



## WORLD CONSTRUCTION CHAMPIONSHIP

### Qualification criteria for applicants in the individual nomination "Design of Electrical and Automation Systems"

#### APPLICANTS

Currently employed specialists; students; and independent applicants.

#### COUNTRIES

Russia,  
Kazakhstan,  
Kyrgyzstan,  
Uzbekistan,  
Tajikistan,  
Belarus,  
Armenia,  
Azerbaijan,  
Moldova,  
Turkmenistan.

#### SPECIALISATIONS:

- Design of electric lighting systems;
- Design of power supply systems of up to 1000V;
- Design of low-current systems (fire automation, alarms and notification);
- Design of power supply systems over 1000V (primary switching, relay protection and automation);
- Design of building engineering automation systems in capital construction projects.

#### REQUIREMENTS FOR CURRENTLY EMPLOYED SPECIALISTS AND INDEPENDENT APPLICANTS

- Higher education;
- Position — employee of a design company or engineering design department (subdivision): design engineer (of any category);
- At least 3 years of general work experience;
- At least 2 years of related work experience in the given profession;
- Confident user of specialised software required for the competition nomination; and
- User of Windows, MS Office, Internet.

#### REQUIREMENTS FOR STUDENTS

- Education — Bachelor's programme (4<sup>th</sup> year), Specialist programme (5<sup>th</sup>-6<sup>th</sup> years), Master's programme (1<sup>st</sup>-2<sup>nd</sup> years).
- Degree/major in engineering in technical systems for power supply up to and above 1000 V, interior electrical lighting, fire protection, or automation.

## **KNOWLEDGE REQUIREMENTS**

### **Common requirements for all the specialisations:**

- ethical behaviour principles;
- design development algorithm within the competence of one's own specialisation;
- calculation methods within the competence of one's specialisation;
- conditions for checking the equipment of the power supply system, electric lighting system, fire protection systems, and automation systems;
- requirements for the equipment depending on the location conditions;
- computer-aided design systems;
- terminology of allied design sections, alphabetic codes of elements on plans and diagrams, and rules of representation of objects (products, structures, and their components);
- amount of background data sufficient to complete a section of the design within the competence of one's specialisation; and
- basic laws of physics (especially concerning electricity), basics of electrical engineering and automated control theory necessary for electrical calculations, development of electrical circuits and the selection of electrical equipment.

### **In addition to the above common requirements, for "Design of electric lighting systems":**

- lighting calculation methods;
- types and systems of artificial lighting, rated lighting values;
- requirements for reliability categories of power supply to electrical consumers;
- requirements for the placement of switchboard equipment;
- requirements for the placement of control devices;
- requirements for the environment in which the equipment, materials, and products are installed;
- conditions for choice of switching equipment;
- rules for drawing up schemes/diagrams;
- cable routing requirements;
- conditions for selecting cable and wire products;
- conditions for selecting cable-bearing structures;
- methods for calculating electrical loads;
- methodology for calculating short-circuit currents;
- methodology for calculating deviation (voltage drop); and
- methodology for determining the centre of electrical loads.

### **In addition to the above common requirements, for "Design of power supply systems":**

- requirements for the placement of switchgear (points) and switchboard equipment;
- requirements for the placement of control devices;
- requirements for the environment in which the equipment, materials, and products are installed;
- conditions for choice of switching equipment;
- rules for drawing up schemes/diagrams;
- bus bars and cable routing requirements;
- conditions for selecting cable and wire products;
- conditions for selecting cable-bearing structures;
- methods for calculating electrical loads;
- methodology for calculating short-circuit currents;
- methodology for calculating deviation (voltage drop); and
- methodology for determining the centre of electrical loads.

**In addition to the above common requirements, for “Design of low-current systems (fire automation, alarms and notification)”:**

- methodologies for calculating sound pressure in premises;
- methodologies for determining the load on an addressable communication line;
- methodologies for calculating battery back-up capacity;
- conditions for selecting cable and wire products;
- conditions for selecting cable-bearing structures;
- principles for selecting detectors depending on the type of exposure to be detected; and
- principles for selecting detectors depending on the detection method.

**In addition to the above common requirements, for “Design of building engineering automation systems”:**

- methods of analysis, calculation, and modelling of systems;
- basics of electric drive and industrial automation, electrical machines;
- basics of application of analogue and digital devices;
- rules of Boolean algebra application;
- devices and principles of interaction of units and elements of equipment and devices;
- basic principles of instrumentation and control;
- basics of metrological support of the processes in the systems;
- basic principles of collection and transfer of system parameters; and
- principles of operation of primary measuring instruments.

**SKILLS REQUIREMENTS**

- perform calculations within the competence of one’s specialisation;
- select equipment taking into account the conditions affecting the design;
- draw equipment and engineering network layouts;
- use regulatory and technical documentation, regulations, and laws when developing design solutions;
- prepare reports on design solutions;
- apply professional computer software tools for designing; and
- draw electrical, functional, structural, and automation diagrams.

**WORK EXPERIENCE**

Experience in developing design solutions to electrical lighting systems or power supply systems of up to 1000V, or low-current systems (fire automation, alarms and notification), or power supply systems over 1000V (primary switching, relay protection and automation), or building engineering automation systems in capital construction projects (for students — at the level of course and/or diploma design).