

OCCUPATIONAL QUALIFICATION STANDARD

Mechatronic, EstQF Level 5

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)
Mechatronic, EstQF Level 5	5

Part A DESCRIPTION OF WORK

A.1 Description of work <p>Mechatronic, EstQF Level 5 Constructs, installs, configures, sets up and services mechanical, hydraulic, pneumatic, electromechanical and electronic systems. Their task is to check and monitor the performance of mechatronic systems.</p> <p>Mechatronic, EstQF Level 5 is prepared to assume the role of team leader and to cooperate with specialists in connected fields when constructing complete systems. The work requires complex professional skills in the fields of mechanics, electricity, electronics and information technology. A mechatronic can work in enterprises offering mechanical, automation, electronics industry and maintenance services. A mechatronics engineer working in the clothing, food, plastics, metal or other production industries understands the nature of the respective production process. The duties of a mechatronics engineer may partly overlap with the duties of skilled workers (e.g. automation and robotics technicians) from enterprises in connected fields.</p> <p>Lowest level of profession: Mechatronic, EstQF Level 4 Highest level of profession: Mechatronics Engineer, EstQF Level 6</p>
A.2 Tasks <p>A.2.1 Planning of work</p> <ol style="list-style-type: none"> 1. Finding the necessary information from technical documentation 2. Planning activities 3. Finding and preparing materials and work equipment <p>A.2.2. Ensuring safety</p> <ol style="list-style-type: none"> 1. Complying with and checking safety requirements 2. Organising a safe workplace 3. Using safety and personal protective equipment and checking its use <p>A.2.3 Constructing and installing systems</p> <ol style="list-style-type: none"> 1. Assembling and installing system parts 2. Installing communications technology and utility networks 3. Programming control systems 4. Configuring system parts 5. Documentation <p>A.2.4 Planned system maintenance</p> <ol style="list-style-type: none"> 1. Conducting and organising checks and maintenance

2. Setting up system hardware and software 3. Documentation
A.2.5 Maintenance repairs of systems 1. Identifying and resolving faults 2. Repairing and replacing equipment and components 3. Checks and activation 4. Documentation
A.3 Work environment and specific nature of work
The working hours of a mechatronics engineer may be in shifts and include night-time, weekends and public holidays, depending on the employer. The pace of work may periodically be fast and stressful. The work may require performing operations in forced positions. The working environment may be both indoors and outdoors.
A.4 Tools
Equipment, measuring instruments and tools, computer with specialised software.
A.5 Personal qualities required for work: abilities and characteristics
The work requires logical and systematic thinking, analytical skills, concentration, dexterity, spatial imagination, visual memory, coordination and good vision.
A.6 Professional preparation
Professional skills are acquired in the course of work, training courses or continuing training that require electrical and mechanical professional skills and experience.
A.7 Most common occupational titles
Mechatronic, configurator, aircraft technician, marine equipment technician, maintenance technician, wind turbine maintenance technician, etc.
A.8 Regulations governing profession
A mechatronic may perform installations and maintenance to an extent that does not infringe the requirements provided for in legislation and in the occupational standards of the field.

Part B COMPETENCY REQUIREMENTS

B.1 Structure of occupation
All competences (B.2.1-B.2.6) must be certified when applying for the qualification of Mechatronic, EstQF Level 5.

B.2 Competences

MANDATORY COMPETENCES

B.2.1 Planning of work	EstQF Level 5
Performance indicators 1. Finds the information necessary for solving their task from technical documentation; 2. Makes suggestions for amending technical documentation, if necessary; 3. Determines the necessary operations based on manuals and technical documentation; 4. Calculates the need for resources using the appropriate software and following the principles of cost accounting and calculations; 5. Compiles a work schedule based on primary data and determines the order of work operations and workplace hazards; 6. Chooses and prepares the materials necessary for the task; 7. Assembles the work equipment necessary for the task; 8. Checks the conformity of work equipment.	

B.2.2 Ensuring safety	EstQF Level 5
Performance indicators 1. Follows work safety requirements at every stage and monitors that they are followed in order to prevent occupational accidents; 2. Follows the operational and safety requirements of equipment; 3. Organises safe workplaces for themselves and employees, taking into account possible risks and hazards; 4. Follows work environment safety rules and organises waste collection, following procedural and supervisory rules; 5. Reports hazards to the person responsible pursuant to the procedure established in the enterprise; 6. Correctly uses the prescribed safety and personal protective equipment; 7. Regularly checks the functionality and use of safety and personal protective equipment; 8. Provides the necessary personal protective equipment.	
B.2.3 Constructing and installing equipment	EstQF Level 5
Performance indicators 1. Assembles system parts according to project documentation; 2. Organises the preparation of the installation site; 3. Installs system parts according to the manufacturer's instructions and project documentation; 4. Installs communications technology and utility networks according to the manufacturer's instructions and project documentation; 5. Programmes industrial controllers in the appropriate programming language based on the technical task; 6. Makes a back-up copy of the programme by saving and describing the changes in quality control; 7. Adjusts the programmes of control systems, if necessary, using the appropriate programming language; 8. Adjusts the parameters of sensors and actuators based on system requirements; 9. Checks the performance of the complete system and its compliance with the project; 10. Documents the changes made to the system and saves them digitally.	
B.2.4 Planned system maintenance	EstQF Level 5
Performance indicators 1. Checks the compliance of equipment performance with the manual visually and using measuring instruments and identifies a possible non-compliance; 2. Forwards information to the employee responsible; 3. Organises planned system maintenance; 4. Periodically services mechatronic systems according to the maintenance plan; 5. Organises maintenance operations and checks that they are carried out; 6. Checks the performance of the system and sets up the software according to the instruction materials; 7. Documents the results and changes and saves them pursuant to the established procedure; 8. Documents the results of the checks and maintenance pursuant to the established procedure.	
B.2.5 Maintenance repairs of systems	EstQF Level 5
Performance indicators 1. Identifies the cause of the error visually or by taking measurements; 2. Analyses the causes of the error based on the manufacturer's instructions, using electrical and mechanical expertise; 3. Eliminates the error or informs the person responsible of the need for additional repairs and makes suggestions for repair activities; 4. Eliminates errors and malfunctions and replaces malfunctioning equipment and their components according to the repair plan; 5. Configures the equipment according to the given parameters; 6. Organises the repairs and the replacement of equipment and components; 7. Checks the performance of the installed components visually, mechanically and using software and performs measurements of automatics and electricity using the appropriate measuring instruments to ensure that the device meets all requirements; 8. Checks the elimination of error messages in the repaired device and its readiness to restart via the control unit, then restarts the device; 9. Compiles a technical report on the repairs and a measurement protocol;	

10. Can use and understand the documents pertaining to repairs and maintenance (instruction manuals for installation, use and maintenance, diagrams and technical drawings (content and symbols)).

RECURRING COMPETENCES

B.2.6 Recurring competences of Mechatronics, Level 5	EstQF Level 5
<p>Performance indicators</p> <ol style="list-style-type: none"> 1. Can read and understand drawings, manuals and other technical documentation and uses technical terminology; 2. Acts in a purposeful and responsible way, following the requirements set out in professional legislation; 3. Takes part in teamwork in order to achieve the best common result, sharing all necessary and useful information with others; 4. Organises the work of the team as the head of the team: initiates activities, monitors their completion and implements improvement measures, if necessary; 5. Supervises colleagues: checks and improves the performance of the person they are supervising, providing appropriate feedback; 6. Communicates with colleagues, clients and specialists from connected fields in a polite and proper manner and presents information in a clear and comprehensible way; 7. Develops themselves professionally and keeps up to date with technological innovations; 8. Uses professional ICT hardware and application software, following the data protection requirements and rules of the enterprise; 9. Uses a computer at the Basic user level for safety and content creation and at the Independent user level for problem-solving, information-processing and communication, Annex 1 – Scale of self-assessment in digital competence; 10. Uses English at least at the B1 level to obtain specialised information, working with materials and professional communication, Annex 2 – Language skills level descriptions. 	
<p>Knowledge:</p> <ol style="list-style-type: none"> 1. classification, purpose, construction and assembly requirements of mechanical, hydraulic, pneumatic, electromechanical and electrical equipment and software apparatus; 2. the principles of information-processing and transmission and signal conversion; 3. the most common mechatronic and hydraulic components (sensors, actuators, PLC controllers, etc.) and their functions, operating principles and product markings; 4. the principles of safe use for lifting apparatus (winches and lifts) and appliances (ropes, slings, etc.). 	

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	24-03122019-2.2.2/7k
2. Occupational qualification standard compiled by:	Eduard Brindfeldt, Tallinna Tööstushariduskeskus Kristo Vaher, Tallinna Tehnikakõrgkool Jüri Riives, IMECC OÜ Ene Krimpus, Magnetic MRO AS Frid Kaljas, Festo
3. Occupational qualification standard approved by:	Engineering, Manufacturing and Processing
4. No. of decision of Sectoral Council	13
5. Date of decision of Sectoral Council	03.12.2019
6. Occupational qualification standard valid until	02.12.2024
7. Occupational qualification standard version no.	7

8. Reference to International Standard Classification of Occupations (ISCO 08)	7421 Electronics Mechanics and Servicers
9. Reference to European Qualifications Framework (EQF)	5
C.2 Occupational title in foreign language	
English:	Mechatronic, EstQF Level 5
C.3 Annexes	
Lisa 1 Scale of self-assessment in digital competence	
Lisa 2 Language skills level descriptions	