



ESF programm „Kutsete süsteemi arendamine“

OCCUPATIONAL STANDARD

Electronic equipment technician, level 4

The occupational standard **Electronic equipment technician of level 4** forms the basis for the compilation of curricula for the vocational secondary education and in-service training and for the assessment of the competence of persons when awarding occupational qualification.

Occupational qualification title	Level of the Estonian Qualification Framework (EQF)
Electronic equipment technician, level 4	4

Part A

JOB DESCRIPTION

A.1 Job description
<p>The professional field of the electronic equipment technician consists of three occupational qualifications: electronic equipment assembler of level 2, formed of two partial qualifications; electronic equipment assembler of level 3, formed of two partial qualifications and one field of specialisation and electronic equipment technician of level 4.</p> <p>Electronic equipment technicians usually work in industrial enterprises where electronic assemblies or products containing them are made and put together.</p> <p>Electronic equipment technician of level 4 is a skilled worker whose work objective is the make, setup and repair of electronic assemblies and troubleshooting in the range of the whole production process according to specified documentation both in series production as well as manufacture of small-lot production and prototypes.</p> <p>Electronic equipment technician of level 4 uses different operating techniques and equipment in operations. He/she supervises co-workers and a small working team in case of need.</p>
A.2 Units
<p>The occupational qualification of the electronic equipment technician of level 4 includes five units.</p> <p>A.2.1 Use of measuring instruments for testing; A.2.2 Assembly of electronic equipment; A.2.3 Repair of electronic equipment; A.2.4 Detection of visual and functional faults of electronic equipment; A.2.5 Documentation of the work process.</p> <p>A list of tasks “Units and tasks” related to the units is presented in Annex 1 to the Occupational Standard.</p>
A.3 Working environment and specific aspects of work
<p>The electronic equipment technician works indoors in premises conforming to special requirements where the wearing of special work clothes may be required. Specific aspects of work may be working with small components that presuppose good vision and distinguishing between colours. His/her working environment is related to the electric hazard and he/she may come into contact with chemicals in his/her work.</p>
A.4 Tools
<p>The main tools of the electronic equipment technician include a computer and computer-controlled equipment (incl. test equipment), hand tools (electrical, pneumatic, etc.), measuring instruments (incl. electrical) and accessories meant for the manufacture of the assembly (e.g. assembly fixtures, etc.), technical documentation as well as normative documents (standards, instructions).</p>
A.5 Personal characteristics necessary for this job: abilities and personal traits
<p>The work of the electronic equipment technician presupposes logical thinking, analysis ability, both flexibility and routine tolerance as well as precision of movements.</p>
A.6 Occupational training
<p>People who have vocational secondary education or secondary education and who have obtained their skills either at the workplace or in in-service trainings usually work as electronic equipment</p>



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technician of level 4.

A.7 Possible job titles

The possible job titles of the electronic equipment technician are trouble-shooter, setter, technician, adjuster and repairer.

Part B

COMPETENCE REQUIREMENTS

B.1. The structure of the occupational qualification

In applying for the occupational qualification of the electronic equipment technician of level 4, the certification of the competencies B.2.1-B.2.5 and B.2.6 (transversal competence) is required.

Assessment method(s):

The content and the form of conduct of the final work or final examination will be approved by the occupational qualifications committee.

Specificity of the assessment method:

The initial occupational qualification of the electronic equipment technician of level 4 is obtained after passing a respective vocational secondary education and

- after passing a final examination or
- after defending the final work assignment.

B.2 Competences

*IPC standards –quality criteria for the manufacture of electronics assemblies.

B.2.1 Use of measuring instruments for testing		EQF level 4
Description	Supporting knowledge	Skills
As a result of the measurement, finds the conformity of the product to the documentation.	a) Knows electrical and non-electrical variables (voltage, length, weight, etc.) as well as units of measurement (volt, ampere, ohm, metre, kilogram, etc.); b) Knows the types, fields of use and technical requirements for measuring instruments and test equipment; c) Knows the principles of calibration and verification.	a) Uses measuring instruments necessary for the work; b) In accordance with the work instructions, calibrates measuring instruments, test equipment and systems as well as tools, if necessary.

B.2.2 Assembly of electronic equipment		EQF level 4
Description	Supporting knowledge	Skills

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<p>Assembles electronics assemblies in accordance with the product documentation, based on the quality criteria set for the assembly, as well as the requirements of the standard IPC J-STD-001, IPC-A-610 and IPC-A-620 or any other equivalent standard.</p>	<ul style="list-style-type: none"> a) Knows the requirements of the standards IPC J-STD-001, IPC-A-610 and IPC-A-620 or in any other equivalent standard; b) Knows different soldering technologies (manual and machine soldering); c) Knows the cleanliness requirements for the assembly; d) Knows materials used in the soldering process and their properties (IPC J-STD-002 to 006 or according to any other equivalent standard);- { }- e) Knows different electronic components; f) Knows the processes of mechanical assembly (riveting, screwing, gluing, pressing, ultrasound welding, etc.); g) Knows the processes of assembly of cable and conductor ties or assemblies; Knows other production processes (washing, varnishing, etc.). 	<ul style="list-style-type: none"> a) Performs manual soldering; b) Observes and applies the requirements of the standards IPC J-STD-001, IPC-A-610 and IPC-A-620 or of any other equivalent standard; c) Uses different tools used for the manual soldering and in other assembly processes; d) Handles and prepares electronic components and materials for soldering; e) Prepares and makes connections of cables or cable ties and assemblies; f) Reads wiring diagrams.
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B.2.3 Repair of electronic equipment		EQF level 4
Description	Supporting knowledge	Skills
<p>Restores the functionality of the electronics assembly and the conformity to other requirements in accordance with the standards IPC 7711 and 7721 or other equivalent standards.</p>	<ul style="list-style-type: none"> a) Knows the requirements and instructions of the standards IPC 7711 and 7721 or other equivalent standards. 	<ul style="list-style-type: none"> a) Follows and applies the requirements and instructions of the standards IPC 7711 and 7721 or other equivalent standards; b) Uses the tools used for the repair of electronic equipment.

B.2.4 Detection of visual and functional faults of electronic equipment		EQF level 4
Description	Supporting knowledge	Skills

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Identifies the cause of the fault in the electronic equipment according to functional and visual requirements.	<ul style="list-style-type: none"> a) Knows the requirements of the standards IPC-A-600, IPC-A-610 and IPC-A-620 or any other equivalent standards; b) Knows different electronic components and their operating principles; c) Knows typical schematic-technical solutions. 	<ul style="list-style-type: none"> a) Identifies defective components in the electronics assembly, using measuring results and the wiring diagram; b) Assesses visually the components conforming to the electronics assembly requirements.
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B.2.5 Documentation of the work process		EQF level 4
Description	Supporting knowledge	Skills
Documents parameters required in the work process and their deviations.	<ul style="list-style-type: none"> a) Knows the requirements set for the production documents; b) Knows the documents used in different stages of the production process. 	<ul style="list-style-type: none"> a) Documents his/her own activities.

TRANSVERSAL COMPETENCIES

B.2.6 Electronic equipment technician, occupational qualification transversal competence of level 4	EQF level 4
<p><u>Performance indicators:</u></p> <ol style="list-style-type: none"> 1) Observes the work process, follows and maintains the quality and productivity; 2) Understands the general organisation of the production and his/her roll in the production (principles of <i>LEAN</i> production and <i>six sigma</i>); 3) Uses one's working area purposefully and keeps it in order (5S principles); uses materials and work equipment prudently and economically; 4) Checks the conformity of the used measuring and work equipment to the requirements, following the presence of the marking (markings that certify calibration); 5) Uses the terminology of the area of specialisation, understands and fulfils the requirements proceeding from the instruction documents; follows the requirements set in the organisation for the documentation; 6) Uses wiring diagrams, mechanics and assembly drawings, understands the need for the archival processing of technical repairs in terms of further work; 7) Participates in the teamwork; 8) Observes the requirements of the working environment and the work safety (incl. waste sorting), using protective equipment for occupational health and safety and safe operating techniques as well as following the principles of ergonomics. 9) Proposes well functioning innovations; uses development and training opportunities; 10) Uses a computer at the level AO1-AO7 (see Annex 2 "Basic computer skills") in his/her work; 11) Uses one freely selected foreign language (preferably English) at level A2 (see Annex 3 "Descriptions of levels of language proficiency"). <p><u>Supporting knowledge:</u></p> <ol style="list-style-type: none"> 1) Principles of the maintenance of tools; 2) Principles of the wiring diagrams, mechanics and assembly drawings; 3) Principles of <i>LEAN</i> production and <i>six sigma</i>; 4) 5S principles; 	

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- 5) ESD principles;
- 6) RoHS principles;
- 7) Requirements for the working environment and the work safety;
- 8) Principles of ergonomics;
- 9) Principles of waste handling.

Assessment method(s):

Assessment of the transversal competence is integrated within other competences of this occupational standard.

Clarification

Lean principles – effective and economical production method.

Six sigma principles – methodology for the improvement of processes (define, measure, analyse, improve, manage).

5S principles – purposeful use and maintenance of the workplace as well as ensuring that it also remains like this (sort, put in order, systematic cleaning, standardise, preserve).

ESD principles – protection of products and electronic components and equipment against static electric discharges.

RoHS – the European Union Directive on the restriction of the use of certain hazardous substances.

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	08-30112012-3.3/4k
2. The occupational standard is compiled by: names of persons and organisations	Kalmer Kand, <i>Enics Eesti AS</i> Priit Kinks, <i>Rantelon OÜ</i> Arno Kolk, <i>Elektroonikatööstuse Liit</i> Andzei Kuznets, <i>Ericsson Eesti AS</i> Polina Lapõševa, <i>Ericsson Eesti AS</i> Milko Milatskov, <i>Stoneridge Electronics AS</i> Andres Ojalill, <i>Tallinna Polütehnikum</i> Eiko Priidel, <i>Teleplan Estonia OÜ</i> Mihkel Viskus, <i>Incap Electronics Estonia OÜ</i>
3. The occupational standard is approved by:	Sectoral Council for Information Technology and Telecommunications
4. No. of the decision of the Sectoral Council	11
5. Date of the decision of the Sectoral Council	30.11.2012
6. The occupational standard is valid until (date)	29.11.2017
7. Occupational standard version No. (1-n)	4
8. Reference to the Classification of Occupations (ISCO 08)	7. Main group “Skilled staff and craft workers”, code 724
9. Reference to the level in the European Qualifications Framework (EQF)	4
C.2 Title of occupational qualification in foreign languages	
In English: Electronic equipment technician	
In Russian: Техник электронных устройств	
C.3 Annexes	
Annex 1 Units and tasks	

	Units and tasks	Electronic equipment assembler, level 2 / Cable assembly machine operator, partial occupational qualification of level 2 The objective of work is the make of cable assemblies and/or electronics assemblies in accordance with specified documentation and instructions.	Electronic equipment assembler, level 2 / Assembler of electronic equipment assembly (module), partial occupational qualification of level 2 The objective of work is the make of electronic assembly (module) in accordance with specified documentation and instructions.	Electronic equipment assembler, level 3 The objective of work is the make and repair of electronic assemblies in accordance with specified documentation.	Electronic equipment technician, level 4 The objective of work is the make, setup and repair of electronic assemblies and troubleshooting in the range of the whole production process according to specified documentation both in series production as well as manufacture of small-lot production and prototypes.
1	Use of measuring instruments for testing	EQF level 2	EQF level 2	EQF level 3	EQF level 4
1	Use of measuring instruments needed for work				x
2	Calibration of measuring instruments, test equipment and systems as well as tools, if necessary.				x
2	Assembly of electronic equipment	EQF level 2	EQF level 2	EQF level 3	EQF level 3
	Description	Makes cable or conductor ties or assemblies in accordance with the requirements of the standard IPC-A-620 or any other equivalent standard.	Makes electronics assemblies in accordance with the requirements of the standard IPC-A-610 or any other equivalent standard		
1	Performance of manual soldering				x
2	Observance and application of the requirements of standards IPC J-STD-001, IPC-A-610 and IPC-A-620 or any other equivalent standard				x
3	Use of tools used in manual soldering and in other assembly processes				x
4	Handling and preparation for soldering of electronic components and materials				x

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5	Preparation and connecting the cable and conductor ties or assemblies				X
6	Reading of wiring diagrams				X
3	Manufacture of electronic assemblies and detection of visual faults	EQF level 2	EQF level 2	EQF level 3	EQF level 4
1	Performance of manual soldering			X	
2	Mechanical assembly of electronic assemblies			X	
3	Observance and application of the requirements of standards IPC J-STD-001, IPC-A-610 and IPC-A-620 or any other equivalent standard		X	X	
4	Use of tools used in manual soldering and in other assembly processes		X	X	
5	Handling and preparation for soldering of electronic components and materials			X	
6	Visual detection of possible faults in electronic assemblies			X	
7	Identification of faulty assemblies			X	
4	Manufacture of cable assemblies and detection of visual faults.	EQF level 2	EQF level 2	EQF level 3	EQF level 4
1	Mechanical assembly of cable and conductor ties or assemblies			X	
2	Preparation and connecting the cables and cable assemblies			X	
3	Observance and application of the requirements of standards IPC J-STD-001, IPC-A-610 and IPC-A-620 or any other equivalent standard	X		X	



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4	Performance of manual soldering			X	
5	Use of tools used in manual soldering and in other assembly processes	X		X	
6	Visual assessment of the conformity of components to the requirements set for the cable assemblies			X	
7	Identification of damaged cable assemblies			X	
5	Repair of electronic equipment	EQF level 2	EQF level 2	EQF level 3	EQF level 4
1	Observance and application of the requirements and instructions of standards IPC 7711 and 7721 or any other equivalent standards			X	X
2	Use of tools needed for the repair of electronic equipment			X	X
6	Documentation of the work process.	EQF level 2	EQF level 2	EQF level 3	EQF level 4
1	Documentation of activities	transversal	transversal	reflects in transversal	X