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THE EFFECT OF ELECTRIC CURRENT ON THE HUMAN BODY

Electric current passing through the human body can cause two types of damage - electric shock and electrical injury. Electric shock is more dangerous, as it affects the whole body. Death occurs from heart or respiratory paralysis, and sometimes from both at the same time. Electrical injuries are electric shocks to outer parts of the body: these are burns, metallization of skin, etc. Current damage is usually mixed and depends on the magnitude and type of current flowing through the human body, the duration of its impact, the pathways through which the current passes, as well as the physical and mental state of the person at the time of defeat.

Another note to pay attention to is different effects of alternating current and direct one. As to the alternating current, it depends mainly on the frequency, in fact the low frequency alternating current is more dangerous than the high-frequency alternating and direct current of the same voltage.

The low frequency alternating current produces extended muscle contraction-tetanus. Tetanus is the condition where muscles involuntarily contract due to the passage of external electric current through the body. When involuntary contraction of muscles controlling the fingers causes a victim to be unable to let go of an energized conductor, the victim is said to be frozen on the circuit. Alternating current of industrial frequency a person begins to feel at 0.6 - 15 mA. The current of 12 - 15 mA causes severe pain in fingers and hands. A person can withstand this condition for

5-10 seconds and can tear his hands off the electrodes. The current of 20 - 25 mA causes very severe pain, the hands are paralyzed and breathing is difficult, the person cannot free himself from the electrodes. At a current of 50 - 80 mA there is the respiratory paralysis, and at 90-100 mA - heart failure and death.

The human body is less sensitive to direct current. Its effect is felt at 12 - 15 mA. The current of 20 - 25 mA causes a slight contraction of the arm muscles. Only at the current of 90-110 mA there occurs respiratory paralysis. Alternating current with a frequency of 50 - 60 Hz turns out to be the most dangerous. With increasing frequency, the currents begin to spread on the surface of the skin, causing severe burns, but not leading to electric shock.

Internal organs are mainly affected by electrical burns. The burns of this kind may appear slightly or they doesn't show on the skin at all. They are caused by the heat generated from the body's resistance to the current passing through it. These cases are more dangerous than external injuries. Internal burns are devastating and often have serious consequences: scarring, amputation, loss of function, loss of sensation and even death. For example, if a lot of tissue is destroyed, the large amount of waste generated can cause serious kidney or blood circulation disorders.

The amount of current flowing through a human body depends on the resistance of the body and the applied voltage. The greatest resistance to current is provided by the upper stratum corneum, devoid of nerves and blood vessels. With dry intact skin, the resistance of the human body to electric current is 40,000 - 100,000 ohms. The stratum corneum has a small thickness (0.05 - 0.2 mm) and at a voltage of 250 V instantly penetrates. Damage to the stratum corneum reduces the resistance of the human body to 800 - 1000 Ohms. The resistance also decreases with increasing current time. Therefore, it is very important to quickly eliminate the collision of the victim with live parts. The outcome of the defeat also largely depends on the path of the current in the human body. The most dangerous paths are arm - legs and arm - arm, when the largest part of the current passes through the heart.

The amount of resistance, and hence the result of electric shock is greatly influenced by the physical and mental state of a man. Increased sweating of the skin, fatigue, nervous excitement, intoxication lead to a sharp decrease in the resistance of the human body (up to 800 - 1000 Ohms). Therefore, even relatively small voltages can lead to electric shock.

It is necessary to remember that the human body is affected not by voltage, but by the amount of current. Under adverse conditions, even low voltages (30 - 40 V) can be life threatening. If the resistance of the human body is 700 ohms, then a voltage of 35 V will be dangerous. Electric currents high enough to cause involuntary muscle action are dangerous and are to be avoided at all costs.