

OCCUPATIONAL QUALIFICATION STANDARD

Electrical Engineer, EstQF Level 6

An occupational qualification standard is a document which describes the set of skills, knowledge and attitudes, i.e. competence requirements, needed to successfully accomplish duties. Occupational qualification standards are used for compiling curricula and awarding qualifications.

Occupational title	Level of Estonian Qualifications Framework (EstQF)
Electrical Engineer, EstQF Level 6	6

Possible specialisation and titles on occupational certificate	
Specialisation	Title on occupational qualification certificate
Electrical networks and systems	Electrical Engineer of Electrical Systems and Networks, EstQF Level 6
Electric automation	Electrical Engineer of Electric Automation, EstQF Level 6
Consumer electrical installations	Electrical Engineer of Consumer Electrical Installations, EstQF Level 6

Part A DESCRIPTION OF WORK

A.1 Description of work <p>It is the job of electrical engineers to ensure the effective, safe, environmentally friendly and both economically and socially acceptable functioning of electrical systems and equipment.</p> <p>Electrical Engineer, Level 6 is an experienced specialist whose role is to maintain existing technologies and those in development.</p> <p>They usually work in a team where they are prepared to take on the leading role and assume responsibility for the employees' performance.</p> <p>The job requires individual action in complex and unexpected situations as well as cooperation with engineers and specialists in related areas.</p> <p>Electrical Engineer, Level 6 specialises in:</p> <ul style="list-style-type: none"> ☐ electrical networks and systems (transmission and distribution systems, larger electrical power plants and large-scale consumers with transmission systems); ☐ electric automation (automated devices and systems which control the operations of power plants, electrical systems and consumers); ☐ consumer electrical installations (electrical installations starting from the distribution system supply point, including small-scale and micro power plants). <p>Competence in at least one of the listed fields must be certified during every instance of specialisation (elective duties):</p> <ol style="list-style-type: none"> 1) electrical and technological commerce 2) design 3) installation, operation and oversight
A.2 Tasks <p>A.2.1 Electrical engineering</p> <ol style="list-style-type: none"> 1. Fulfilling technical engineering tasks 2. Using information and communications technology (ICT) 3. Fulfilling occupational norms <p>A.2.2 Management and supervision</p>

1. Management 2. Supervision
Specialised areas of work
<p>A.2.3 Electrical networks and systems</p> <p>1. Maintaining electrical networks and systems</p> <p>2. Resolving specialist problems</p> <p>A.2.4 Electric automation</p> <p>1. Maintaining automated equipment and systems that conduct the work of electrical networks and systems</p> <p>2. Resolving specialist problems</p> <p>A.2.5 Consumer electrical installations</p> <p>1. Maintaining consumer electrical installations</p> <p>2. Resolving specialist problems</p>
Elective areas of work
<p>A.2.6 Electrical and technological commerce.</p> <p>A.2.7 Designing.</p> <p>A.2.8 Installation, operation and oversight</p>
A.3 Work environment and specific nature of work
Electrical engineers usually work in offices or on site. Working hours can be flexible. Electrical engineers must be guided by general occupational, electricity and environmental safety requirements.
A.4 Tools
The tools necessary for carrying out tasks are IT hardware and software, electrical tools, measuring tools and protective gear.
A.5 Personal qualities required for work: abilities and characteristics
The profession requires an environmentally friendly way of thinking that facilitates sustainable development, plus decision-making and analytical skills, precision, a sense of responsibility, willingness to communicate and cooperate, spatial imagination and adaptability.
A.6 Professional preparation
Electrical Engineer, Level 6 has completed at least four years of specialised applied higher education and has specialised work experience.
A.7 Most common occupational titles
Engineer, designer, site manager, duty coordinator, dispatcher, consultant, etc.
A.8 Regulations governing profession
Electricity Market Act, Building Code and Equipment Safety Act.

Part B COMPETENCY REQUIREMENTS

B.1 Structure of occupation
<p>Electrical Engineer, Level 6 specialising in electrical networks and systems must have certified competences B.2.1-B.2.3 and at least one competence from B.2.6-B.2.8;</p> <p>Electrical Engineer, Level 6 specialising in electric automation must have certified competences B.2.1, B.2.2 and B.2.4 and at least one competence from B.2.6-B.2.8;</p> <p>Electrical Engineer, Level 6 specialising in consumer electronic installations</p>

must have certified competences B.2.1, B.2.2 and B.2.5 and at least one competence from B.2.6-B.2.8.

B.2 Competences

MANDATORY COMPETENCES

B.2.1 Electrical engineering	EstQF Level 6
<p>Performance indicators:</p> <ol style="list-style-type: none"> 1. defines and solves engineering tasks, using knowledge of the following: <ol style="list-style-type: none"> a) mathematics, science, programming, economics, foreign language and philosophy; b) strength of materials, graphics, theoretical mechanics and machinery; c) basics of electrotechnics, principles of power-generating systems (including those connected through an inverter), electricity transmission devices and switchgears, electric automation, functioning of electricity-powered devices, renewable energy and energy efficiency 2. fulfils the requirements of pertinent legal acts and quality systems (including normative documents and standards). 3. uses a computer for information processing, communication, safety and problem-solving at the Independent user level (see Annex 2 – Scale of self-assessment in digital competence); 4. uses appropriate hardware and modern software solutions to solve professional problems; 5. keeps up to date with developments in digital technology. 6. complies with basic data protection requirements; 7. is guided in their work by the professional ethics of engineers (see Annex 3 – Engineer's professional ethics); 8. supports the wider promotion and appreciation of the work and occupation of engineering in society; explains the nature and importance of the occupation and ways in which to pursue it; 9. maintains their qualifications and keeps up to date on technological developments; 10. uses at least one foreign language (including Estonian as a foreign language) at the B1 level (see Annex 4 – Language skills level descriptions); 11. mediates and provides technical information for everybody in a comprehensive manner and participates actively in discussions and meetings; 12. Builds relationships and works with colleagues and clients, acting in accordance with best practice in communication; 13. meets the requirements of standards and regulations associated with the occupation (quality management systems, environmental protection and electrical, fire and occupational safety). 	
B.2.2 Management and supervision	EstQF Level 6
<p>Performance indicators:</p> <ol style="list-style-type: none"> 1. plans activities and leads work teams; 2. gathers information on an ongoing basis, analyses activities, gives feedback and adjusts activities as necessary; 3. works with project documents, compiles reports, memos and instructions, changes in the organisation of work and work programmes; also descriptions, schematics, evaluations, etc. 4. coordinates the work of those being supervised based on the task and developments in the field; 5. passes on professional skills and knowledge, taking into account the needs and expectations of those being supervised. 	

COMPETENCES RELATED TO SPECIALISATION

Electrical Engineer, Level 6 specialising in electrical networks and systems must have certified competence B.2.3.

Electrical Engineer, Level 6 specialising in electric automation must have certified competence B.2.4.

Electrical Engineer, Level 6 specialising in consumer electronic installations must have certified competence B.2.5.

Electrical networks and systems

B.2.3 Electrical networks and systems	EstQF Level 6
<p>Performance indicators:</p> <ol style="list-style-type: none"> 1. organises for electrical networks and systems to be kept operational, taking into account related fields (e.g. automation and consumer installations). 2. finds solutions to specialised problems using methods based on knowledge of the following: <ol style="list-style-type: none"> a) operating principles of power-generating systems (including those connected through an inverter); b) principles of the operation and protection of electrical networks (transmission and distribution systems); c) operating principles of electrical system components (power plant, windmill, producers connected through inverters, overhead power line, cable line, direct current link, substation, transformer, apparatus for switching, capacitor, reactor, apparatus for storing electrical energy, relay control, power consumption units, etc.); d) principles of renewable energy and energy efficiency; e) principles of the stable operation of an electrical system (maintaining voltage and frequency); f) operating principles of the electricity market; g) operating principles of system automatics – potential deviations in a system's performance and possible prevention methods. 	

Electric automation	
B.2.4 Electric automation	EstQF Level 6
<p>Performance indicators:</p> <ol style="list-style-type: none"> 1. Organises for automation devices and systems that conduct electrical networks and systems to be kept in operation, taking into account related fields (manufacturing and production automation, etc.); 2. Finds solutions to specialised problems in their area of operation using methods based on knowledge of the following: <ol style="list-style-type: none"> a) operating principles of automated devices used to produce, transmit, distribute and consume electricity; b) operating principles of electronic equipment and installations powering industrial and energy enterprises, buildings and the technology within them; c) operating principles of automatic control, system theory and technological processes (including electrical light and electronic technology); d) operating principles of the instrumentation and appliances used in machines and power plants; e) operating principles of telematics and data communication protocols; electric local area and smart networks f) operating principles of relay control (selectivity, coverage, speed, sensitivity and reliability); g) operating principles of system automatics. 	

Consumer electrical installations	
B.2.5 Consumer electrical installations	EstQF Level 6
<p>Performance indicators:</p> <ol style="list-style-type: none"> 1. organises for electrical devices and systems leading the work of consumer electrical installations to be kept operational, taking into account related fields (heating and ventilation installations, robotics, automatics and communication installations, etc.); 2. finds solutions to specialised problems in their area of operation using methods based on knowledge of the following: <ol style="list-style-type: none"> a) operating principles of devices and systems used in micro and small-scale electrical production, business, manufacturing and community buildings and houses (e.g. local area and smart networks); b) operating principles of electronic equipment and installations linked to technology found in consumer electrical installations; c) operating principles of automatic control and technological processes (electrical lighting, industrial and building automatics, etc.) in consumer electrical installations; d) operating principles of electrical machines (including engines, generators and transformers), electrical drives (including electric transport) and the instrumentation used to drive them; e) function and choice principles (including selecting the right fit) of protection equipment for electrical installations. 	

OPTIONAL COMPETENCES

To obtain the qualification of Electrical Engineer, Level 6 one competences from B.2.6 - B.2.8 must be certified;

B.2.6 Energy and technology commerce	EstQF Level 6
Performance indicators: 1. compiles, as instructed, a balance sheet for energy and capacity, taking into account manufacturing and consumption trends; 2. carries out economic transactions, mediating electrical appliances profitably from manufacturer to consumer, implementing appropriate business methods in different economic situations.	
B.2.7 Designing	EstQF Level 6
Performance indicators: 1. collects the input required for designing; 2. compiles a project as instructed and in accordance with the terms of reference, taking into account legal acts, the specific nature of the site and the integrity of the system and using relevant software; 3. compiles the project solution (including calculations and schematics), taking into account technical compatibility and suitability and ensuring that the electrical installation is safe to use.	
B.2.8 Installation, operation and oversight	EstQF Level 6
Performance indicators: 1. reads specialised projects and understands them; 2. performs installation, operation and oversight duties on site, following legal acts and normative documents (including standards and user manuals); 3. fulfils the operating schedule (including the appliance maintenance plan), organising the necessary work and the ordering of materials; 4. uses relevant devices, software and technology in diagnostics, testing and configuration; 5. documents information relating to the electrical installation in accordance with requirements; 6. monitors and checks the safety of the construction and use of a given electrical appliance in accordance with the requirements established in legal acts.	

Part C GENERAL INFORMATION AND ANNEXES

C.1 Information concerning compilation and certification of occupational qualification standard and reference to classification of occupations	
1. ID of occupational qualification standard in register of occupational qualifications	07-03052018-1.1.1/6k
2. Occupational qualification standard compiled by:	Lembit Vali, Eesti Elektroenergeetika Selts Lauri Öövel, OÜ Energoservis Hannes Mäe, Siemens Osakeyhtiö Eesti filiaal Tiit Metusala, Tallinna Tehnikaülikool Tõnis Viira, Elering AS Renè Nukki, Tallinna Tehnikakõrgkool
3. Occupational qualification standard approved by:	Energy, Mining and Chemical Industry
4. No. of decision of Sectoral Council	10
5. Date of decision of Sectoral Council	03.05.2018
6. Occupational qualification standard valid until	29.03.2023
7. Occupational qualification standard version no.	6
8. Reference to International Standard Classification of Occupations (ISCO 08)	2151 Electrical Engineers

9. Reference to European Qualifications Framework (EQF)	6
C.2 Occupational title in foreign language	
English:	Electrical Engineer, EstQF Level 6
English:	Engineer of Consumer Electrycal Equipment
English:	Engineer of Electrical Automation
English:	Engineer of Electrical Systems and Networks
C.3 Annexes	
Lisa 1 Elektriinseneride kutsete tasemed	
Lisa 2 Scale of self-assessment in digital competence	
Lisa 3 Engineer's Professional Ethics and Code Of Conduct	
Lisa 4 Language skills level descriptions	