OCCUPATIONAL STANDARD

Conventional machine tool operator, level 3

The occupational standard is a document that describes the job and competence requirements, i.e. a set of skills, knowledge and attitudes required for successful job performance in a particular occupation.

The occupational standard of a conventional machine tool operator, level 3 serves as the basis for preparation of vocational education and in-service training curricula and assessment of professional competence of people.

Occupational qualification title	Level of the Estonian Qualification Framework (EQF)
Conventional machine tool operator, level 3	*3*
Title of partial occupational qualification	
Miller	*3*
Turner	*3*
Grinder	*3*

Part A
JOB DESCRIPTION

A.1 Job description

Conventional machine tool operators are mainly employed in companies that perform metalworking by means of turning, milling or grinding.
Depending on the vocational training of the operator, the work is carried out on a lathe, milling machine or grinding machine, on which he/she machines work pieces in accordance with the drawing or sample.
The main tasks of a conventional machine tool operator are machining, drilling and threading surfaces, treads, openings and grooves.
The occupational qualification of a conventional machine tool operator includes the following partial occupational qualifications:

a) miller
b) turner
c) grinder

The main task of a **miller** is the production of work pieces by machining surfaces, openings, treads and grooves using a milling machine.
The tasks of a **turner**, in addition to machining surfaces, treads, openings and grooves, also include threading and cutting.
Grinder's tasks include machining of work pieces by grinding surfaces and treads on a conventional grinding machine.

A.2 Units

A.2.1 Preparation of work process
2.1.1 Examining working drawings and documents
2.1.2 Organising a proper workplace
2.1.3 Verifying the good condition of the machine tool
2.1.4 Checking the compliance of the blank
A.2.2 Performing maintenance work of machine tools
2.2.1 Performance of regular maintenance and cleaning work
2.2.2 Registration of technical problems

OPTIONAL COMPETENCIES
A.2.3 Machining work pieces on a conventional milling machine
2.3.1 Setting up a conventional milling machine for the manufacture of work pieces
2.3.2 Manufacture of work pieces on a conventional milling machine
2.3.3 After treatment of work pieces and storage within the limits of the work place
A.2.4 Machining work pieces on a conventional lathe
2.4.1 Setting up a conventional lathe for the manufacture of work pieces
2.4.2 Manufacture of work pieces on a conventional lathe
2.4.3 After treatment of work pieces and storage within the limits of the work place
A.2.5 Machining work pieces on a conventional grinding machine
2.5.1 Setting up a conventional grinding machine for the manufacture of work pieces
2.5.2 Manufacture of work pieces on a conventional grinding machine
2.5.3 After treatment of work pieces and storage within the limits of the work place

The occupational qualification of a conventional machine tool operator of level 3 includes the following partial occupational qualifications:
Miller, level 3
A.2.1 Preparation of work process
2.1.1 Examining working drawings and documents

2.1.2 Organising a proper workplace
2.1.3 Verifying the good condition of the machine tool
2.1.4 Checking the compliance of the blank
A.2.2 Performing maintenance work of machine tools
2.2.1 Performance of regular maintenance and cleaning work
2.2.2 Registration of technical problems
A.2.3 Machining work pieces on a conventional milling machine
2.3.1 Setting up a conventional milling machine for the manufacture of work pieces
2.3.2 Manufacture of work pieces on a conventional milling machine
2.3.3 After treatment of work pieces and storage within the limits of the work place

Turner, level 3
A.2.1 Preparation of work process
2.1.1 Examining working drawings and documents
2.1.2 Organising a proper workplace
2.1.3 Verifying the good condition of the machine tool
2.1.4 Checking the compliance of the blank
A.2.2 Performing maintenance work of machine tools
2.2.1 Performance of regular maintenance and cleaning work
2.2.2 Registration of technical problems
A.2.4 Machining work pieces on a conventional lathe
2.4.1 Setting up a conventional lathe for the manufacture of work pieces
2.4.2 Manufacture of work pieces on a conventional lathe
2.4.3 After treatment of work pieces and storage within the limits of the work place

Grinder, level 3
A.2.1 Preparation of work process
2.1.1 Examining working drawings and documents
2.1.2 Organising a proper workplace
2.1.3 Verifying the good condition of the machine tool
2.1.4 Checking the compliance of the blank
A.2.2 Performing maintenance work of machine tools
2.2.1 Performance of regular maintenance and cleaning work
2.2.2 Registration of technical problems
A.2.5 Machining work pieces on a conventional grinding machine
2.5.1 Setting up a conventional grinding machine for the manufacture of work pieces
2.5.2 Manufacture of work pieces on a conventional grinding machine
2.5.3 After treatment of work pieces and storage within the limits of the work place

List of tasks related to the units is specified in Annex 1 ”Units and tasks of occupational qualifications of conventional machine tool operators”.

A.3 Working environment and specific aspects of work

The working time of conventional machine tool operators is generally fixed. According to the work organisation of the company, the work may be also performed based on a flexible working schedule. Depending on the production segment (serial or piece production), the work can be routine or alternating, pace of work is generally moderate. The working environment is located indoors and is noisy. Metal dust and vapours of coolants in the working environment may cause allergic reactions. Since work is performed by means of machines, failure to follow safety requirements may cause accidents at work. Thus, it is mandatory to follow strictly the occupational safety requirements and use the required personal protective equipment.

A.4 Tools

Universal and special jigs, measuring instruments, hand tools (e.g. file, scraper, abrasive stone, etc.), lifting equipment, personal protective equipment
A.5 Personal characteristics necessary for this job: abilities and personality traits
Sense of responsibility and honesty, diligence, punctuality, skill to plan work independently, spatial thinking, calmness, good eyesight and hearing, good physical fitness. Ability to concentrate, ability to cope with routine, coordination, mathematical skills
A.6 Occupational training
Usually, people working in this profession have professional education or acquired professional skills via practical work experience or in-service training.
A.7 Possible job titles
Turner, miller, grinder

Part B
COMPETENCE REQUIREMENTS

B.1. The structure of the occupational qualification
In order to obtain **the occupational qualification of a conventional machine tool operator, level 3,** the applicant must verify the mandatory competencies B.2.1, B.2.2 and B.2.6 and at least two competences among optional competencies (B.2.3, B.2.4 and B.2.5). In order to obtain **the partial occupational qualification of a miller, level 3,** the applicant must verify competencies B.2.1, B.2.2, B.2.6 and B.2.3. In order to obtain **the partial occupational qualification of a turner, level 3,** the applicant must verify competencies B.2.1, B.2.2, B.2.6 and B.2.4. In order to obtain **the partial occupational qualification of a grinder, level 3,** the applicant must verify competencies B.2.1, B.2.2, B.2.6 and B.2.5.

B.2 Competencies

MANDATORY COMPETENCIES

B.2.1 Preparation of work process	**EQF level 3**
Performance indicators: 1. Examines the working drawings and necessary documents (e.g. work order, delivery notes, technical requirements) and ensures that all necessary documents are present, clear and understandable. If required, asks for additional information. 2. Ensures that the approximate vicinity of the working place is in order and safe. Checks that the personal protective equipment (e.g. goggles, gloves, etc.) is present and in order. Ensures by visual inspection that the machine tool is in order and cleaned before work. 3. Turns the machine tool on and monitors that are no deviations in its work. In case of deviations, reacts according to authorisations fast and relevantly, and, if required, informs the specialist or his or her immediate manager about the problems. 4. Checks the compliance of the blank with working drawings by using measuring instruments.	
Supporting knowledge: a) operating principles, modes and technical options of conventional machine tools; b) technical drawing; c) materials science: various metallic and non-metallic materials, their differences (physical and mechanical properties, heat treatment, marking, most common EN and ISO material standards, etc.); d) basis of tolerating (fits and tolerances); e) basis of machining; f) methods of monitoring the operation of a machine tool; signs referring to failure; g) most common failure types, methods for their prevention; h) safety rules, safety measures and personal protective equipment required when using the machine / machine tool; i) documentation related to work; j) measuring instruments necessary for work (e.g. calliper, angle meter, micrometres, etc.) and their principles of use; k) general knowledge about slinging and lifting equipment.	
Assessment method(s): combined method containing verification of theoretical knowledge as well as practical skills.	

B.2.2 Performing maintenance work of machine tools	**EQF level 3**

1. Performs regular maintenance and cleaning work according to the user manual of a machine tool and uses the required tools. 2. Registers all occurred technical problems and informs the specialist or immediate manager. 3. Always arranges and cleans the machine tool and working place after work.
Supporting knowledge: a) operating principles, modes and technical options of machine tools; b) methods of monitoring the operation of a machine tool; signs referring to failure; c) most common failure types, methods for their prevention; d) safety rules, safety measures and personal protective equipment required when using the machine / machine tool; e) technical documentation (terminology and symbols); filling in of documents.
Assessment method(s): combined method containing verification of theoretical knowledge as well as practical skills.

OPTIONAL COMPETENCIES

B.2.3 Machining work pieces on a conventional milling machine	**EQF level 3**
Performance indicators: 1. Examines the working drawing and sets the machine tool for manufacture of work pieces: fixes the blank to the machine tool by selecting proper fixtures. Selects required cutting instruments based on the detail drawing and verifies their good working condition and, if required, sharpens the cutting instruments. Based on the detail drawing, material of the blank and cutting instrument to be used, determines the optimum cutting modes and sets the machine tool accordingly. If required, adjusts the selected cutting modes with possibilities of the tool. Analyses the measuring chains specified on the working drawing and calculates necessary missing measures. 2. Manufactures work pieces (planes and flat contours, contours milled with a form cutter, polyhedrons and straight grooves milled with a indexing head) based on the prescribed detail drawings, which conform to the precision requirements IT 14 of ISO standard. Checks the quality of finished work piece and conformance to the technical documentation. 3. Cleans the finished work pieces, trims the metal and removes other machining waste. Stores finished work pieces based on the requirements of the arrangement of working place. Cleans the machine tool and arranges the working place after work.	
Supporting knowledge: a) technological processes of making standard work pieces; b) cutting instruments used at milling; c) different conventional milling machines, their operating principles, structure, controlling and use; d) general knowledge on maintenance of conventional milling machines (lubricants and coolants, filters, etc.); e) various accessories, tools, setting and fixing jigs, principles of their use and maintenance; f) technological modes of milling machines; g) technical terminology related to milling (in native language and at least in one foreign language).	
Assessment method(s): combined method containing verification of theoretical knowledge as well as practical skills.	

B.2.4 Machining work pieces on a conventional lathe	**EQF level 3**
Performance indicators: 1. Examines the working drawing and sets the machine tool for manufacture of work pieces: fixes the blank by means of proper fixtures. Selects required cutting instruments based on the detail drawing and verifies their good working condition and, if required, sharpens the cutting instruments. Based on the detail drawing, material of the blank and cutting instrument to be used, determines the optimum cutting modes and sets the machine tool accordingly. Adjusts the selected cutting modes with the possibilities of the tool. Analyses the measuring chains specified on the working drawing	

and calculates the missing measures. 2. Manufactures work pieces (turning of conic and cylindrical surfaces, machining of inside and outside threads, drilling, etc.) based on the prescribed detail drawings, which conform to the precision requirements IT 14 of ISO standard. Checks the quality of finished work piece and conformance to the technical documentation. 3. Cleans the finished work pieces, trims the metal and removes other machining waste. Stores finished work pieces based on the requirements of the arrangement of working place. Cleans the machine tool and arranges the working place after work.
Supporting knowledge: a) technological processes of making standard work pieces; b) cutting instruments used at turning; c) different threads; d) different conventional lathes, their operating principles, structure, controlling and use; e) general knowledge on maintenance of conventional lathes (lubricants and coolants, filters, etc.); f) various accessories, tools, setting and fixing jigs, principles of their use and maintenance; g) technological modes of lathes; h) technical terminology related to turning (in native language and at least in one foreign language).
Assessment method(s): combined method containing verification of theoretical knowledge as well as practical skills.

B.2.5 Machining work pieces on a conventional grinding machine	**EQF level 3**
Performance indicators: 1. Examines the working drawing and sets the machine tool for manufacture of work pieces: fixes the blank by means of proper fixtures. Selects the proper grindstone based on detail drawing and verifies its good working condition, balances, if required. Based on the detail drawing, material of the blank and grindstone to be used, determines the optimum cutting modes and sets the machine tool accordingly. Adjusts the selected cutting modes with the possibilities of the tool and if required, sharpens the grindstone. Analyses the measuring chains specified on the working drawing and calculates necessary measures. 2. Machines work pieces (planes and treads, cylindrical surfaces) based on the prescribed detail drawings and technical requirements, which conform to the precision requirements IT 10 of ISO standard. Checks the quality of the finished work piece and conformance to the technical documents. 3. Cleans the finished work pieces, trims the metal and removes other machining waste. Stores finished work pieces based on the requirements of the arrangement of working place. Cleans the machine tool and arranges the working place after work.	
Supporting knowledge: a) technological processes of making standard work pieces; b) abrasion materials and binders used at grinding; c) structure and marking of grindstones; d) different conventional grinding machines (cylindrical, surface and centreless grinding machines), their operating principles; e) general knowledge on maintenance of conventional grinding machines (lubricants and coolants, filters, etc.); f) various accessories, setting and fixing jigs, principles of their use and maintenance; g) technological modes of grinding machines; h) technical terminology related to grinding (in native language and at least in one foreign language).	
Assessment method(s): combined method containing verification of theoretical knowledge as well as practical skills.	

TRANSVERSAL COMPETENCIES

B.2.6 Transversal competencies of the occupational qualification of a conventional machine tool operator, level 3	**EQF level 3**

Performance indicators:

1. A conventional machine tool operator makes high-quality products that conform to the prescribed technical requirements. He or she meets the deadlines and technological route.
2. He or she uses the working time effectively, works systematically and in an organised manner and follows the prescribed instructions, procedures and safety requirements.
3. A conventional machine tool operator uses all the acquired knowledge and skills specific to his/her field to achieve the work goals.
4. He/she thinks fast and understands new information quickly. He/she has no difficulties acquiring new tasks, methods and techniques. Uses opportunities for self-development and improving one’s skills.
5. While working, analyses his/her activities and presents ideas and innovation proposals for improvement of work.
6. A conventional machine tool operator is a team worker who can cope with conflict situations, if needed. Takes criticism reasonably and is able to make conclusions and learn from it.
7. Communicates in professional activities and understands professional terminology in Estonian and at least one foreign language (English is recommended).
8. Computer skills Module 1–Module 4, Module 7, Module 12.

Assessment method(s):

Assessment of transversal competences is integrated within other competences of this standard.

Part C
GENERAL INFORMATION AND ANNEXES

C.1 Information on the preparation and approval of the occupational standard, on the body awarding occupational qualifications, and reference to the location of the occupational standard in classifications	
1. Designation of the occupational standard in the register of occupational qualifications	10-16092014-1.1/6k
2. The occupational standard is compiled by	Andres Pählapuu - *Hissmekano Eesti OÜ* Allan Märk - *AS NORMA* Anu Kull - *Tallinna Lasnamäe Mehaanikakool* Veiko Põldmaa - *Tallinna Tööstushariduskeskus* Anu Tuuksam - *SA Innove*
3. The occupational standard is approved by	Mechanical industry, Metallurgical industry and Instrument engineering Sector Skills Council
4. Number of the decision of the Sector Skills Council	9
5. Date of the decision of the Sector Skills Council	16.09.2014
6. The occupational standard is valid until (date)	15.09.2019
7. Version number of the occupational standard	6
8. Reference to the Classification of Occupations (ISCO 08)	7223 Machine tool adjusters and operators
9. Reference to the European Qualification Framework (EQF)	3
C.2 Title of occupational qualification in foreign languages	
In English – conventional machine tool operator **Names of partial occupational qualification in English** Turner - conventional turning machine operator, conventional lathe operator Miller - conventional milling machine operator Grinder - conventional grinding machine operator	
C.3 Annexes	
Annex 1 Units and tasks of occupational qualifications of conventional machine tool operators	