 74. Ann. ICRP 26 (3–4). P. 1–205.

2.ICRP, 2010. Conversion Coefficients for Radiological Protection Quantities for External Radiation Exposures. ICRP Publication 116, Ann. ICRP 40 (2–5).

3.Bernhardsson C. Experimental determination of dose conversion coefficients for external radiation exposure with gamma emitting radionuclides, 2012. – P. 125–133.

4.ICRP, 2007. The 2007 Recommendations of the International Commission on Radiological Protection. ICRP Publication 103. Ann. ICRP 37 (2-4), pp. 1-332.

N. Tatsulya (PSACEA, Dnipro)
Scientific supervisor: A. Petrenko, Cand. Sc. (Tech), Assoc. Prof.
Language consultant: L. Druzhinina, Assoc. Prof.

ECOLOGICALLY SAFE SYSTEMS OF BUILDING MICROCLIMATE PREMISES

Functioning of life-support systems of buildings is connected with the consumption of heat, electric and other types of energy. It is a well-known fact that production of different types of energy is connected with technological processes. Any technological process leads to the deterioration of environmental situation. Therefore, the main environmental task in the functioning of technological process is to reduce its negative impact on the environment. [2]

At the current stage of development of the construction industry, namely, the installation of life-support systems for buildings, the question of environmental cleanliness inside the premises of the building also raises. Therefore, along with global solutions for the protection of the environment, it is also necessary to address this challenge. [1]

The ways of solving the problems of ensuring indoor climate in buildings by reducing environmental pollution and indoor cleanliness can be achieved by the following methods:

–reducing of the consumption of non-renewable energy (gas, coal, liquid fuels) through the use of renewable energy (solar, wind, etc.);

–reducing of the amount of energy consumed;

–improvement of microclimate technology in order to improve the indoor comfort in buildings. [5]

The amount of non-renewable energy consumption can be reduced by using renewable energy (sun, wind, etc.). One of the promising areas of modern energy development is the use of renewable energy for heat and cold supply of life support systems in buildings on the basis of heat-used installations of combined heat and cold production, absorption heat transformers (AHT). These heat transformers represent a thermodynamic system where heat is transformed by means of combined forward and reverse cycles. [3]

APT have high efficiency, environmental friendliness, quiet operation, easy maintenance, long service life, full automation. On the basis of these thermal transformers the technology is offered and the principal scheme of its operation is developed for the year-round provision of microclimate parameters in the premises of buildings with complex use of solar, wind and biomass energy, as well as energy of the ground and water bodies. In case of lack of renewable energy, a backup heating is provided. [2]

Reducing of the amount of energy consumed can be done in the following ways:

1. by reducing the thermal capacity of the systems through the use of

–highly efficient insulating building materials for external enclosures,

–technologies related to thermal drainage of buildings (strengthening of thermal protection properties of external enclosures),

–effective insulation of the main routes of the systems. [4]

2. by reducing heat loss due to

–control of heat supply to each premise according to its demand,

–controlling the heat regime of the building according to the set programme with the use of heat supply control systems and metering of the consumed heat energy,

–control of stable operation of the heating system and distribution of the heat carrier by branches, risers and sections in accordance with the technological map of supply to each heater.[1]

3.application of modern environmentally friendly piping systems made of plastic;

4.optimisation of air exchange (reducing the amount of supply air to the normative amount per one working person);

5.zoning of rooms according to the area of the working or serviced zone;

6.utilisation of cleaning and recirculation of indoor air;

7.use of natural stimuli of air movement;

8.monitoring the state of the internal atmosphere and controlling its parameters. [5]

In order to solve the problem of reducing energy consumption in the systems of providing microclimate in the premises, it is proposed to carry out two simultaneously operating systems:

–a system of year-round provision of thermal comfort in the room through the use of heating surfaces (in the transitional and cold periods of the year) and cooling (in the warm period of the year);

–air conditioning system. [3]

Regulation of indoor microclimate parameters is a complex task. The complex of interacting nodes of the proposed system is very complex and, therefore, their interconnected work can be clearly controlled only with the use of computer technology. [1]

It is proposed to regulate the microclimate parameters by a two-stage scheme:

–general control of the system of providing microclimate of premises;

–local control of the indoor climate system.

The system of general and local automatic control of indoor microclimate parameters includes the following blocks:

–sensors for registering the parameters of indoor microclimate and life support systems;

–logic control centre;

–controls for shut-off and regulating valves of the microclimate system. [4]

Modern development of the energy sector dictates a new technological policy, which is based on the principle of maximum energy conservation, strict control over its consumption and environmental protection. The proposed technologies for microclimate control based on natural energy sources are the most environmentally friendly technologies and they meet the requirements of today. [5]

REFERENCES

1.Anselm, Akubue Jideofor. "Building with nature: ecological principles in building design." *Journal of Applied Sciences* 6.4, 2006: 958-963.

2.Lockhart, Andy, and Simon Marvin. "Microclimates of urban reproduction: The limits of automating environmental control." *Antipode* 52.3, 2020: 637-659.

3.Tumini, Irina. "The urban microclimate in open space. Case studies in madrid." *Cuadernos de investigación urbanística* 96, 2014: 1-73.

4.Петров А. Види мікроклімату та його оптимальні показники. URL: https://poltava.to/news/62335/

5.Тарадуда Д. В. "Забезпечення промислової та цивільної безпеки в україні та світі: управління, технології, моделі." Луцьк: РВВ Луцького НТУ, 2016.

O. Trehubov (PSACEA, Dnipro)
Scientific supervisor: V. Shalomov, Cand.Sc. (Tech), Assoc. Prof.
Language consultant: N. Shashkina, Cand. Sc. (Phil), Assoc. Prof.

THE INFLUENCE OF VIBRATION FREQUENCY ON DRIVER DROWSINESS, REACTION TIME, AND DRIVING PERFORMANCE

Motor vehicle accidents cause 1.25 million deaths worldwide each year, while the associated injuries lead to 40 million years lost due to disability. Although speeding and intoxication are leading contributors to vehicle accidents, approximately 20% of accidents are due to a loss of attention caused by drowsiness. In the USA alone, 41,000 injuries and more than 800 deaths are caused annually by driver drowsiness. This toll places an enormous burden on society due to lives lost, decreased productivity, as well as additional costs borne by the national healthcare system resulting from the management of disability and rehabilitation. In the context of commercial vehicles, accidents stemming from driver drowsiness or inattentiveness are notably amplified, accounting for approximately 39% of such incidents. This issue is particularly widespread within the trucking sector, where a substantial 47.1% of truck drivers in the United States have acknowledged experiencing drowsiness at some point in their professional trajectory, with 25.4% revealing such occurrences within their first year of operation. Correspondingly, data from Ukraine indicates that a considerable number (exceeding 60) of fatal accidents involving heavy motor vehicles each month are due to drivers either dozing off or succumbing to fatigue.

Distinctions can be made between the definitions of fatigue and drowsiness. Fatigue is characterized as a gradual and cumulative process, linked with a reluctance for exertion, a pervasive sense of weariness, inhibitions, impaired cognitive function, diminished efficiency, and decreased alertness. On the other hand, the term “drowsy” refers simply to a proclivity for falling asleep. Specifically, “drowsiness” denotes the transitional phase between wakefulness and the initial sleep stage. A driver experiencing drowsiness contends with the urge to stay awake, oscillating between varying degrees of alertness and drowsiness. A distinguishing feature between fatigue and drowsiness lies in their fluctuation patterns over short intervals; the former typically lacks rapid fluctuations within seconds, unlike the latter. In line with common experiences, rest and inactivity alleviate fatigue but exacerbate drowsiness.

A driving simulator (Fig. 1) was used to carry out the experiments. A seat obtained from a motor sedan, whose back was inclined at 15^{0} to the vertical direction, was mounted at the centre of an aluminium platform (dimensions: 1300 mm × 900 mm × 16 mm). This allowed the participants to be comfortably seated for driving. The platform was designed to have natural frequencies outside of the 1–80 Hz range in order to avoid any confounding influence of structural vibration. The platform was suspended on four air mounting bags. A servo-controlled hydraulic actuator was fixed under the platform at the centre, allowing it to deliver a vertical (z-axis) input vibration to the platform and the seat. A 42-inch video screen was placed 1.5 m in front of the participant to display the driving scenario.

The purpose and the procedure of the experiment were verbally explained to potential participants, and consent to participate was obtained. The experiments were all conducted during the daytime, between 9 a.m. and 1 p.m. Each participant had to attend six sessions, which were held on different days. There