OCCUPATIONAL QUALIFICATION STANDARD

Thermal Energy 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)
Thermal Energy Engineer, EstQF Level 6	6

Possible specialisation and titles on occupational certificate	
Specialisation	**Title on occupational qualification certificate**
Thermal equipment and systems	Thermal Energy Engineer, EstQF Level 6 Thermal equipment and systems
District heating and district cooling systems	Thermal Energy Engineer, EstQF Level 6 District heating and district cooling systems
Gas equipment and installations	Thermal Energy Engineer, EstQF Level 6 Gas equipment and installations
Heat sources and heating centres	Thermal Energy Engineer, EstQF Level 6 Heat sources and heating centres
Industrial and commercial cooling equipment and systems	Thermal Energy Engineer, EstQF Level 6 Industrial and commercial cooling equipment and systems

Part A
DESCRIPTION OF WORK

A.1 Description of work

The aim of a thermal energy engineer's work is to create solutions for the safe and efficient functioning of thermal and energy technologies.
Thermal energy engineering occupations:
Thermal Energy Engineer, Level 6
Diploma Thermal Energy Engineer, Level 7
Chartered Thermal Energy Engineer, Level 8.
Thermal Energy Engineer, Level 6 organises the construction and operation of thermal and energy technologies that have been developed and are in use. They work independently in complex and unpredictable situations, assuming the role of leader when necessary and cooperating with specialists from related fields.

Thermal Energy Engineer, Level 6 specialises in:
- thermal equipment and systems*;
- district heating and cooling systems**;
- gas equipment and installations***;
- heat sources and heating centres**** or
- industrial and commercial cooling equipment and systems*****.

More specific occupational fields of Thermal Energy Engineer, Level 6 are:
- drawing up technical documentation;
- managing construction processes (except when specialising in gas and cooling equipment and systems);
- organising operations.

For competence restrictions concerning occupations, see Annex 1. *Thermal equipment and systems are heating and auxiliary equipment which utilises primary energy or perform energy conversion (boilers, industrial furnaces, driers, heat pumps, solar panels, refrigeration equipment, cooling devices, fuel preparation systems, heat storage devices, etc.); **District heating and cooling systems are recirculation systems installed in the ground or on supports (pipelines, closing devices, regulatory and measuring devices, leak detection systems, devices compensating for thermal pressure, etc.) which are designed to transport heating or cooling energy to consumers. In general, the heat transfer medium used to transport energy is cleaned and chemically treated water; ***Heat sources and heating centres are boiler rooms, local boiler units, heat pumps, solar panels and boiler rooms; These do not include radiator, hot-air and underfloor heating systems, hot water systems, domestic ventilation systems, air-conditioning systems and noise-suppressing systems. ****Gas equipment and installations are equipment for producing, processing, transmitting, storing and using gas and filling gas containers, including pressure vessels for natural gas, biogas, industrial gas, fuel gas, evaporators, internal piping, external piping, terminals, filling stations, petrol stations and gas stations; *****Industrial and commercial cooling equipment and systems are heating and cooling pump systems, including direct evaporation systems, pump systems, absorption cooling systems and adiabatic systems, compressor devices, heat exchangers, pressure vessels and piping.
A.2 Tasks
A.2.1 Engineering work 1. Fulfilling technical engineering tasks. 2. Using information and communications technology (ICT). 3. Fulfilling occupational norms. A.2.2 Cooperation and supervision 1. Organising cooperation. 2. Providing supervision.
Specialised areas of work
A.2.3 Thermal equipment and systems A.2.4 District heating and cooling systems A.2.5 Gas equipment and installations A.2.6 Heat sources and heating centres A.2.7 Industrial and commercial cooling equipment and systems
Elective areas of work
A.2.8 Preparing technical documentation 1. Making preparations for the development of project solutions. 2. Formalising documentation A.2.9 Construction management 1. Making preparations for construction. 2. Organising construction. 3. Arranging the handover of the construction site. A.2.10 Organising equipment operations 1. Organising operations and maintenance. 2. Identifying and rectifying faults. 3. Documenting operations.
A.3 Work environment and specific nature of work
Thermal energy engineers work in offices and on site. Working hours can be flexible.
A.4 Tools
Thermal energy engineers use ICT tools and software in their work (e.g. specialised computer programmes, tools and measuring devices).

A.5 Personal qualities required for work: abilities and characteristics
The profession requires an engineering-minded, environmentally friendly way of thinking that facilitates sustainable development, plus creativity, independence, decision-making and analytical skills, precision, a sense of responsibility, willingness to communicate and cooperate, spatial imagination and adaptability.
A.6 Professional preparation
Thermal Energy Engineer, Level 6 has completed specialised higher education. They have also completed further training and have independent work experience in the field.
A.7 Most common occupational titles
Thermal Technology Engineer, Production Engineer, Production Manager, Thermal Automatics Engineer, Regime Engineer, Dispatcher, Energy System Specialist, Energetics Engineer, Engineer of Cooling Devices, Energy Block Specialist, Project Planner, Project Lead, Site Manager, Department Manager, etc.
A.8 Regulations governing profession
Equipment Safety Act and Building Code and their implementing acts and EVS EN 378 and EU regulation No 517/2014. The aforementioned regulations regulate the activities of those who compile projects for district heating and district cooling systems, construction site inspectors, construction leads, building auditors, those carrying out owner's supervision, fitters of fuel gas installations and refrigeration equipment and those in charge of inspecting whether the usage requirements of pressure devices are being met. The occupational qualification enables a competence to be obtained by registering it with the Economic Activity Registry.

Part B
COMPETENCY REQUIREMENTS

B.1 Structure of occupation
Competences B.2.1 and B.2.2 and at least one specialised competence from B.2.3-B.2.7 must be certified when applying for the qualification of Thermal Energy Engineer, Level 6. To specialise in thermal equipment and systems, district heating and cooling systems and heat sources and heating centres, at least one competence from B.2.8-B.2.10 must be certified. To specialise in gas equipment and installations and industrial and commercial refrigeration equipment and systems, one of the two competences B.2.8 or B.2.10 must be certified.

B.2 Competences

MANDATORY COMPETENCES

B.2.1 Engineering work	EstQF Level 6
Performance indicators: 1. completes engineering tasks using appropriate contemporary knowledge of the natural sciences and engineering (mathematics, physics, engineering mechanics, material technology, programming, thermodynamics, heat transfer, hydrogen gas mechanics, fuels and combustion, engineering graphics, strength of materials, etc.); 2. takes into account the social, economic, environmental and ethical aspects of engineering; 3. utilises solutions linked to fields related to thermal energetics (e.g. ICT, construction, electricity, automatics and mechanics); 4. takes into account the user's needs, financial situation and limitations; 5. uses a computer for information processing, communication, safety and problem-solving at the Independent user level and for content creation at the Advanced user level (see Annex 2 – Scale of self-assessment in digital competence); 6. uses appropriate hardware and modern software solutions to resolve specialist problems (e.g. modelling, simulation, analytical and synthesis technology and smart network solutions) and can choose the best hardware and software for a project;	

7. keeps up to date with developments in digital technology and supports others in improving their ICT skills; 8. follows the occupational requirements of legal acts and standards, e.g. work organisation and occupational safety requirements. 9. is guided in their work by the requirements of the professional ethics of engineers, (see Annex 3 – Engineer's professional ethics and code of conduct); 10. supports the wider promotion of the work and occupation of engineering through their actions and protects the interests of the occupation; 11. maintains their qualifications, keeps up to date on technological developments and proposes innovations to improve energy efficiency; 12. mediates and provides technical information for everybody in a comprehensive manner and participates actively in discussions and meetings; 13. uses at least one foreign language at the B2 level (see Annex 4 – Language skills level descriptions).

B.2.2 Cooperation and supervision	**EstQF Level 6**
Performance indicators: 1. creates and maintains effective professional relationships with individuals, colleagues and business partners (including organisations), bearing in mind their goals and quality of service; 2. organises the work of work teams, instigating activities and guiding their progress towards results; 3. delegates work in an appropriate and fair manner, involving and motivating employees; 4. observes and checks work performance, giving appropriate/constructive feedback in a timely manner; 5. passes on professional skills and knowledge, taking into account the needs and expectations of those being supervised.	

COMPETENTCES RELATED TO SPECIALISATION

At least one specialised competence from B.2.3-B.2.7 must be certified when applying for the qualification of Thermal Energy Engineer, Level 6.

Thermal equipment and systems	
B.2.3 Thermal equipment and systems	**EstQF Level 6**
Performance indicators: 1. develops optimal technical solutions using appropriate methods based on experience, skills and relevant knowledge: a) principles of thermodynamics and heat and mass distribution processes; b) requirements of the use of thermal equipment and systems c) operating principles of the technological processes of equipment and systems d) main technical solutions of thermal equipment and systems and the principles behind their choice; e) requirements of the energy efficiency of thermal equipment and systems. 2. takes into account the specific nature of related fields (electric power supply, automatics, constructions, water supply, fuel management, etc.).	

District heating and district cooling systems	
B.2.4 District heating and district cooling systems	**EstQF Level 6**
Performance indicators: 1. develops optimal technical solutions using methods based on experience, skills and relevant knowledge: a) principles of thermodynamic and hydraulic processes; b) compensation solutions for thermal shock; c) operating principles of automatic control and technological processes; d) overview of the main technical solutions of district heating and district cooling systems and the principles behind their choice; e) requirements of the energy efficiency of district heating and district cooling systems.	

2. takes into account the specific nature of related fields (external communications, geotechnics, automatics, road construction, constructions, etc.).

Gas equipment and installations	
B.2.5 Gas equipment and installations	**EstQF Level 6**
Performance indicators: 1. develops optimal technical solutions using methods based on experience, skills and relevant knowledge: a) materials used in the construction of gas installations (such as plastic, steel and copper) and their nature; b) principles of gas dynamic processes; c) nature and fields of use of fuel gas, thermodynamic state and composition of gas, combustion theory; d) requirements of using gas equipment; e) solutions for storing fuel gas and gas supply, potential uses; f) main technical solutions of gas equipment and installations and principles behind their choice; g) requirements of the explosion risk and energy efficiency of gas equipment and installations. 2. takes into account the specific nature of related fields (external communications, geotechnics, automatics, road construction, constructions, fire safety etc.).	

Heat sources and heating centres	
B.2.6 Heat sources and heating centres	**EstQF Level 6**
Performance indicators: 1. develops optimal technical solutions using methods based on experience, skills and relevant knowledge: a. construction physics qualities of buildings; b. principles of thermodynamic, hydraulic and aerodynamic processes; c. main technical solutions of heating systems belonging to buildings and principles behind their choice; d. requirements of the energy efficiency of heating systems belonging to buildings. 2. takes into account the specific nature of related fields (constructions, electricity supply, automatics, water supply, etc.).	

Industrial and commercial cooling equipment and systems	
B.2.7 Industrial and commercial cooling equipment and systems	**EstQF Level 6**
Performance indicators: 1. develops optimal technical solutions using methods based on experience, skills and relevant knowledge: a) principles of thermodynamic processes; b) use, principles and construction of refrigeration system components; c) principles of inspection and maintenance; d) multi-stage refrigeration systems. 2. observes the use of the cooling cycle in accordance with the safety card of the refrigerant (EN-378 and F-GA requirements); 3. takes into account the specific nature of related fields (constructions, electricity supply, automatics, water supply, etc.).	

OPTIONAL COMPETENCES

To specialise in thermal equipment and systems, district heating and cooling systems and heat sources and heating centres, at least one competence from B.2.8-B.2.10 must be certified.
To specialise in gas equipment and installations and industrial and commercial refrigeration equipment and systems, one of the two competences B.2.8 or B.2.10 must be certified.

B.2.8 Building design	**EstQF Level 6**
Performance indicators: 1. collects and systematises the input necessary for further designing, using appropriate software;	

2. compiles technical documentation based on standard projects, using appropriate software; 3. compiles project documentation under supervision (including schematics, explanatory reports and material summaries) in accordance with the design task and the general solution of the project.	
B.2.9 Construction management	**EstQF Level 6**
Performance indicators: 1. observes the competence limitations of construction management (see Annex 1); 2. estimates the volume of construction work based on the project and requests a quote for the necessary materials, equipment and contractor work; 3. compiles or commissions a project for completing specialised work (including the organisation scheme of the construction site, work safety measures and timetables) and a budget; 4. gathers the necessary resources for specialised work on the construction site; 5. organises construction work in their specialised field in accordance with occupational standards, timetables and the project's budget and following occupational health and safety requirements and environmental protection requirements; 6. commissions or compiles schematics of products, explanatory statements and other documents, making sure that they are in accordance with construction norms and quality standards; 7. organises documentation (e.g. completed work, measuring and testing acts, implementation schematics, equipment and material documentation and maintenance and user manuals) as required; 8. organises quality control to assess compliance with construction norms and quality requirements before the transfer of the construction site.	
B.2.10 Organising equipment operations	**EstQF Level 6**
Performance indicators: 1. observes the competence limitations of organising device operations (see Annex 1); 2. organises maintenance in accordance with the maintenance plans and operating manuals of utility networks and systems and the use and maintenance manuals provided by the manufacturers of equipment; 3. supervises and assesses the progress of technological processes (gas, district heating, refrigeration, etc.); 4. organises the operation of utility networks and utility systems in accordance with operation plans and assesses the risks associated with operations; 5. assesses whether energy equipment and systems correspond to their requirements and assesses their operational capabilities; 6. identifies deviations in utility networks and systems with the help of previously developed methods and instructions; 7. informs the person in charge and rectifies the fault in accordance with procedure; 8. documents operation and management activities in a format that can be reproduced.	

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	07-30032023-2.7/6k
2. Occupational qualification standard compiled by:	Eimar Jõgisu, Nomine Consult OÜ Aleksander Iivanainen, Inspecta Estonia OÜ Toomas Rähmonen, Termopilt OÜ (Skype) Kauri Koster, Adven Eesti AS, Eesti Soojustehnikainseneride Selts Riho Pilv, Cooltec OÜ Andres Siirde, Tallinna Tehnikaülikool Igor Krupenski, Heatconsult OÜ Vladislav Mašatin, AS Utilitas Tallinn Aleksei Lebedev, Eesti Mereakadeemia Imre Soorand, Eesti Külmaliit
3. Occupational qualification standard approved by:	Energy, Mining and Chemical Industry

4. No. of decision of Sectoral Council	30
5. Date of decision of Sectoral Council	30.03.2023
6. Occupational qualification standard valid until	02.10.2024
7. Occupational qualification standard version no.	6
8. Reference to International Standard Classification of Occupations (ISCO 08)	2151 Electrical Engineers
9. Reference to European Qualifications Framework (EQF)	6
C.2 Occupational title in foreign language	
English:	Thermal Energy Engineer, EstQF Level 6
C.3 Annexes	
Lisa 1 Competence restrictions concerning occupations	
Lisa 2 Scale of self-assessment in digital competence	
Lisa 3 Engineer's Professional Ethics and Code Of Conduct	
Lisa 4 Language skills level descriptions	