THE EVALUATION OF THE UNSAFE AND HARMFUL FACTORS DURING THE OPERATION OF THE TRANSFORMERS AND ELECTRIC MOTORS OF OWN POWER STATION REQUIREMENTS

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The electric saturation of modern production forms an electrical hazard, the source of which can be electric networks, electrified equipment and tools, computer and organizational equipment that runs on electricity. This determines the urgency of the problem of electrical safety – the elimination of electrical injuries. [1]

Compared to other types of occupational injuries, electric injuries make up a small percentage; however, in terms of the number of injuries with a serious and especially fatal outcome, it occupies one of the first places.

The greatest number of electrical injuries (60–70 %) occurs at work on electrical installations with voltages up to 1000 V. This is explained by the wide distribution of such installations and the relatively low level of training of people who operate them. Electrical installations over 1000 V are much less in operation and they are serviced by specially trained personnel, which leads to fewer electrical injuries.

The rules described in the article are intended to ensure reliable, safe and rational operation of electrical installations and their maintenance in good condition. Maintenance of existing electrical installations, conducting operational switching in them, organization of repair and commissioning works and tests is carried out by specially trained electrical personnel. Electrical personnel must clearly understand the features of their enterprise, fully strengthen and strictly observe labor and production discipline, know and comply with the instructions and requirements of other regulations. [2]

The safety of high-voltage installations is the state of equipment in which there is no unacceptable risk in the process of its production, installation, commissioning, storage and transportation associated with harm to human life and health, property, and the environment.

Work performed on high-voltage installations is complex and dangerous, so the risk of industrial injury increases many times.

Electric motors and transformers are sources of noise and vibration. Machine noise is caused by the vibration of parts. The increased noise is caused by incomplete assembly of the transformer core packages and partial attraction of the moving part of the magnetic lines. Electric motors create increased noise due to continuous
operation in overload mode, single-phase interruptions or contact wear. Static and dynamic balancing parts are used to eliminate vibrations. The deformation of the gaps in the joints can also be eliminated. To reduce the vibration of the machine, use the low frequency vibration of the spring, which isolates the machine from the foundation.

Soundproof doors are installed to prevent the spread of noise. For long-term work in the open air during the cold season under environmental conditions: low air temperature, wind speed and high humidity – body hypothermia is possible.

While working in the cold, it is necessary to prevent severe freezing of the working bodies and to ensure rapid heating. Warm clothing prevents hypothermia in the human body. It is also necessary to use local heaters or arrange regular breaks for heating in special warm rooms. To prevent overheating of the body during the warm period, it is advisable to use ventilation.

Work at heights includes work that is performed at a height of 1,6 m or more above the surface of the floor, ceiling or floor. The height of the transformer with voltage classes of 15,75 kV and 24 kV is up to 5,5 m. Routine inspections and repair work pose a risk associated with working at heights. Work at a height of not more than 4 m can be performed from the stairs, and at a higher level – using special equipment with a fence. All lifting devices must be ready for use and securely fastened.

Motors have rotating parts, so there is a risk of injury during operation. To exclude the possibility of touching parts of the engine, it is necessary that all rotating parts and parts that connect the engines to the mechanisms have fences.

The presence of voltage is the main risk factor when operating a transformer with a voltage class of 15,75/6,3 kV and 24/6,3 kV and electric motors with a voltage of 6,3 kV. [3]

Electric shock is possible in the following cases: touching a dangerous distance or approaching it under voltage without voltage or damage to the insulation, contact with the housing of a transformer or motor that is energized due to damage to the insulation.

The following threshold values of alternating current of industrial frequency of 50 Hz can be distinguished: threshold value of the receiver (0,5–1,5 mA); non-transmission threshold (10–15 mA); lethal current (100 mA or more).

In order to protect people from electric shock, the standards define the maximum values of permissible contact voltages and currents that ensure the safe operation of people when interacting with industrial frequency alternating current systems.

Sensor voltages and currents for workers working at high temperatures (25° C and above) and humidity (more than 75 %) should be reduced by 3 times. [4]

A measure of protection against electric shock is the insulation of conductive parts, which prevents currents on metal parts from electrical systems, prevents current from flowing to the ground, and also protects a person from current in case of accidental contact with live parts.

To maintain the insulation of electrical systems in good condition, your resistance is measured periodically or continuously. Other elements of the transformer (oil, inputs) must be checked independently. The inaccessibility of live parts of the transformer and electric motors requires clean fences at a height of 2 or 1.6 m for the planning level.

The role of protective grounding in transformers and electric motors of auxiliary needs of power plants is to convert short circuits in the case. Overcurrent protection is enabled, which disables the accident zone.
The danger of arcing lies in the fact that a person can be connected to the electrical circuit remotely using an arc without touching live parts. The core of the arc is at a very high temperature, which causes injuries.

To avoid injuries due to sparking in electrical systems with a voltage class of 1–35 kV, it is forbidden to approach unlimited live parts closer than 0.6 m.

**Conclusions:** In order to ensure the safe work of personnel, measures should be provided to:
- creation of safe working conditions at the station;
- constant monitoring of their implementation;

The article analyzed the dangerous factors that arise during the operation of the power plant. In addition, the necessary steps were taken to eliminate the risk to staff life.

**References:**


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**ПРОБЛЕМА ЩОДО РІВНЯ ФІЗИЧНОЇ ПІДГОТОВКИ КУРСАНТІВ НВЗ МВС УКРАЇНИ**

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В Україні сьогодні панує дещо криміногенна ситуація, і кількість скоєних злочинів, особливо із застосуванням насильства та фізичної сили, з кожним днем збільшується. Ці умови створюють ризик для правоохоронців при виконанні своїх обов’язків. Відповідно до сучасної практики, правоохоронний досвід та статистична звітність, здійснюючи свої повноваження, представники Національної поліції України досить часто використовують фізичний вплив, фізичну силу, прийоми рукопашного бою та боротьби при затриманні правопорушників або припиненні протиправної діяльності правопорушників. Задля цього працівники поліції повинні бути максимально добре навчени для особистої безпеки та безпеки населення. Тому підвищення рівня фізичної підготовки курсантів є сьогодні дуже актуальною проблемою.

Одним з пріоритетних напрямів підготовки майбутніх працівників поліції до професійної діяльності є спеціальна фізична підготовка. Спеціальна фізична підготовка – це комплекс заходів, спрямованих на формування та