American Journal of Interdisciplinary Research and Development
ISSN Online: 2771-8948
Website: www.ajird.journalspark.org
Volume 35, December - 2024

TECHNICAL CONTROL AND PREVENTION OF ELECTRICAL SAFETY HAZARDS IN ENTERPRISES

Khalmirzayev Shavkatbek Kurbanovich
Assistant, Andijan Machine-Building Institute

ABSTRACT:
This article discusses the control and supply of production processes through electric currents, which is a characteristic feature of living organisms. As a result, living cells in the human body vibrate due to rapid muscle contractions, which are primarily caused by disruptions in bioelectrical processes. The human body is primarily controlled by bioelectrical currents. This is caused by the effect of high-voltage electric current from the external environment, which disrupts the regulation of bioelectric currents. As a result, an electric shock occurs in the human body, leading to disturbances in the respiratory system and failure of the circulatory system.

Keywords: Electric current, biological effects, electrolytic effects, bioelectricity, biocurrents, biological death, frequency.

Introduction

Due to the widespread use of electric energy in industry, accidents caused by electric current and the issues surrounding their prevention have become important concerns. The most dangerous aspect of an electric shock is that there is no way to detect the danger in advance.

"Therefore, organizational and technical measures to mitigate the dangers of electric current must be implemented, including the installation of barriers and personal protection systems. In general, the effects of electric current are not limited to a single biological impact; they can be classified into the effects of electric arcs, magnetic fields, and static electricity."

The effect of electric current on the human body includes thermal (heat), electrolytic, and biological effects. The thermal effect is observed as burns on certain parts of the body, as well as the heating of blood vessels, nerves, and cells. In this case, the electric current can affect only certain parts of the body without crossing the central nervous system or the cardiovascular system. The biological effect of electric current is specific to living organisms. As a result, the cells in the human body vibrate due to sharp muscle contractions, which occur because of the disruption of bioelectrical processes. The human body is primarily controlled by bioelectric currents. When high-voltage electric current from the external environment interferes with these biocurrents, an electric shock occurs. In an uncontrolled organism, this disruption can prevent vital functions, leading to respiratory and circulatory system malfunctions. Given the variety of effects electric

current can have on the human body, these effects can generally be categorized into two groups: local electric effects and electric shock.

Burns and electrical marks caused by local electric shocks may indicate skin metallization. An electrical burn typically occurs when a voltage arc forms between the body and an electrical conductor. The severity of the burn can vary depending on the voltage applied to the conductor.

There are four levels of electric shock:

- As a result of a sharp contraction of the muscles, the person is ejected from the current and does not lose consciousness.
- As a result of a sharp contraction of the muscles, the person loses consciousness, but the heart and breathing continue to function.
- The person loses consciousness, and the respiratory system or heartbeat stops.
- Clinical death occurs, in which no signs of life are visible in the person.

The state of clinical death is a specific interval between life and death, during which a person survives through internal mechanisms for a limited time.

At this time, the signs of life in the person are as follows:
• There is no breathing, no blood circulation, no response to external stimuli, and no pain.
• The pupil of the eye is dilated and unresponsive to light.
• Clinical death typically lasts 5-8 minutes.
• Without any intervention, the cells in the cerebral cortex begin to disintegrate, and clinical death progresses to biological death.
• The resistance of the human body to the effects of electric current is influenced by the voltage of the current. As the voltage increases, the amount of current flowing through the body also increases, while the body's resistance remains constant.

The resistance of the internal organs of the body is much lower. While dry, intact human skin has a resistance ranging from 2,000 to 20,000 ohms or higher, wet or damaged skin has a resistance of 40 to 5,000 ohms, which is similar to the resistance of the body's internal organs.

Considering the above, the resistance of the human body is typically assumed to be 1,000 ohms for general technical calculations. If 0.6 to 1.5 mA of 50 Hz industrial electric current flows through the human body, it will be perceptible, and this amount of current is referred to as the 'limit of perception.

If the amount of current flowing through the human body reaches 10-15 mA, the muscles will contract irregularly, and the person will lose the ability to control parts of their body. They will be unable to remove or throw away the power cord causing the electrical shock. This level of current is known as the 'limiting current.

If the number of current reaches 25-50 mA, it will affect the chest, making it difficult to breathe. Prolonged exposure, lasting several minutes, can lead to death from respiratory arrest.

If the current exceeds 100 mA, it affects the heart muscles, disrupting the heart's rhythm. As a result, the circulatory system fails completely, leading to death.

The duration of the current flowing through the human body is also crucial. If the current flows for an extended period, the conductivity of the body increases, and harmful byproducts of the current accumulate, worsening the complications.

The type and frequency of the current also play an important role in its harmful effects. The most dangerous currents are those with frequencies between 20 and 100 Hz. The effects of currents with frequencies below 20 Hz or above 100 Hz vary, but they tend to be less harmful than those in the 20-100 Hz range.

If the current remains constant, the threshold of detection is typically around 6-7 mA, while the threshold for causing arrest is between 50-70 mA. A current of 300 mA can be sufficient to stop the heart for 0.5 seconds. To summarize, the primary goal of labor protection and technical safety in the workplace is to eliminate the causes of injuries and other accidents that occur during production. It also involves ensuring that the organization's management prioritizes the improvement of working conditions for employees, with a focus on integrating scientific and technological advancements. This includes the continuous enhancement of labor safety, protective equipment, labor culture, and the development and implementation of organizational, technical, and sanitary measures to prevent accidents. One of the objectives of the labor safety management system is to increase awareness among workers and employees about labor protection laws, to identify the most effective solutions for creating a healthy and safe working environment, and to recommend their implementation in production.

REFERENCES

1. Rezchikov, E.A., Nosov, V.B., Pishkina, E.P., Sherbak, E.G., Chvertkin, N.S. Bezopasnost' jiznedeyatel'nosti: Uchebnoe posobie. Ch. 2. Edited by E.A. Rezchikov. Moscow: MGUI, 1998.
2. Varvarin, V.K., Koyler, V.Ya., Panov, P.A. Directory of Electrical Equipment. Rosselkhozizdat, 1979.
3. Dolin, P.A. Guide to Technical Safety. Moscow: Energoizdat, 1982.
4. Yerebsov, I.N. Basic Electronics. Moscow: Energoatomizdat, 1989.
5. Ахмедов, А., and Ш. К. Халмирзаев. "ИССЛЕДОВАНИЕ БЕЗОПАСНОСТИ ЗАЗЕМЛЕНИЯ." Лучшие интеллектуальные исследования 21.1 (2024): 170-173.
6. Sahibjanovna N. M., Sohibjamolovna S. N. Application of virtual laboratories on the course" Design of measuring instruments" //ACADEMICIA: An International Multidisciplinary Research Journal. – 2022. – Т. 12. – №. 7. – С. 187-192.