

# Scientific approach to managing the impacts of electric power devices

DEPARTMENT FOR ENVIRONMENTAL IMPACTS OF ELECTRIC POWER FACILITIES

Low-frequency electric and magnetic fields are at the core of our research work and are the basis for the engineering development of advanced power installations and the application of new technological solutions to ensure the safety of people and nature.



We study the effects of electromagnetic radiation on people and the wider environment.



We carry out accredited measurements of the effects of noise and lighting in the modern environment.



The results of our research are used in industry and in everyday life.

In addition to earthing, electromagnetic radiation, short-circuits, corrosion of buried metal structures and the study of the effects operating between power system facilities and other infrastructure structures, we have a comprehensive research interest in the effects of noise and lighting in the environment.

Our science-based findings, expert assessments and opinions are the basis for verifying compliance with legislation and for the operation of power installations – from transformers and transmission lines to railways, base stations and various industrial facilities.

## DEVELOPING RELIABLE EARTHING SYSTEMS

- Designing and dimensioning the earthing systems of power substations, transmission lines and other facilities.
- Carrying out measurements and analyses of the specific resistivity of the soil and already constructed earthing systems.
- Conducting measurements of bonding (galvanic) connections, contact voltages and potential funnel distribution.
- Measuring lightning conductor installations and electrical installations.
- Developing effective measures to achieve the safety of the earthing system.
- Introducing systematic improvement of inappropriate earthing and lightning systems.

## WE DETERMINE ELECTROMAGNETIC COMPATIBILITY (EMC)

- Advising, monitoring and measuring the electromagnetic compatibility of devices and systems.
- Investigating the causes of electromagnetic disturbances in power and industrial installations.
- Analysing the electromagnetic compatibility conditions and its provision in installations.
- Supervising the execution of works and compliance with good EMC engineering practice.
- Carrying out radio frequency interference measurements of power installations and lines.
- Testing the functionality of systems for electromagnetic interference.

## WE STUDY ELECTROMAGNETIC FIELDS (EMF)

- Carrying out measurements and analyses of electric and magnetic fields.
- Performing calculations of electric and magnetic fields based on 3D electromagnetic models.
- Studying electric and magnetic fields (substations, power lines, cable ducts, etc.).
- Advising on the design and implementation of measures to reduce electromagnetic radiation.
- Determining compliance with environmental and other relevant legislation.
- Performing assessments, expert evaluations and reports on the environmental impact of EMF.
- Following developments in the wider scientific community to protect people from the effects of EMF.



## RESEARCHING NOISE EFFECTS IN THE ENVIRONMENT

- Measuring and analysing noise.
- Performing noise calculations in the natural and living environment based on 3D noise models.
- Performing system research of noise caused by corona on HV overhead power lines.
- Advising on the design and implementation measures to reduce noise.
- Performing assessments, expert evaluations and reports on the environmental impact of noise.
- Warranty and control measurements of noise.

## RESEARCHING ILLUMINATION EFFECTS IN THE ENVIRONMENT

- Measuring and analysing illuminance.
- Performing 3D model calculations for the design and rehabilitation of existing lighting.
- Producing lighting plans.
- Performing illuminance and luminance impact assessments on the environment and people.

## STUDYING CORROSION OF METAL GROUNDING SYSTEMS

- Researching direct currents of railways leakage.
- Advising designing facilities according to the impact of DC stray currents.
- Carrying out potential measurements of buried metal structures.
- Conducting measurements, preparing analyses and proposing measures to reduce the impact of DC stray currents.
- Determining the probabilities of AC corrosion.
- Advising on design and implementation.

**Our scientific knowledge of the effects of electromagnetic radiation and expert support in applying advanced solutions for the benefit of people and the environment are indispensable for the compliance verification and development of power installations.**

## STUDYING SHORT CIRCUITS AND PROTECTION

- Calculation of short circuits on all voltage levels.
- Calculation of current loads of earthing systems of electric power structures.
- Managing the issues connected to neutral point earthing in distribution and transmission networks.
- Calculations of load and dimensioning of HV cable conductor screens.
- Managing issues connected to induced quantities in HV cable conductor screens.
- Consulting at the implementation and methods for earthing the cable conductor screens.
- Calculations and measurements of HV overhead power lines' electric parameters.
- Analysis distance and overcurrent protection in transmission and distribution networks.
- Reconstruction of real fault events.

## IDENTIFYING THE IMPACTS OF THE ELECTRICITY SYSTEM ON OTHER INFRASTRUCTURE SYSTEMS

- Research AC interference of electric power system to other infrastructural systems.
- Consultation in planning electric power and infrastructural facilities with regard to AC interference.
- Calculations of inductive, conductive and capacitive couplings.
- Measurements and analyses of mutual impacts of existing infrastructure.
- Proposals and consultation in planning and implementation of mitigation measures.