# OCCUPATIONAL QUALIFICATION STANDARD

**Mechanical 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) |
|---|---|
| Mechanical Engineer, EstQF Level 6 | 6 |

| Possible specialisation and titles on occupational certificate | |
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| **Specialisation** | **Title on occupational qualification certificate** |
| Production engineering | Mechanical Engineer, EstQF Level 6<br>Production engineering |
| Mechanical and robotic systems | Mechanical Engineer, EstQF Level 6<br>Mechanical and robotic systems |

## Part A
## DESCRIPTION OF WORK

| **A.1 Description of work** |
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| Mechanical engineers create engineering solutions and ensure that products, machines and systems function efficiently and safely.<br>They work in the fields of mechanical engineering, engineering and production technology (e.g. the metal, mechanical, aeronautical, automobile, timber, food and chemical industries and in the fields of agricultural equipment and energetics).<br>Three occupational qualification standards have been developed for the occupation:<br>a) Mechanical Engineer, Level 6<br>b) Certified Mechanical Engineer, Level 7<br>c) Authorised Mechanical Engineer, Level 8<br><br>Mechanical Engineer, Level 6 is an experienced technical or technology specialist who specialises in manufacturing products (production technology) or installing and maintaining machine and robotic systems.<br>They design technologies for manufacturing machines, equipment and products and manage the maintenance of existing equipment and systems.<br><br>Their job requires working in a team with specialists from connected fields and taking responsibility for the performance of employees. |
| **A.2 Tasks** |
| A.2.1 Mechanical engineering<br>1. Fulfilling technical engineering tasks<br>2. Using information and communications technology (ICT)<br>3. Fulfilling occupational norms<br><br>A.2.2 Cooperation and supervision<br>1. Cooperation<br>2. Supervision |
| **Specialised areas of work** |
| Production engineering |

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| A.2.3 Production engineering<br>1. Preparing 3D models and technical drawings<br>2. Manufacturing products<br>3. Organising the maintenance and repair of production equipment and systems<br><br>Mechanical and robotic systems<br>A.2.4 Mechanical and robotic systems<br>1. Installing and operating mechanical and robotic systems<br>2. Programming mechanical and robotic systems<br>3. Organising the maintenance and repair of mechanical and robotic systems |
| **A.3 Work environment and specific nature of work** |
| Mechanical engineers work in offices, manufacturing enterprises and at indoor and outdoor sites.<br>General work safety requirements must be met when working in production plants and on sites. Working hours can be flexible. |
| **A.4 Tools** |
| ICT equipment, software, specific calculation and drawing programmes and other equipment. |
| **A.5 Personal qualities required for work: abilities and characteristics** |
| The work requires engineer-like logical thinking, creativity, independence, decisiveness, analytical skills, accuracy, responsibility, communication and cooperation, spatial imagination, empathy and adaptability, assertiveness and an ability to learn. |
| **A.6 Professional preparation** |
| Mechanical Engineer, Level 6 has obtained a professional higher education degree or a Bachelor's degree and has professional work experience. |
| **A.7 Most common occupational titles** |
| Project manager, designer, constructor, production manager, technologist, mechatronic engineer, robotics engineer, process engineer, quality engineer, maintenance engineer, CAD/CAM engineer, etc. |
| **A.8 Regulations governing profession** |
| The design, construction and operation of production systems and equipment are regulated by relevant international and national regulations (machinery directive, Equipment Safety Act, etc.). |

## Part B
## COMPETENCY REQUIREMENTS

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| **B.1 Structure of occupation** |
| Competences B.2.1 and B.2.2 and one competence connected to the specialisation (B.2.3 or B.2.4.) must be certified when applying for the qualification of Mechanical Engineer, EstQF Level 6. |

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| **B.2 Competences** |

### MANDATORY COMPETENCES

| **B.2.1 Mechanical engineering** | **EstQF Level 6** |
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| Performance indicators<br>1. Identifies and solves engineering tasks using relevant general engineering knowledge (mathematics, physics, engineering mechanics, materials technology, etc.) and economic knowledge (business studies, business processes, etc.);<br>2. Finds the best solutions to professional problems using experience and the appropriate engineering knowledge (production equipment and systems, technical diagnostics methods for products and equipment; product | |

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| manufacturing technologies and methods; components of hydraulics and pneumatics; modelling, technological production processes and systems, etc.).<br>3. Uses mechanical engineering-related solution methods across technical and economic fields (e.g. ICT, electricity and thermal engineering);<br>4. Assesses the applicability of technologies taking into consideration user needs, the market situation and restrictions;<br>5. Uses a computer for information processing, communication, safety and problem-solving at the Independent user level, Annex 1 – Scale of self-assessment in digital competence;<br>6. Uses appropriate hardware and modern software solutions to solve professional problems.<br>7. Keeps up to date with developments in digital technology<br>8. Sets ICT-related tasks and submits a description of the terms of reference to specialists in the field.<br>9. Complies with basic data protection requirements;<br>10. Meets the requirements of standards and regulations associated with the occupation (quality management systems, occupational safety, environmental protection and energy efficiency);<br>11. Their work is guided by the requirements of the professional ethics of engineers, Annex 2 – Engineer's professional ethics and code of conduct;<br>12. Supports the wider promotion of the work and occupation of engineering through their actions and protects the interests of the occupation;<br>13. Maintains their qualifications, keeps up to date on technological developments and proposes innovations (e.g. to improve energy efficiency);<br>14. Mediates and provides technical information for everybody in a comprehensive manner and participates actively in discussions and meetings;<br>15. Uses at least one foreign language at the B1 level, Annex 3 – Language skills level descriptions. |
| **B.2.2 Cooperation and supervision** **EstQF Level 6** |
| Performance indicators<br>1. Builds relationships and works with individuals, colleagues and partners, focusing on operational objectives;<br>2. Explains and justifies their viewpoints and is able to negotiate agreements within the team as well as between third parties;<br>3. Manages various social situations, including conflicts, using appropriate communication methods and taking into account differences of opinion;<br>4. As a project manager, sets the team's objectives, delegates work appropriately and fairly and is responsible for its completion;<br>5. Manages cooperation between connected fields.<br>6. Passes on professional skills and knowledge and coordinates the work of those supervised;<br>7. Draws up plans for supervising employees, describing the required competences and setting goals for the process of supervision. |

## COMPETENTCES RELATED TO SPECIALISATION

When applying for the qualification of Mechanical Engineer, EstQF Level 6 must be certified one competence connected to the specialisation (B.2.3 or B.2.4.).

| **Production engineering** | |
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| **B.2.3 Production engineering** | **EstQF Level 6** |
| Performance indicators<br>1. Produces 3D models and technical drawings according to the terms of reference, using the appropriate design software (CAD).<br>2. Makes products based on technical drawings and the planned technology, using the appropriate tools, measuring instruments, jigs and materials.<br>3. Organises the maintenance and repair of production equipment and systems according to the works planned. | |

| **Mechanical and robotic systems** |
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| B.2.4 Mechanical and robotic systems | EstQF Level 6 |
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| Performance indicators<br>1. Installs and sets up equipment, industrial field-level networks and communications networks according to technical documentation and following network safety requirements;<br>2. Conducts the calibration procedure, adhering to instructions;<br>3. Monitors the work process parameters of mechanical and robotic systems and the compliance of the product with quality requirements, adjusting the parameters, if necessary;<br>4. Compiles production reports in a digital (ERP) system;<br>5. Writes programmes for mechanical and robotic systems according to the planned technology, using software for visualising robotic systems and models of robotic production lines in development environments;<br>6. Adjusts the robot programme, if necessary, using the appropriate programming language;<br>7. Makes a back-up copy of the programme by saving the changes in quality control to and describing them in a predetermined data medium;<br>8. Organises the maintenance and repair of robotic systems in compliance with the maintenance plan;<br>9. Enters completed maintenance and repair works in a digital (e.g. ERP) system. | |

## Part C
## GENERAL INFORMATION AND ANNEXES

| C.1 Information concerning compilation and certification of occupational qualification standard and reference to classification of occupations | |
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| 1. ID of occupational qualification standard in register of occupational qualifications | 24-08112018-1.1.1/6k |
| 2. Occupational qualification standard compiled by: | Oliver Mets, INSERO OÜ<br>Vello Vainola, Tallinna Tehnikakõrgkool<br>Veljo Konnimois, RadiusTech OÜ<br>Andre Laanemets, SKF Estonia OÜ<br>Priit Kulu, Tallinna Tehnikaülikool<br>Kristo Vaher, Eesti Mehaanikainseneride Liit |
| 3. Occupational qualification standard approved by: | Engineering, Manufacturing and Processing |
| 4. No. of decision of Sectoral Council | 10 |
| 5. Date of decision of Sectoral Council | 08.11.2018 |
| 6. Occupational qualification standard valid until | 07.11.2023 |
| 7. Occupational qualification standard version no. | 6 |
| 8. Reference to International Standard Classification of Occupations (ISCO 08) | 2144 Mechanical Engineers |
| 9. Reference to European Qualifications Framework (EQF) | 6 |
| **C.2 Occupational title in foreign language** | |
| English: | Mechanical Engineer, EstQF Level 6 |
| **C.3 Annexes** | |
| Lisa 1 Scale of self-assessment in digital competence | |
| Lisa 2 Engineer's Professional Ethics and Code Of Conduct | |
| Lisa 3 Language skills level descriptions | |