ГЕОЕКОЛОГІЯ ТА ОХОРОНА ПРАЦІ

УДК 699.87

V.O. Bronytskyi, assistant, **O.V. Liashenko,** student (National Technical University of Ukraine «Kyiv Polytechnic Institute»)

ASSESSMENT OF ECOLOGICAL EFFICIENCY OF USE OF CONSTRUCTION MATERIALS FOR WINTERIZATION

В.О. Броницький, асистент, **О.В. Ляшенко,** студ. (НТУУ «КПІ»)

ОЦІНКА ЕКОЛОГІЧНОЇ ЕФЕКТИВНОСТІ ВИКОРИСТАННЯ БУДІВЕЛЬНИХ МАТЕРІАЛІВ ДЛЯ УТЕПЛЕННЯ

The article deals with ecological efficiency of winterization of houses from use of not ecological building materials and their influence in the course of improvement of temperature condition of premises is carried out. The carried-out analysis of ecological analogs in the field for the purpose to improve improvement of environmental and economic conditions and increase safety in residential areas.

Keywords: *ecological; building materials; insulator; negative influence; heat insulation.*

У статті проведена оцінка екологічної ефективності утеплення будинків при використанні неекологічних будматеріалів і їх вплив в процесі поліпшення температурного режиму житлових приміщень. Проведений аналіз екологічних аналогів в даній області з метою поліпшення еколого-економічного стану і підвищення безпеки в житлових приміщеннях.

Ключові слова: *екологічні; будівельні матеріали; утеплювач; негативний вплив; теплоізоляція.*

В статье проведена оценка экологической эффективности утепления домов от использования неэкологических стройматериалов и их влияние в процессе улучшения температурного режима жилых помещений. Проведенный анализ экологических аналогов в данной области с целью улучшения эколого-экономического состояния и повышения безопасности в жилых помещениях.

Ключевые слова: *экологические; строительные материалы; утеплитель; негативное влияние; теплоизоляция.*

Introduction. The modern person needs to be in perfect security in the place of the accommodation. For this reason reduction of influence of the harmful substances which are contained in construction materials by use of environmentally friendly building materials becomes an important question of the present.

Many construction materials cause an allergy, a headache and worsen the general health. Some are even considered as radioactive. Influence of such materials in most cases isn't pernicious, but over time can do harm to health of the person.

The powerful sphere of a construction, using not ecological construction materials, winterization of the house is. Reduction of use of heating in buildings is

necessary for economy of means of consumers and for general resource-saving that, in turn, will reduce a negative impact of power by the environment. That is correctly warmed houses is a guarantee of improvement of an ecological and economic condition of the country.

Aim of the work is the analysis of influence of not ecological heaters on the person, search of ecological analogs for thermal insulation and the comparative analysis of the received results.

At the moment one of the most widespread heaters is expanded polystyrene, polyfoam, mineral wool: glass wool and basalt cotton wool [1]. These construction materials aren't ecological and have their own significant deficiencies [2], which are given in the Table 1.

Table 1

Disadvantages non-environmental insulation materials

Insulation materials	Disadvantages
Expanded polystyrene	- Destruction of material in a short time under the influence of oxygen in the air at normal temperature; - Significant excess concentrations of toxic substances above the MAC; - Content in smoke in case of fire toxic organic compounds; - Fire hazard.
Styrofoam	- When burning or intense heating allocates styrene; - Promotes the formation of fungal mold.
Glass wool	- During the the operational processes microparticles with insulated material released into the air. With infrequent ventilation space particles detected in humans airways and penetrate into the lungs; - Risk of glass wool shown at direct contact with the skin. Frequent negative effects of insulation material were observed at the conclusion of. Solid particles can damage the layer of skin and penetrate into the deep distance. This causes a itchiness
Basalt wool	- For the binding of the fibers together using a special resin based on phenol and formaldehyde - highly toxic substances that can easily evaporate and become the cause of many diseases.

The harmful effect of substances contained in the insulation materials and which can be allocated are described in Table 2 [3].

Table 2

The influence of substances contained in materials for thermal insulation on human organism

Substances	The influence on human organism
Phenol	Negative impact on the cardiovascular, nervous system and other internal organs, such as kidneys, liver and others. When injected through the respiratory tract, phenol irritate them and can cause burns. If you hit it on the skin produced burns that can develop into ulcers. Even at the lowest doses it provokes fatigue, nausea and headache.
Phenolphthalein	If the product gets inside through the respiratory tract, death occurs instantly or paralysis.
Formaldehydes	Cause allergies, cancers, leukemia and mutational changes in the body.

Continuation table 2

Substances	The influence on human organism
Benzene	Affects many organs and vital systems, the total consideration, it is a poison for blood. Metabolism of benzene to form a toxic product, is in the red bone marrow and liver. Therefore, the first affected humans circulatory system. Reduces the number of erythrocyte hemoglobin decreases catastrophically. When exposed to benzene in the cells of the red bone marrow there is a series of chromosomal disorders.
Toluene	Evaporation of toluene can penetrate through the human respiratory organs, and through the skin, causing damage to the nervous system.

Paying attention to the above-mentioned disadvantages of non-environmental insulation materials, switching to ecological analogues is appropriate and necessary decision. Eco-friendly building materials, in turn, are divided into two types: completely ecological and environmental conditionally [4].

Absolutely ecological – is wood, stone, natural glues, caoutchouc, cork, silk, felt, cotton, leather, natural drying oil, straw, bamboo and others.

The slight disadvantage is that they do not always meet the technical requirements. So, therefore, should be used in building conventionally environmently materials, which are also made from natural resources, safe for the environment, but have a high technical indicators. Modern ecological insulation characterized by low thermal conductivity, versatility of use, durability.

Environmental conventionally insulation materials include: flax, hemp, peat blocks, ecowool, wool, wood stoves, damask.

Through natural flax origin can be used for internal soundproofing and heat insulation, to increase fire resistance in the production process to heat insulation material added boron salts or the conducting surface treatment of fireproof materials. For performance insulation qualities of hemp linen is not inferior, but it does not produce domestic producers, as well as industrial hemp cultivation is prohibited.

Wool – insulating material, contains new and recycled wool. Wool manufacturers add substances to scare away insects. Some manufacturers treated with fireproof heat insulation material materials.

Fibreboard produced with a shaving and other wood waste. Characterized by low thermal conductivity, high stability and water vapor permeability.

Cork – made from cork oak, which grows in Portugal. Grinded bark is treated with hot steam, mixed with natural cork resin and pressed into forms.

Kamka – is organic material made from seaweed stormy emissions of Zostera which is common in the Black Sea. A large amount of calcium in it do not live rodents and harmful insects.It is one hundred percent environmentally friendly material. It contains organic compounds of iron, iodine, cobalt, zinc, amino acids. This material has a mild odor of iodine, bromine and hydrogen sulfide. It positively affects the respiratory and nervous systems.

After the analysis of the literature were received advantages of ecological insulation materials that are listed in the Table. 3

Table 3

Advantages of ecological insulation material

Insulation materials	Advantages
Flax, hemp	- Natural antiseptics which prevent the formation of mold, fungus on the walls; - Do not cause the allergic reactions, reducing health risks especially young children; - This type of materials does not create condensation on the walls, as well as able to retain moisture and turn it out even in the winter; - No harmful effects on nature and human health in the production, operation and disposal.
Peat blocks	- Due antiseptic properties of peat in blocks not appear fungi and mold. - Freezing condensation does not affect the porous structure.
Ecowool	- Contains mineral boron compounds which impart it antiseptic properties and fire resistance.
Wool	- During high moisture can absorb water, about 30% of its dry weight, then releasing it.
Cork	- Porous structure provides good thermal insulation and air permeability; - Resins provide resistance to rotting and mold occurrence
Kamka	- Does not rot, does not lose properties when wet and does not endorse combustion; - High humidity kamka takes away excess of moisture from the room, and when the dry air, on the contrary, its moisturizes.

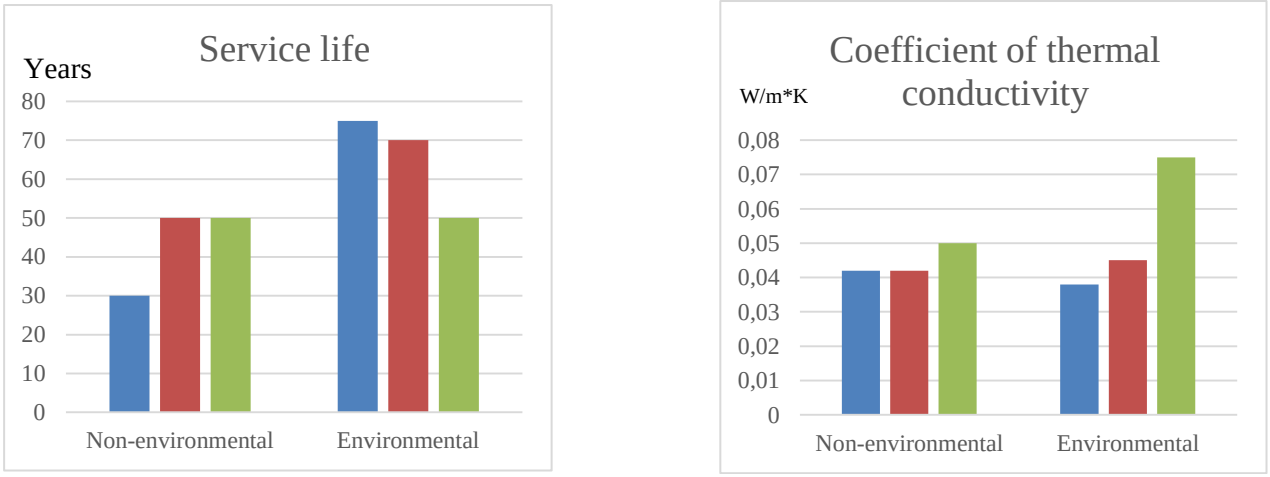
Table 4 shows the comparative characteristics of the main environmental and non-environmental construction materials for thermal insulation by such indicators as coefficient of thermal conductivity, service life, cost of material [5].

Table 4

Comparative characteristics of building materials for thermal insulation

Material	Coefficient of thermal conductivity, W/m*K	Service life, years	Cost, UAH/m^2
Non-environmental			
Expanded polystyrene	0,031 – 0,042	30	63,65
Glass wool	0,033 – 0,042	50	13,62
Basalt wool	0,034 – 0,05	50	41,50
Environmental			
Flax	0,038	75	70
Ekowool	0,038 – 0,045	70	66
Kamka	0,075	50	40

In figure 1 presents a comparative analysis of the indicators in table 4.



a b

Fig. 1. Coefficient of thermal conductivity (a) and Service life (b)

Based on data from the table, half-scientists in the course the analysis of modern sources for works in the sphere of winterization of houses, it is visible that useful life of ecological materials is 20-25% more, heat conductivity of ecological materials is better and the general indicator is 2-3% more. In case of the termination of useful lives of ecological materials it is unnecessary any additional cash costs for their utilization.

Conclusion

Performed analysis the negative impact of non-environmental materials for insulation on the health live organisms and the environment.

Explained the feasibility of using ecological building materials for thermal insulation residential premises, the results of which are presented in the Table. 4., useful life of ecological materials is 20-25% more, heat conductivity of ecological materials is better and the general indicator is 2-3% more. Because of all the harmful effect of non-environmental insulation, health and environmental condition must be in the priority, despite the two disadvantages of ecological materials: undeveloped industries and the high cost of products.

References

1. Бобров, Ю.Л. Теплоизоляционные материалы и конструкции / Ю.Л. Бобров, Е.Г. Овчаренко, Б.М. Шойхет, Е. Петухова [Текст] // – М.: ИНФРА-М, 2003г. - 268с.

2. Кривенко, П.В. Будівельне матеріалознавство – підручник [Текст] / П.В. Кривенко, Е.К. Пушкарьова, В.Б. Барановський та ін. // – Київ: Либідь, 2012 – 245 с.

3. Пушкарьова, К.К. Сучасні українські будівельні матеріали, вироби та конструкції / К.К. Пушкарьова [Текст] // – К.: Асоціація «ВСВБМВ», 2012. – 664 с.

4. Кочергин, С.М. Изоляция. Материалы и технологи [Текст] / С.М. Кочергин // – К.: Стойинформ, 2006 – 656 с.

5. Бадьин, Г.М. Строительство и реконструкция малоэтажного энергоэффективного дома [Текст] / Г.М. Бадьин // – БХВ-Петербург, 2011. – 432 с.

Стаття надійшла до редакції 26.10.2016р.

УДК 697.922:628.852.2

Т.Ф. Козловська, канд. хім. наук, доц., **С.В. Сукач**, канд. техн. наук, доц. (Кременчуцький національний університет імені Михайла Остроградського) **Л.О. Левченко**, канд. екон. наук, доц. (НТУУ «КПІ»)

КРИТЕРІЇ ВПЛИВУ ЕЛЕКТРОМАГНІТНИХ ПОЛІВ НА ОРГАНІЗМ ЛЮДИНИ ПРИ ПЛАНУВАННІ ПРАЦЕОХОРОННИХ ЗАХОДІВ

T.F. Kozlovska, S.V. Sukach (Kremenchuk Mykhailo Ostrohradskyi National University) **L.O. Levchenko** (National Technical University of Ukraine "Kyiv Polytechnic Institute")

CRITERIA INFLUENCE OF ELECTROMAGNETIC FIELDS ON THE HUMAN BODY WHEN PLANNING LABOUR PROTECTION STANDARDS ACTIVITIES

Встановлено залежність показників життєдіяльності організму людини від впливу електромагнітних полів. Доведено, що при аналізі електромагнітної обстановки необхідно враховувати як параметри електромагнітних полів і стан оточуючого середовища, в якому знаходиться працівник, так і розміри, форми та положення людини відносно поширення електромагнітних полів. Встановлено необхідність проведення досліджень негативного впливу електромагнітних полів на організм людини з урахуванням медико-біологічних аспектів при планування працеохоронних заходів.

Ключові слова: *електромагнітне поле; працеохоронні заходи; енергетичне забруднення.*

Установлена зависимость показателей жизнедеятельности организма человека от влияния электромагнитных полей. Доказано, что при анализе электромагнитной обстановки необходимо учитывать как параметры электромагнитных полей и состояние окружающей среды, в которой находится работник, так и размеры, формы и положение человека относительно распространения электромагнитных полей. Установлена необходимость проведения исследований негативного влияния электромагнитных полей на

