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THE EFFECT OF ELECTRIC CURRENT ON THE HUMAN BODY

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ABSTRACT: - The article analyses the use and influence of electric current on the human body. The electrolytic action is expressed in the decomposition of blood and other organic liquids, causing significant violations of their physic-chemical compositions. The biological effect is manifested in irritation and excitation of the living tissues of the body, which may be accompanied by involuntary convulsive muscle contraction, including the muscles of the heart and lungs.

KEYWORDS: Magnitude, Electrical safety, The electrolytic action, technical measures.

INTRODUCTION

In the centure of technological progress, a person cannot imagine his daily activities without devices that use electrical energy. But at the same time, one should not forget that electric current carries a great danger to human life.

Electrical safety is a system of organizational and technical measures and means that ensure the protection of people from the harmful and dangerous effects of electric current, electric arc, electromagnetic field and static electricity.

Distinguish between direct and alternating current. Today, the use of alternating current with a frequency of 50 Hz to 300 GHz is common. Let's analyze this range in more detail:

1) Power frequency current, 50 Hz, used in industrial and domestic electrification systems;
2) Low frequency current, 3-300 kHz - in radio broadcasting, during melting, welding, heat treatment of metals;
3) Medium frequency current, 0.3-3.0 MHz - in broadcasting, with inductive heating of metals and other materials;
4) High frequency current, 3.0-30 MHz - in radio broadcasting, television, medicine, when welding polymers;

5) Very high frequency current, 30-300 MHz - in radio broadcasting, television, medicine, welding of polymers;
6) Ultra-high frequency current, 0.3-3.0 GHz - in radar, in multichannel radio communications, in radio astronomy, in radio spectroscopy, in radio navigation, in radio relay communications, in telecommunications, in flaw detection, in geodesy, in physiotherapy, during sterilization and cooking, etc;
7) Ultra high frequency current. 3-30 GHz;
8) Extremely high frequency current, 30-300 GHz;

THE MAIN FINDINGS AND RESULTS

To calculate the magnitude of the current flowing through a person when he gets under an electrical voltage with a frequency of 50 Hz, the resistance of the human body is conventionally assumed to be 1 kOhm. This value has little relation to the actual resistance of the human body.

Depending on the type and strength of the current on a person, it can have a variety of effects. Thermal action is expressed in burns of certain parts of the body, heating of blood vessels and nerve fibers. The electrolytic action is expressed in the decomposition of blood and other organic liquids, causing significant violations of their physico-chemical compositions. The biological effect is manifested in irritation and excitation of the living tissues of the body, which may be accompanied by involuntary convulsive muscle contraction, including the muscles of the heart and lungs. As a result, various disorders in the body may occur, including a violation and even a complete cessation of the activity of the respiratory and circulatory organs. The irritating effect of current on tissues can be direct, when the current passes directly through these tissues, and reflex, that is, through the central nervous system, when the current path lies outside these organs. All the variety of action of electric current leads to two types of damage: electrical injuries and electric shocks. Electrical injuries are clearly defined local damage to body tissues caused by exposure to electric current or an electric arc (electric burns, electric signs, skin plating, mechanical damage).

This report reports on the degree of influence of electric current, depending on its parameters. Experimentally, a sample was obtained by measuring the electrical resistance of a person. The measurements were made using the equipment: "Device for studying the resistance of the human body" (Fig. 1).

In the second graph, we see that as the frequency increases, the human impedance decreases. At a current frequency of more than 10 kHz, the resistance of the skin is extremely low. But the electric current does not have a damaging effect on the internal organs. This dependence explains the phenomenon when a person can be under the influence of a high-frequency arc discharge for several minutes.

Separately, it is worth noting that currents with frequencies from 50 Hz to 200 Hz, which are multiples of the heart rate, are especially dangerous, as they can cause fibrillation. Also, such currents disrupt the biochemical functions of the cell.

CONCLUSION

The consequences that will arise as a result of the action of an electric current on a person depend on many factors, namely:

- from the size and type of the flowing current, alternating current is more dangerous than direct current;
- the duration of its impact, the longer the duration of the current on a person, the more severe the consequences;

- flow paths, the greatest danger is the current flowing through the brain and spinal cord, the area of \u200b\u200bthe heart and respiratory organs (lungs);
- from the physical and psychological state of the person. The human body has a certain resistance, this resistance varies depending on the state of the person (see diagram).

The minimum current that the human body can feel is 1 mA.

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