



ESF program "Development of the system of qualifications"

# OCCUPATIONAL QUALIFICATION STANDARDS

## Automatician, Automation Technician, Level 5

**The Occupational Qualification Standards are documents** that describe the work, a set of skills, knowledge and attitudes or competency requirements for successful performance of the work.

The Occupational Qualification Standards form a basis for the compilation of vocational secondary education and continuing education and for assessment of the competence on awarding the occupational qualification.

<b>Occupational title</b>		<b>Estonian Qualifications Framework (EQF) level</b>
Automatician, Automation Technician, Level 5		5
<b>Specialization</b>	<b>Title on the occupational qualification certificate</b>	
Production Automation	Production Automatician, Level 5	
Building Automation	Building Automatician, Level 5	

## Part A

### DESCRIPTION OF WORK

#### A.1 Description of work

Automation Technicians are skilled employees whose main activity is the installation and operation of automation systems, components, and equipment. In the companies of production automation, they use electromagnetic, pneumatic and/or hydro automation tools, the companies of building automation use specific equipment.

An Automatician-Technician, Level 5 is working independently or in a team, where he or she manages the performance of installation projects. He or she is responsible for their own performance and the performance of others. The work involves coaching, counseling of clients, resource sharing, and cooperation, where appropriate, with electricians, technologists, IT specialists and professionals in related fields.

He or she is based in their work on the principles of energy efficiency, sustainability, and environmental preservation.

Automatician-Technician specializes in manufacturing or building automation.

**Automatician-Technician specializing in manufacturing automation** works in the enterprises dealing with automation of processes, production equipment, and production systems. He or she governs, directs and controls the automation systems of the industry of production of electricity, district heating, wood, chemical, food, machinery, water supply and agriculture and other. He or she also performs tasks related to installation, maintenance and operation of production equipment and robots.

**The Automatician-Technician specializing in building automation** works in the enterprises dealing with automation of the utility systems of buildings and facilities. He or she performs the tasks related to installation, maintenance, maintenance, and deployment of the automation and the local management network of heat and cold supply, heating and cooling systems, ventilation, water supply and sewerage of buildings and facilities.

#### Related occupational qualifications:

Automatician, Level 4

#### A.2 Work Units

##### A.2.1 installation of automation equipment and systems

2.1.1 Preparatory work

2.1.2 The construction of equipment and systems.

2.1.3 Start-up work.

2.1.4 Documentation

##### A.2.2 Operation of automation equipment and systems

2.2.1 Preparatory work

2.2.2 Maintenance, servicing and repair of the equipment.

2.2.3 Monitoring and control of automated technological processes.

##### A.2.3 Management and supervision

2.3.1 Work organization, including the management of performance of installation projects.

2.3.2 Supervision of the employees.

#### **WORK UNITS RELATED TO SPECIALISATION**

##### **A.2.4 Installation and operation of production automation**

2.4.1 Installation of the equipment and systems, maintenance, and servicing.

2.4.2 Process management.

##### **A.2.5 Installation and operation of building automation**

2.5.1 Installation works of the equipment and systems.

2.5.2 Operation, maintenance and servicing of the equipment and systems.

#### **THE OPTIONAL WORK UNITS**

A.2.6 Installation and operation of automation equipment and systems in potentially explosive environments.

A.2.7 Installation and operation of automation equipment and systems in chemically aggressive environments.

A.2.8 Installation and operation of automation equipment and systems in the environments related to increased sterility.

#### **A.3 Working environment and the specificity of the work**

The work may involve physical and mental exertion, and fast-paced working. Depending on the specialization, work can take place outdoors, in heights, or in hazardous or specific working environments (explosion and fire hazard, exposure to chemicals, heightened hygienic and sterility requirements etc.).

#### **A.4 Work equipment**

The basic tools of an Automatician-technician are the tools of information technology (computer technology hardware and software), means of telecommunications, hand, and special tools, measuring instruments and tools.

#### **A.5 Personal characteristics necessary for the work: aptitude and personality traits**

Coping with the work requires logical thinking, communication and expression skills, good concentration, perseverance, coordination ability, a developed sense of responsibility and readiness to learn.

#### **A.6 Professional training**

The occupational qualification of Automatician -technician level 5 can be obtained studying in an educational institution or working on the specialty and completing professional training courses.

#### **A.7 The most common job titles**

Automatician, Automatician-installer, Automatician-mechanic, service Automatician, setter of the automatics of machine tools, programmer, Automatician-operator, machine tools Automatician, etc.



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## Part B COMPETENCY REQUIREMENTS

### B.1. Structure of the occupational qualification

On application for the occupational qualification of the Automatician-technician is required the certification of the competencies B.2.1 - B.2.3 and B.2.9 (transversal competencies) and of one competence related to specialization from the selection (B.2.4 - B.2.5). For certification of the occupational qualification of the Automatician specializing in production automation equipment and systems is required, in addition, to certify the competency B.2.4.

For certification of the occupational qualification of the Automatician specializing in building automation equipment and systems is required, in addition, to certify the competence B.2.4. Certification of the optional competencies B.2.6-B.2.8 is voluntary.

### B.2 Competencies

#### MANDATORY COMPETENCIES

B.2.1 Installation of automation equipment and systems	ECT Level 5
<u>Performance indicators</u>	
<ol style="list-style-type: none"> <li>1) examines the provided installation documentation;</li> <li>2) assesses the feasibility of automation systems, if necessary, makes changes in the automation lay outs;</li> <li>3) assesses the resources needed for installation work and the size and complexity of the installation work;</li> <li>4) prepares calculations of work-related costs, based on the purpose of the work and the current legislation;</li> <li>5) prioritizes the actions, draws up a timetable for carrying out the installation work;</li> <li>6) coordinates technical solutions with associated professionals;</li> <li>7) verifies the existence of, or need for coordination;</li> <li>8) selects the tools and methods according to the task and uses them as intended;</li> <li>9) installs the actuator and sensor equipment and measurement instruments, in accordance with the project;</li> <li>10) prepares and/or installs automation panels and cabling systems, including data communication systems;</li> <li>11) installs wiring, cables and equipment in a manner that protects them from the mechanical loads and electromagnetic interference of the environment;</li> <li>12) make adjustment works: tests the compliance of the systems (including communications systems) with project solutions;</li> <li>13) tunes and adjusts the settings of the apparatus, changes the programs of the controllers, checks the result of the work;</li> <li>14) follows the installation schedule, checks the compliance of the work done with the project and the use of resources;</li> <li>15) verifies the reliability of the installed system: performs automation and electrical measurements with the appropriate instrumentation to make sure the system is in compliance with the automation system, and the system does not have errors that would cause failures;</li> <li>16) eliminates potential errors and faults, based on the nature of the error and the needs of the technological process;</li> </ol>	

<p>17) leads the process into a technologically stable mode of operation;</p> <p>18) corrects in cooperation with specialists the parameters of the automated process in accordance with the requirements of the technology;</p> <p>19) documents the changes made and the installation and operation works;</p> <p>20) prepares as-built drawings and manuals of the automation systems.</p>
<p><u>Knowledge:</u></p> <p>1) the most common installation methods;</p> <p>2) tools used in installation;</p> <p>3) basic knowledge of automation installation works, the materials used and their properties;</p> <p>4) automation system parameters and principles of operation;</p> <p>5) installation regulations and requirements.</p>
<p><u>Assessment method(s):</u></p> <p>Theory questions, a sample work or an interview, or monitoring at the workplace.</p>

<b>B.2.2 Operation of automation equipment and systems</b>	<b>ECT Level 5</b>
<p><u>Performance indicators</u></p> <ol style="list-style-type: none"> <li>1) reads and interprets drawings (including as-built drawings), is guided in his or her activities from equipment manuals, technical passports and other source documents;</li> <li>2) selects the tools and equipment (including measuring instruments) according to the task and uses them as intended;</li> <li>3) uses appropriate methods for troubleshooting and system maintenance programs;</li> <li>4) monitors the information of the progress of technology processes, if necessary, adjusts the set points of the parameters of the process in the automation means;</li> <li>5) maintains, repairs, tunes and checks automation devices (e.g., actuator and sensor equipment, measuring equipment), and automation panels and cabling systems according to the implementation project;</li> <li>6) during the repair, updates the layouts;</li> <li>7) keeps up to date with the prices of automation tools and materials (costs) for the purchase of automation equipment from the sales market of the equipment;</li> <li>8) evaluates the condition of the system and the need for maintenance activities, draws up a care plan</li> <li>9) inspects and maintains the work of the communications devices between the automation equipment (including the functioning of local management network);</li> <li>10) detects and eliminates failures;</li> <li>11) documents the maintenance and the performance;</li> <li>12) on the basis of measurements analyzes the energy consumption, the technological process;</li> <li>13) keeps record of his or her labor costs, uses resources efficiently;</li> <li>14) makes proposals to update and optimize the systems (e.g. green energy deployment);</li> <li>15) is familiar with the principles of preparation and development of the technical solutions of the local management networks and with the equipment used.</li> </ol>	
<p><u>Knowledge:</u></p> <ol style="list-style-type: none"> <li>1) principles of financial accounting;</li> <li>2) automatic control, command and control equipment and instruments (including measuring instruments in the area of their use);</li> </ol>	
<p><u>Assessment method(s):</u></p> <p>Theory questions, a sample work or an interview, or monitoring at the workplace.</p>	

<b>B.2.3 Management and supervision</b>	<b>ECT Level 5</b>
<u>Performance indicators</u>	
<ol style="list-style-type: none"> <li>1) organizes the work of the team, distributes the tasks, motivates the subordinates;</li> <li>2) monitors and verifies the safety of co-workers;</li> <li>3) examines and evaluates the performance and work results of employees/supervisees;</li> <li>4) checks the quality of work, including the quality of the work of subcontractors;</li> <li>5) monitors the adherence to the deadlines in the implementation of the planned activities;</li> <li>6) works in a cost effective way, considering the profitability calculation and quality requirements;</li> <li>7) participates in the economic activity of the company, including identification of the risks and developing of preventive measures;</li> <li>8) supervises the work of the employees and evaluates the results of their operations; presents, introduces safe working practices;</li> <li>9) directs the employees to use of the work techniques ensuring quality, helps to find solutions to problems;</li> <li>10) organizes user trainings (including related to technical indicators of the used automation).</li> </ol>	
<u>Knowledge:</u>	
<ol style="list-style-type: none"> <li>1) basics of management;</li> <li>2) basics of financial accounting;</li> <li>3) requirements of the legislation governing the field.</li> </ol>	
<u>Assessment method(s):</u>	
Theory questions, a sample work or an interview, or monitoring at the workplace.	

## COMPETENCIES RELATED TO SPECIALISATION

<b>Production Automation</b>	
<b>B.2.4 Installation and operation of production automation equipment.</b>	<b>ECT Level 5</b>
<u>Performance indicators</u>	
<ol style="list-style-type: none"> <li>1) reads and interprets the functional and management schemes of production automation;</li> <li>2) installs and adjusts the production equipment and robots related to the production process (e.g., power generation, chemical industry) understanding the nature of the manufacturing process;</li> <li>3) installs automation cables makes the necessary connections of automation cables;</li> <li>4) performs the tasks related to maintenance, care and repair of the equipment and systems;</li> <li>5) analyzes the hardware and software faults occurring in the automatic systems of the equipment, machines and processes in their area of responsibility;</li> <li>6) assesses the development trends of automation hardware and software tools and recommends to choose the best solutions;</li> <li>7) installs and checks the production equipment and robots related to the production process (e.g., power generation, chemical industry) understanding the nature of the manufacturing process;</li> <li>8) corrects the parameters of the automated process in accordance with the requirements of the technological documentation;</li> <li>9) performs tasks related to introducing of the equipment, including testing.</li> </ol>	
<u>Knowledge:</u>	
<ol style="list-style-type: none"> <li>1) equipment and systems related to the technological processes of the production of electricity,</li> </ol>	

<p>district heating, wood, chemical, food, and machine industry;</p> <ol style="list-style-type: none"> <li>2) operating principles and application of the equipment / instrumentation and electrical actuators used in the process;</li> <li>3) basic knowledge of pneumatic, hydraulic, power electronic equipment;</li> <li>4) classification and use production automation systems, components and equipment.</li> </ol>
<p><u>Assessment method(s):</u> Theory questions, sample work or an interview, or monitoring at the workplace.</p>

<b>Building Automation</b>	
<b>B.2.5 Installation and operation of building automation equipment and systems.</b>	<b>ECT Level 5</b>
<u>Performance indicators</u>	
<ol style="list-style-type: none"> <li>1) reads and interprets the functional and management schemes and text materials of building automation in the ongoing automation work project;</li> <li>2) installs automation cables and the automation panels bundled with automation tools and apparatus and performs the necessary connections of the automation cables in the switchgear in accordance with the plan solution of the automation working drawings (if necessary, in cooperation with the specialists in associated areas);</li> <li>3) installs sensors, actuators and other automation tools and cables used on automation systems on site (technological units), taking into account the technical characteristics of automation equipment or tools, and installation requirements; performs the predetermined cable connections;</li> <li>4) if necessary, on building automation systems prepares installation layouts /drawings of automation tools for their installation on site (in the room);</li> <li>5) controls the compliance of the automation tools and apparatus of the installed automation system with the automation work project;</li> <li>6) reads and interprets the functional and control layouts of the built-in automation systems and the structure diagrams of local networks with text materials in the implementation documentation;</li> <li>7) tunes the regulating and control automation and control systems in the built automation system for the operation as a single integrated system;</li> <li>8) handles the technical surveillance systems buildings or of buildings or facilities for ensuring the optimum performance of automation systems;</li> <li>9) checks (tests) the reliability of the newly installed system;</li> <li>10) eliminates errors/faults and performs follow-up check;</li> <li>11) checks the configuration parameters, if necessary, changes the settings and controls the operation of the device;</li> <li>12) determines the deviations in the operation of the device using measuring instrumentation;</li> <li>13) organizes repair or replacement of automation tools in accordance with manufacturer's instructions and technical specifications;</li> <li>14) tests the work of the repaired or replaced equipment in the system if necessary, adjusting the device;</li> <li>15) adjusts the automation system components to ensure the intended operation modes of HVAC;</li> <li>16) monitors the work of automation equipment in specified periods of time;</li> <li>17) documents the surveillance of systems, enters the data into the maintenance book;</li> <li>18) where appropriate performs general surveys of the automation systems and analyzes the hardware and software failures occurring in the systems;</li> </ol>	

<p>19) assesses the development trends of the methods and tools used in the automation and uses the best possible solutions;</p> <p>20) knows and is able to use technical specifications and features of the automation tools specifically designed for use in building automation with the knowledge and use of their software (including regarding the program of the freely programmed controllers).</p>
<p><u>Knowledge:</u></p> <ol style="list-style-type: none"> <li>1) operating principles, uses and conditions of operations of the automation of the heat and cold supply systems, heating and cooling systems and ventilation and water supply and sewerage systems of buildings (structures, etc.);</li> <li>2) possibilities of implementation of local management networks in operation of HVAC facilities;</li> <li>3) general principles of operation of electrical and communications networks in order to ensure the functioning of the communication between local networks.</li> </ol>
<p><u>Assessment Method(s):</u> Theory questions, sample work or an interview, or monitoring at the workplace.</p>

### OPTIONAL COMPETENCIES

<p><b>B.2.6 Installation and operation of automation equipment and systems in potentially explosive environments.</b></p>	<p><b>ECT Level 5</b></p>
<p><u>Performance indicators</u></p> <ol style="list-style-type: none"> <li>1) Installs connects and maintains the explosion-proof (Ex-Certification) automation tools and cable systems, taking into account the specificities of a potentially explosive environment.</li> </ol>	
<p><u>Knowledge:</u></p> <ol style="list-style-type: none"> <li>1) building requirements of space with a heightened the danger of explosion;</li> <li>2) the equipment and cables installed in an explosive environment and their marking;</li> <li>3) the specific nature of the structures of the equipment corresponding with the markings, their use and installation conditions.</li> </ol>	
<p><b>B.2.7 Installation and operation of automation equipment and systems in chemically aggressive environments.</b></p>	<p><b>ECT Level 5</b></p>
<p><u>Performance indicators</u></p> <ol style="list-style-type: none"> <li>1) Installs connects and maintains equipment and cable systems, taking into account the specificities of a chemically aggressive environment.</li> </ol>	
<p><u>Knowledge:</u></p> <ol style="list-style-type: none"> <li>1) requirements of use of chemically aggressive space;</li> <li>2) the equipment and cables installed in an explosive environment and their marking;</li> <li>3) the specific nature of the structures of the equipment corresponding with the markings, their use and installation conditions.</li> </ol>	
<p><b>B.2.8 Installation and operation of automation equipment and systems in the environments related to increased sterility.</b></p>	<p><b>ECT Level 5</b></p>
<p><u>Performance indicators</u></p> <ol style="list-style-type: none"> <li>1) Installs connects and maintains equipment and cable systems, taking into account the specificities of environment with an increased sterility (such as pharmaceutical and food industries, medical institutions).</li> </ol>	



Knowledge:

- 1) requirements of use of the space with increased requirements for sterility;
- 2) the equipment and cables installed in the space with increased requirements for sterility;
- 3) the specific nature of the structures of the equipment corresponding with the markings, their use and installation conditions.

**TRANSVERSAL COMPETENCIES**

<b>B.2.12 Automation-Technician, level 5, transversal competencies</b>	<b>ECT Level 5</b>
<u>Performance indicators</u>	
<ol style="list-style-type: none"> <li>1) reads and interprets automation layouts and drawing related to automation systems;</li> <li>2) fundamentals and symbols of electrical and automation engineering, making functional layouts for compilation of source materials;</li> <li>3) uses in his or her work the Estonian language at level B2 and one foreign language at level A2 (see Annex 1);</li> <li>4) use of the possibilities of information and communication technology (information retrieval, work with documents, etc.);</li> <li>5) masters the most common word-processing and spreadsheet programs, and the documentation programs based thereon, including professional programs;</li> <li>6) uses and improves the CAD software creates new projects;</li> <li>7) in the assigned site in all the work adheres to the statutory occupational health (including first aid), environment preservation, and occupational safety requirements;</li> <li>8) complies with fire and electrical safety requirements;</li> <li>9) uses in his or her work ergonomic and safe working practices and personal protective equipment;</li> <li>10) arrange for a safe and handy workplace, keeps it clean and tidy;</li> <li>11) checks the compliance with the requirements of the workplaces of all the team members;</li> <li>12) assesses the risks and dangers of the workplace using risk assessment methodologies;</li> <li>13) uses in his or her work ergonomic and safe working practices;</li> <li>14) handles purposefully the basic tools and resources of the profession;</li> <li>15) interacts with customers: identifies the customer needs, works in a customer-oriented way, creates customer relationships, advises clients;</li> <li>16) measures and detects and evaluates and/or analyzes the technological and electrical parameters by means of measurement instruments;</li> <li>17) is willing to develop themselves continually in order to cope with the evolving technology, software, new equipment and working techniques;</li> <li>18) handles properly the environmentally hazardous materials that need to be utilized, arranges for treatment of the waste emerging as a result of work in accordance with the requirements of environmental protection.</li> </ol>	
<u>Knowledge:</u>	
<ol style="list-style-type: none"> <li>1) automation equipment and installations, their classification and function;</li> <li>2) automation system parameters and principles of operation;</li> <li>3) basic knowledge of automatics, mechanics and electrical engineering (including terminology);</li> <li>4) principles of operation of the components related to the hydraulics and pneumatics;</li> <li>5) basic knowledge of information technology, telecommunications, and security systems.</li> </ol>	
<u>Assessment Method(s):</u>	
<p>Transversal competencies are assessed in integration with the assessment of all other competencies provided in the occupational qualification standard.</p>	

## Part C

### GENERAL INFORMATION AND ANNEXES

<b>C.1 Information for the of preparation and approval of the occupational standard, the awarding body, and a reference to the location of the occupational standard in the classifications</b>	
1. The marking of the occupational standard in the occupational qualification register	07-26032014-1.2/6s
2. Occupational qualification standard prepared by:	Leho Kuusk, ABB Ellen Mihklepp, Tallinna Vesi Natalya Tšurkina, Tallinn Polytechnic School Arvo Ulla, EETEL Alexander Grünstam, Estonian Society of System Engineers
3. Occupational qualification standard approved by	Professional Council of Energy, Mining and Chemical Industry
4. Date of Professional Council Decision.	26.03.2014
5. Occupational Standard valid until	25.03.2019
6. Occupational standard version number	5
7. Reference to the Classification of Occupations (ISCO 08)	74 Employees of electrical and electronics industry
8. Reference to the European Qualifications Framework (EQF)	5
<b>C.2 Occupational title in a foreign language</b>	
English Automatician, Automation Technician	
<b>C.3 Annexes</b>	
Annex 1 Language skill levels descriptions	