AP25794755. Development of methods for monitoring and predicting the destruction of substation structural elements from electrochemical corrosion. sc.s. - Voitkevich S.

Project Abstract:

The power grid infrastructure is a complex system that includes all the necessary components for the transmission, distribution, and consumption of electrical energy. This system plays a key role in the electric power industry and ensures the energy security of the state. Substations, as an essential part of the power system, perform the functions of voltage transformation, regulation, and distribution of electrical energy.

To ensure electrical safety, all elements of the power grid structures (cables, reinforced concrete poles and foundations, equipment supports at substations, pipelines, artificial grounding devices, etc.) must be grounded, forming a unified grounding system. During the operation of electrical installations, changes often occur in these grounding systems due to violations of their integrity caused by the impact of electrochemical corrosion on grounding elements. This leads to changes in the corrosion environment at the facility, such as a sharp increase in anodic currents at the points of damage to the aluminum sheaths of cables, which in turn reduces their service life.

The safe and reliable operation of power grid facilities is crucial for the stable functioning of the entire electric power system. Effective operation of these facilities is especially important in the context of increasing energy consumption and the development of electrical engineering in modern society.

The goal of the project is to develop a methodology for monitoring and predicting the destruction of substation structural elements due to electrochemical corrosion, including a model of current distribution across the elements of the substation's power grid structure, which allows forecasting the intensity of electrochemical corrosion.

Project Objectives:

- Analyze the main research directions on the causes of intensive corrosion of substation structural elements and methods of combating it;
- Analyze the geometric arrangement of substation structural elements, including the grounding system;
- Experimentally determine electrical parameters for model development;
- Develop a model of current distribution across the elements of the substation's power grid structure, including the grounding system;
- Experimentally study the model of current distribution across the elements of the substation's power grid structure, including the grounding system;
- Develop a methodology for monitoring and predicting the destruction of substation structural elements due to electrochemical corrosion.

Date of publication of the material: 01.07.2025