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NORMALIZATION OF THE ELECTROMAGNETIC FIELD AND PROTECTION FROM IT

Xurramova Xadicha Mamadovna
(Namangan, Uzbekistan)
Namangan Institute of Engineering and Technology
hadich71@inbox.ru +998997258768

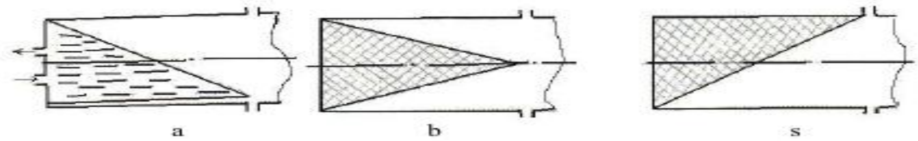
Abstract

The effect of the electromagnetic field on the human body depends on the voltage of the electric and magnetic fields, the intensity of the energy flow, the vibration frequency, the accumulation of radiation on a certain surface of the body, and the personal characteristics of the human body. The main reason for the impact of the electromagnetic field on the human body is that the atoms and molecules in the human body begin to divide into positive and negative poles under the influence of this field. Polarized molecules begin to move in the direction of electromagnetic field propagation. As a result of the impact of the electromagnetic field on the human body, ionized currents are generated in the blood and intercellular fluids under the influence of the external field. The alternating electric field heats the cells of the human body due to the alternating dielectric polarization, as well as the generation of conductive currents. The heat effect is due to energy absorption of electromagnetic fields. The absorption of energy and the generation of ionized currents have a special effect on biological cells, this effect is due to the violation of the delicate electrical potentials in human internal organs and cells and changes in the functions of fluid circulation.

Key words: normalization, intercellular fluids, safety, ionized, quickly, electrical potentials, dangerous materials, electromagnetic field, construction, ensuring, high frequency, maximum radiation, human error, control.

Inroduction The permissible levels of radiation established in our republic are very few units. Therefore, even if the organism is exposed to radiation for a long time, there may be no change. "Sanitary norms and rules for those who work at sources of high, very high and extremely high frequency electromagnetic fields" provided for by the sanitary standards define the following permissible norms and limits: electromagnetic field in workplaces, radio frequency voltage, electrical content 20 V/m in the frequency range of 100 kHz-30 MHz, 5 in the frequency range of 30-300 MHz. It should not exceed VGm. According to the magnetic composition, it should be 5 V/m in the frequency range of 100 kHz-1.5 MHz. In the range of SVCH 30-300,000 MHz, the maximum radiation current voltage allowed during the working day is 10 μW/cm2, the radiation during no more than 2 hours of the working day should not exceed 100 µV/cm2. In this case, protective glasses must be worn. During the rest of the working time, the radiation intensity should not exceed 10 µW/cm2. In the SVCH range, the radiation flux density should not exceed 1 µW/cm2 for people whose profession is not related to radiation and permanent residents. Analyzing the formulas mentioned above, placing workplaces further from the electromagnetic field and changing the distance between the antennas that direct the currents of the electromagnetic fields and the workplaces, reducing the radiation voltage of the generator, transmitting the radiation currents with the workplaces installation of absorbing and reducing screens between antennas, as well as use of personal protective equipment against electromagnetic fields in workplaces are the main means of protection. The method of protection achieved by extending the distance is the simplest and most effective. This method can be used by workers whose workplaces are outside electromagnetic fields, and also in cases where radiation devices can be remotely controlled. The possibility of using this method will be successful only if the room where the work is being performed is large enough. Another way to reduce radiation is to replace a strong radiation generator with a weaker radiation generator. But in this method it is necessary to take into account the technological process. Another way to reduce radiation power is to use attenuators, radiation absorbing or reducing devices equivalent to an antenna, which can eliminate or reduce the radiation power in the distance from the generator to the radiating device. Radiation absorbing devices can be coaxial and waveguide. Graphite or other carbon alloy is used as an energy absorber. Also, some dielectric materials can be used. Such materials include rubber, podevorirol, and others. Taking into account the heating of such energy-absorbing devices under the influence of energy, cooling surfaces are created in them.

Main part Attenuators used to reduce radiation power can be constant or variable. Permanent attenuators are made of materials with a high absorption coefficient of electromagnetic waves. The blades and plates of these attenuators are made of dielectric material and the top layer is covered with a thin metal plate. They are installed parallel to the linear field of electromagnetic force. The attenuation power of attenuators can be increased or decreased by sinking the blade deeper into the waveguide or by moving the plates closer together. The correct use of radiation absorbing devices and attenuators ensures that electromagnetic energy propagation to the external environment is reduced by more than 60 dB, and it is possible to ensure the amount of beam current less than 10 µW/cm2. One of the main methods of protection against electromagnetic radiation is the method of screens. The screen can be installed directly on the source or workplaces that emit electromagnetic waves. Reflector screens are made of materials that conduct electricity well. The protective feature of the screens is based on the formation of Foucault current on the screen surface under the influence of the electromagnetic field. In turn, the Foucault current creates a charge that has an opposite charge to the electromagnetic field. As a result, the joining of two fields is observed, and a field with less power than both fields remains. It is possible to calculate the lost energy on the surface of the screen and the thickness of the screen where a certain amount of radiation can be lost. We denote the power and density of the light flux passing through the screen by Ro and Io, and the power and density of the light flux without the screen by R and I. In this case, the weakened radiation is determined by the following formula:



Radiation absorbing devices:
a) cooling using water flow; c) cooling using ribbed surfaces.

In order to coordinate coaxial and wave-reflecting and absorbing devices, they can be made with a curved surface, pin-shaped and stepped, as well as dielectric washers. Attenuators used to reduce radiation power can be constant or variable. Permanent attenuators are made of materials with a high absorption coefficient of electromagnetic waves. The blades and plates of these attenuators are made of dielectric material and the top layer is covered with a thin metal plate. They are installed parallel to the linear field of electromagnetic force. The attenuation power of attenuators can be increased or decreased by sinking the blade deeper into the waveguide or by moving the plates closer together. The correct use of radiation absorbing devices and attenuators ensures that electromagnetic energy propagation to the external environment is reduced by more than 60 dB, and it is possible to ensure the amount of beam current less than 10 μW/cm2.

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$$L=10\lg\frac{P}{P_o}=10\lg\frac{I}{I_o},$$

Based on the strength of the screen, they are made of solid materials with good electrical conductivity, thickness not less than 0.5 mm. Open spaces left for observation and technology should be fenced with a metal mesh with a mesh of not less than 4x4 mm. The screen must be grounded. Mesh and screen elements must be well welded together. Because the decrease in electrical conductivity leads to a sharp decrease in the screen effect. The degree of weakening of the electromagnetic field with the screen is conditionally determined by the fact that the depth of penetration of electromagnetic waves into the screen material is less than the thickness of the screen. When the depth of penetration of the magnetic field into the screen is d, its attenuation is e=2.718 times, and it is determined by the following formula:

$$\delta = 1/\sqrt{\mu\sigma p f} \qquad (14.2.)$$

Here: μ' -absolute magnetic resistance of the screen material g/m; σ - specific conductivity of screen material, Sm/m; f-frequency, Gs. In this case, the effectiveness of screen protection must satisfy the following inequality:

$$E>j^{dG'\sigma}, \qquad (14.3.)$$

Here: thickness of d-screen material, mm; The larger μ', σ, f is, the smaller the depth of penetration of the field into the thickness of the screen; which makes the screen thinner. Usually, the penetration depth of electromagnetic fields of high and medium high frequency is very small (much less than mm), so the choice of such screens is considered from the construction point of view.

Conclusion Radiation is one of the most dangerous physical processes for humans, and its uncontrolled exposure can lead to fatal consequences. Radioactive gas radon is especially dangerous for cellars and basements, as well as for the lower floors of houses and buildings. Rising through cracks in the earth's crust, it enters basements and semi-basements and passes to the upper floors through ventilation shafts and stairs with air currents. The effect of the electromagnetic field on the human body depends on the voltage of the electric and magnetic fields, the intensity of the energy flow, the vibration frequency, the accumulation of radiation on a certain surface of the body, and the personal characteristics of the human body. The main reason for the impact of the electromagnetic field on the human body is that the atoms and molecules in the human body begin to divide into positive and negative poles under the influence of this field. Polarized molecules begin to move in the direction of electromagnetic field propagation.

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