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ESF programm „Kutsete süsteemi arendamine“

OCCUPATIONAL STANDARD

Land surveyor, level 7

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.

This occupational standard is the basis for assessment of professional competency of people.

Occupational qualification title	Estonian qualifications framework (EstQF) level
<i>Land surveyor, level 7</i>	7



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Part A JOB DESCRIPTION

A.1 Job description

Geodesy (in Greek *geodaisia* "division of the Earth") is a science of determination of the shape and size of the planet Earth and parts of its surface as well as used surveying methods, mathematical processing of surveying results and depicting of the parts of the ground on level as maps, plans and profiles.

The main duty of the land surveyor is performance of geodetic operations on construction sites, planning and designing areas: first the surveying works on the site and then processing, analyzing, interpretation and formulation of obtained data.

The land surveyor acts according to the profession in different areas: construction surveys, special engineering works, works related to higher geodesy, geodesy works. Based on the area of activity and formed traditions, the person working in geodesy area is called a land surveyor together with land management surveyor.

The vocations in the profession of geodesy are as follows:

Land surveying technician, level 4; land surveyor, level 5, land surveyor, level 6, land surveyor, level 7.

This occupational standard describes the professional competencies of the level 7 land surveyor.

Land surveyor, level 7 is a highly experienced top specialist who works in companies and institutions related to geomatics and is responsible for the high quality work of the team.

Land surveyor, level 7 works in complicated and unpredictable situations and, if needed, proposes innovative solutions for the risen problems. If needed, develops and implements new technologies.

A.2 Units

A.2.1 Surveying works on the site

- 2.1.1 Preparing the surveying works
- 2.1.2 Establishment of geodetic survey network
- 2.1.3 Performing tacheometric surveying works
- 2.1.4 Performing geodetic satellite surveying works
- 2.1.5 Performing levelling work

A.2.2 Processing survey data

- 2.2.1 Revision and analysis of survey data
- 2.2.2 Performing geodetic calculations
- 2.2.3 Preparing geodetic drawings
- 2.2.4 Documenting survey data and calculation results

OPTIONAL UNITS

A.2.3 Geodetic surveys

- 2.3.1 Establishment of projecting and actual construction network
- 2.3.2 Performing setting-out works
- 2.3.3 Performance of execution and revision surveys of buildings (including utility networks) and documenting the results

A.2.4 Engineering and geodetic surveys

- 2.4.1 Architectural surveying of buildings and preparation of drawings
- 2.4.2 Surveying and preparation of drawings of more complicated facilities

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- 2.4.3 Surveying works of historical buildings (including ruins)
- 2.4.4 Surveying works of deformations of buildings
- 2.4.5 Surveying and calculation of material volumes
- 2.4.6 Calibration and preparing technical specifications of specific facilities
- 2.4.7 Performing hydrographic surveying works

A.2.5 Engineering and geodetic surveys

- 2.5.1 Establishing surveying networks
- 2.5.2 Survey of the area
- 2.5.3 Survey of utility networks and documenting the results
- 2.5.4 Obtaining of necessary co-ordinations

A.2.6 Higher geodesy works

- 2.6.1 Designing of local geodetic networks
- 2.6.2 Designing of national geodetic networks
- 2.6.3 Building and reconstruction of local geodetic networks
- 2.6.4 Building and reconstruction of national geodetic networks
- 2.6.5 Erection of gravimetric networks
- 2.6.6 Conversions and determination of conversion parameters between the coordinate systems

Comparative list of units and tasks of geomatics profession is indicated in Annex 1 “Units and tasks”.

A.3 Working environment and specific aspects of work

Land surveyors work in the office as well as in field works. Working time is flexible, depending on need, the sites should be surveyed also outside ordinary working time. The character of work is alternating – work in office alternates with field works.

The risk factors related to the working environment of the land surveyor are mainly caused by traffic and peculiarity of the buildings, construction and industrial sites and hence he or she must strictly follow the valid safety requirements.

In certain situations it may happen that when performing work tasks, the land surveyor must enter private properties, border of the state or other territories with limited access. In that case it is necessary to obtain a permission for staying and working in the specified territories.

A.4 Tools

The tools of the land surveyor in the office include office equipment and professional software programs. In the field work, the land surveyor uses relevant instruments (e.g. tachometer, surveyor's level, GPS-surveying instruments, etc) and, if needed, also the common hand tools like spade, saw, hammer, etc. In the field work sites it is mandatory to wear the safety equipment (helmet, reflective jackets).

A.5 Personal characteristics necessary for this job: abilities and personality traits

The work of the land surveyor presumes logical thinking and analytic abilities, visual memory, spatial imagination.

Mathematical capability, concentration, decision and planning abilities are also essential. Geodesy work needs openness and good communication skills, preciseness, sense of duty, self-discipline and ability to work under stress.

For field works, a good physical condition and readiness to work in different weather conditions are recommended.

A.6 Occupational training

Level 7 land surveyor has professional higher education and he or she has passed in-service trainings and has long-term practical experience in the area of geodesy.

A.7 Possible job titles



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Land surveyor, land surveyor

Part B COMPETENCE REQUIREMENTS

B.1 The structure of the occupational qualification

Land surveyor, level 7 professional standard consists of two obligatory (B.2.1-2.2) and four optional competencies (B.2.3-2.6).

7. Verification of obligatory (B.2.1 and B.2.2), at least one optional (B.2.3 - 2.6) and transferable competencies and knowledge (B.2.7 - B.2.13) is required for obtaining the profession of land surveyor, level 7.

B.2 Competencies

OBLIGATORY COMPETENCES

B.2.1 Surveying works on the site	EstQF level 7
<u>Performance indicators:</u>	
<ol style="list-style-type: none"> 1. Registers planned survey works according to valid procedure. Organises preparation of survey works, selects the technical and methodical instructions necessary for work. 2. Organises creation of the geodetic surveying network based on the prescribed task and selected surveying instruments. 3. Checks the results of the tacheometric survey and assesses their conformance to the initial task. 4. Checks the results of the geodetic satellite survey and assesses their conformance to the initial task. 5. Checks the levelling results and assesses their conformance to the initial task. 	
<u>Supporting knowledge:</u>	
<ol style="list-style-type: none"> a) Geodetic instruments used for survey of the sites, and their operating principles b) Utility networks c) Survey methods 	
<u>Assessment method(s):</u>	
Portfolio and, if needed, oral questioning/interview, assessment based on documents (certifying education, in-service training, current professional length of service) and a written test	
B.2.2 Processing survey data	EstQF level 7
<u>Performance indicators:</u>	
<ol style="list-style-type: none"> 1. Decides on eligibility of survey data for further activities. 2. Makes geodetic calculations, assesses the credibility of results and gives the precision evaluation to it. Confirms the appropriateness of data for the subsequent work stages. 3. If needed, checks the conformance of drawings to actual situation, calculation results and valid requirements. 4. Documents and, if needed, archives the survey data, calculation results and drawings based on the requirements provided by the client. 	
<u>Supporting knowledge:</u>	
<ol style="list-style-type: none"> a) Methods for interpretation, analysis and processing for geodetic survey data b) Theory of processing and equation calculation of survey data c) Coordinate systems and their interrelations 	

d) Different precision calculation methods, their use

Assessment method(s):

Portfolio and, if needed, oral questioning/interview, assessment based on documents (certifying education, in-service training, current professional length of service) and a written test

OPTIONAL COMPETENCES

B.2.3 Geodetic surveys	EstQF level 7
<p><u>Performance indicators:</u></p> <ol style="list-style-type: none"> 1. Designs and establishes projecting and actual construction network according to technical specifications and peculiarity of the site. 2. Develops the program for geodetic survey setting-out works, performs setting-out for the sites with more complicated configuration (with several coordinate systems). 3. Performs execution and revision surveys of buildings according to the prescribed task and technical specifications. Prepares as-built drawings and compares the results of the revision surveys with building design documentation and upon detection of the non-conformity, informs the client about it. 	
<p><u>Supporting knowledge:</u></p> <ol style="list-style-type: none"> a) Skill to read more complicated, included 3D building design documentation b) Civil-engineering terminology c) Different building structure types; d) Basics of building technologies; e) Methods for building a construction network; f) Setting-out, execution and revision survey methods 	
<p><u>Assessment method(s):</u></p> <p>Portfolio and, if needed, oral questioning/interview, assessment based on documents (certifying education, in-service training, current professional length of service) and a written test</p>	
B.2.4 Engineering and geodetic surveys	EstQF level 7
<p><u>Performance indicators:</u></p> <ol style="list-style-type: none"> 1. Designs and builds the survey network according to the prescribed technical specifications and peculiarity of the site. 2. Plans and organizes the survey works of the area according to the initial task. 3. Checks the logic of the utility network database by comparing data with the ones of network manager's. 4. Is responsible for existence of necessary co-ordinations. 	
<p><u>Supporting knowledge:</u></p> <ol style="list-style-type: none"> a) Principles of establishment of survey networks, survey and calculation methods b) methods of survey of the areas c) Knowledge about utility networks; d) Survey methods of utility networks e) Procedure of coordination of the layout of utility networks 	
<p><u>Assessment method(s):</u></p> <p>Portfolio and, if needed, oral questioning/interview, assessment based on documents (certifying education, in-service training, current professional length of service) and a written test</p>	



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B.2.5 Higher geodesy works	EstQF level 7
<p><u>Performance indicators:</u></p> <ol style="list-style-type: none"> 1. Collects and analyses archive materials about the geodetic networks of a specific area. Performs the reconnaissance of the geodetic network. Based on the obtained data and prescribed order, prepares the design documentation to stage 1, 2 and 3 of the local geodetic network. 2. Collects and analyses the archive materials about the area covered with the design documentation. Performs the reconnaissance of the geodetic network. Prepares the geodetic network design documentation based on obtained data and prescribed order. 3. According to the design documentation, builds and reconstructs the stage 1, 2 and 3 of the geodetic network, including survey, calculation and formulation works. 4. Builds and reconstructs the national geodetic networks based on the building design documentation, including survey, calculation and formulation works. 5. Builds gravimetric networks from preparation of the design documentation until formulation works. 6. Determines conversion parameters between the coordinate systems by using relevant software programmes. If needed, performs conversions between coordinate systems. 	
<p><u>Supporting knowledge</u></p> <ol style="list-style-type: none"> a) Geodetic reference systems; b) Designing of national and local geodetic networks; c) Survey and calculation methods of national and local geodetic networks; d) Structure of gravimetric network, survey and calculation methods e) Professional software (e.g. for calculation of GNSS, polygonometry and levelling, etc networks). f) Methods for determination and use of equation parameters between the coordinate systems 	
<p><u>Assessment method(s):</u> Portfolio and, if needed, oral questioning/interview, assessment based on documents (certifying education, in-service training, current professional length of service) and a written test</p>	

B.2.6 Engineering and geodetic surveys	EstQF level 7
<p><u>Performance indicators:</u></p> <ol style="list-style-type: none"> 1. Based on the prescribed initial task, prepares methods and tasks for architectural surveys of buildings and drawings (plans, sections of the structures, façade drawings, drawings of design assemblies, 3D models, etc) made for the reconstruction design documentation based on these surveys. 2. Based on the prescribed initial task, develops methods and tasks for performance of surveys of more complicated facilities (e.g. bridges, viaducts, production and technological equipment, power stations, hydrotechnical facilities, purification equipment, etc) and preparation of the drawings (plans, sections of structures, façade drawings, drawings of design assemblies, 3D models, etc) made for the reconstruction design documentation based on these surveys. 3. Based on the detail and preciseness requirements fixed in the initial task, develops the methods and tasks for survey of historic buildings and their parts. 4. Based on the prescribed initial task, develops methods and tasks for survey of deformations of the buildings. Analyses and presents the data obtained as the result of the work. 5. Based on the preciseness requirements set in the initial task, develops methods and tasks for survey and calculation of material quantities. 6. Based on the specification and normative documents of the indicated site, prepares method and tasks for precision measuring, calibration and preparing technical specifications of specific facilities 	

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<p>(stadiums, fuel tanks, swimming pools, firing ranges, railway, more complicated industrial and production equipment).</p> <p>7. Based on the initial task provided by the client, develops method and tasks of hydrographic survey works aimed at structural design works.</p>
<p><u>Supporting knowledge</u></p> <p>a) Methods for architectural survey of buildings; b) Methods for survey of complicated buildings; c) Principles of checking the deformation of the buildings; d) Principles of 3 D model and volumetric calculations; e) principles of calibration and preparing technical specifications of facilities f) Methods of hydrographic survey.</p>
<p><u>Assessment method(s):</u> Portfolio and, if needed, oral questioning/interview, assessment based on documents (certifying education, in-service training, current professional length of service) and a written test</p>

TRANSFERSAL COMPETENCES

B.2.7 Following of quality in work	EstQF level 7
<p><u>Performance indicators:</u></p> <ol style="list-style-type: none"> Level 7 land surveyor provides with his or her work service which conforms to the agreed standards and quality requirements and adheres to the operational instruction, safety requirements, guidelines and procedures. Expresses himself or herself well in writing, all presented written materials are structured, logical and correct. Regards ethical beliefs and values important, shows integrity of actions and words. Is conscientious towards environment and society. Has clear analytical thinking, uses own knowledge efficiently; acknowledges new ideas and development trends. Sees and understands new business opportunities, takes the financial side of processes and activities into account. Consider wide spectre of topics related to organization as well as the area more widely. 	
B.2.8 Planning of own work	EstQF level 7
<p><u>Performance indicators:</u></p> <ol style="list-style-type: none"> Level 7 land surveyor is oriented to results and achievement of goals in his or her work, he or she works well and is dedicated to work. Ethical beliefs and values are important for him or her. Plans time and activities beforehand, keeps the agreed schedule, deadlines and stages. His or her working style is systematic, methodical and orderly. Before making any decisions, the land surveyor analyses all relevant numeric and verbal information available for him or her, also all other sources of information. 	
B.2.9 Communication skills and team work	EstQF level 7
<p><u>Performance indicators:</u></p> <ol style="list-style-type: none"> Creates good relations with clients as well as colleagues and communicates successfully with people from all levels. Adapts with the team and keeps up the team spirit. Shares his or her knowledge and skills with colleagues. Delegates work appropriately and fairly by creating development opportunities to subordinates and supervising them. Manages and checks, initiates activities, gives the others perception of direction and takes 	

responsibility.	
B.2.10 Coping with problems	EstQF level 5
<u>Performance indicators:</u>	
1. Level 7 land surveyor is adaptable, responds and adapts easily with changes, withstands stress and copes well with drawbacks. Works efficiently also in stressful situations and, if needed, can manage conflicts. Takes criticism reasonably and learns from it.	
B.2.11 Participation in lifelong learning	EstQF level 7
<u>Performance indicators:</u>	
1. Learns and obtains new tasks, methods and techniques; seeks learning opportunities, approaches solving of situations and problems in innovative and creative manner. Accepts new technologies.	
2. The land surveyor looks for proper learning opportunities and develops own working knowledge through constant professional development.	
B.2.11 Language skills	
Estonian – level C1	
At least one foreign language at level B2 and the other on level B1	
B.2.12 Computer skills	
Computer skills on level AO1-AO7, AO12	
General knowledge about CAD-programs	
<u>7. Transfersal knowledge of the vocation of the land surveyor, level 7</u>	
a) Geodetic instruments, survey equipment and methods of survey	
b) Geodesy terminology	
c) Geodetic networks	
d) Documenting, formulation and archiving of survey and calculation results	
e) Legislation regulating the work of the land surveyor	
- Act of Register of Economic Activities	
- Spatial Data Act	
- Regulation of the Minister of Economic Affairs and Communications “Procedure of performance of the geodetic surveys”	
- Building Act	
- Land Cadastre Act	
f) Management area knowledge, teamwork	
g) General knowledge about accounting;	
h) general knowledge about business area	
<u>Assessment method(s):</u>	
Transfersal competencies are appraised in an integrated manner together with appraisal of all other competencies presented in the professional standard.	



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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	
Designation of the occupational standard in the register of occupational qualifications	13-21112014-3.4/6k
The occupational standard is compiled by:	Mairolt Kakko – OÜ REIB / Eesti Geodeetide Ühing Jaan Kallandi – OÜ Metricus / Eesti Geodeetide Ühing Jüri Randjärv – Maaülikool Karin Kollo – Maa-amet Toivo Tomingas – Maa-amet
The occupational standard is approved by	Building, Real estate and Geomatics Sectoral Council
No. of the decision of the Sectoral Council	33
Date of the decision of the Sectoral Council	21.11.2014
The occupational standard is valid until (date)	02.06.2018
Occupational standard version No	6
Reference to the Classification of Occupations (ISCO 08)	2165 Map-drawers and surveyors
Reference to the level in the European Qualifications Framework (EQF)	7
C.2 Title of occupational qualification in foreign languages	
In English:	land surveyor
In Russian:	геодезист
In Finnish:	maanmittari
C.3 Annexes	
Annex 1.	Units and tasks of geodesy area
Annex 2.	Descriptions of language skill levels
Annex 3.	Computer skills

UNITS AND TASKS	Land survey technician, level 4	Land surveyor, level 5	Land surveyor, level 6	Land surveyor, level 7
OBLIGATORY UNITS AND TASKS				
1. Surveying works on the site				
Preparation of surveying works	X	X	X	X
Establishment of geodetic survey network	–	X	X	X
Performing tacheometric surveying works	X	X	X	X
Performing geodetic satellite surveying works	X	X	X	X
Performing levelling work	X	X	X	X
2. Processing survey data				
Revision and analysis of survey data	X	X	X	X
Performing geodetic calculations	X	X	X	X
Preparing geodetic drawings	X	X	X	X
Documenting survey data and calculation results	X	X	X	X
UNITS AND TASKS OF OPTIONAL COMPETENCIES				
3. Performance of construction surveys				
Establishment of projecting and actual construction network	–	Participates in supervision	X	X
Performing geodetic setting-out works	Participates in supervision	Participates in supervision	X	X
Performance of execution and revision surveys of buildings (including utility networks) and documenting the results	Participates in supervision	Participates in supervision	X	X
4. Performance of geodetic surveys				
Establishing surveying networks	Participates in supervision	Participates in supervision	X	X
Survey of the area	X	X	X	X
Survey of utility networks and documenting the results	X	X	X	X
Preparing a lay-out of the area	X	X	X	X
Obtaining of necessary co-ordinations	–	–	X	X
UNITS AND TASKS	Land survey technician, level 4	Land surveyor, level 5	Land surveyor, level 6	Land surveyor, level 7

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5. Cadastral survey				
Setting-out and survey of cadastral unit	X			
Situation survey	X			
Preparing a plan of the cadastral unit	Participates in supervision	–	–	–
Determining the surface areas	Participates in supervision			
Documenting a cadastral survey	X			
6. Performing engineering and geodetic surveys				
Architectural surveying of buildings and preparation of drawings		Participates in supervision	X	X
Surveying and preparation of more complicated facilities		Participates in supervision	X	X
Surveying works of historical buildings (including ruins)		Participates in supervision	X	X
Surveying works of deformations of buildings	–	Participates in supervision	X	X
Surveying and calculation of material volumes		X	X	X
Calibration and preparing technical specifications of specific facilities		Participates in supervision	X	X
Performing hydrographic surveying works		X	X	X
7. Higher geodesy works				
Designing of local geodetic networks			X	X
Designing of national geodetic networks			–	X
Building and reconstruction of local geodetic networks			X	X
Building and reconstruction of national geodetic networks	–	–	X	X
Erection of gravimetric networks			–	X
Conversions and determination of conversion parameters between the coordinate systems			X	X