OCCUPATIONAL QUALIFICATION STANDARD

Chartered Thermal Energy Engineer, EstQF Level 8

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)
Chartered Thermal Energy Engineer, EstQF Level 8	8

Possible specialisation and titles on occupational certificate	
Specialisation	**Title on occupational qualification certificate**
Thermal energy economy	Chartered Thermal Energy Engineer, EstQF Level 8 Thermal energy economy
Thermal equipment and systems	Chartered Thermal Energy Engineer, EstQF Level 8 Thermal equipment and systems
District heating and district cooling systems	Chartered Thermal Energy Engineer, EstQF Level 8 District heating and district cooling systems
Gas equipment and installations	Chartered Thermal Energy Engineer, EstQF Level 8 Gas equipment and installations
Heat sources and heating centres	Chartered Thermal Energy Engineer, EstQF Level 8 Heat sources and heating centres
Industrial and commercial cooling equipment and systems	Chartered Thermal Energy Engineer, EstQF Level 8 Industrial and commercial cooling equipment and systems
Research and education	Chartered Thermal Energy Engineer, EstQF Level 8 Research and education

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
DiplomaThermal Energy Engineer, Level 7
Chartered Thermal Energy Engineer, Level 8

Chartered Thermal Energy Engineer, Level 8 is a leading specialist with broad-ranging knowledge and experience in their field. They develop and optimise existing and create new thermal and energy technologies. They work independently in complex situations requiring mastery and new strategic solutions, coordinate work between related fields and are ready to manage teams and organisations.

Chartered thermal energy engineers specialise in:
- developing the thermal economy*;
- thermal equipment and systems**;

? district heating and cooling systems***; ? gas equipment and installations****; ? heat sources and heating centres*****; ? industrial and commercial cooling devices and systems****** or ? research and education*******. More specific occupational fields of Chartered Thermal Energy Engineer, Level 8 (excluding the thermal economy and research and education specialisations, which have no specific occupational fields) are: ? designing buildings; ? expert analysis of building projects; ? construction management; ? auditing construction; ? owner supervision; ? organising operations. For competence restrictions concerning occupations, see Annex 1. *Development of the thermal economy consists of organising the energy economy in companies and local governments, compiling development plans and conducting energy and resource audits in companies; **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 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 and installations 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. *******Research and development consists of systematic creative tasks (baseline studies, applied research and product development) aimed at gathering new knowledge using the scientific method.
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. Management. 2. Supervision and mentoring.
Specialised areas of work
A.2.3 Thermal energy economy A.2.4 Thermal equipment and systems A.2.5 District heating and cooling systems A.2.6 Gas equipment and installations A.2.7 Heat sources and heating centres A.2.8 Industrial and commercial cooling equipment and systems A.2.9 Research and education
Elective areas of work
A.2.10 Building design

1. Planning project solutions. 2. Formalising construction projects. A.2.11 Expert analysis of building projects 1. Determining the complexity and volume of construction projects. 2. Oversight and evaluation of construction projects. 3. Documenting the results of the evaluation of construction projects. A.2.12 Construction management 1. Making preparations for construction. 2. Organising construction. 3. Arranging the handover of the construction site. A.2.13 Owner supervision 1. Verifying compliance of design project with requirements 2. Checking compliance with safety regulations. 3. Checking documentation. 4. Notifying clients. A.2.14 Building audits 1. Auditing buildings. 2. Compiling an audit report. A.2.15 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
Chartered Thermal Energy Engineer, Level 8 has completed doctoral studies or has previously obtained the qualification of Diploma Thermal Energy Engineer, Level 7. In both instances, professional work experience and in-service training are required.
A.7 Most common occupational titles
Thermal Technology Engineer, Production Engineer, Production Lead, Thermal Automatics Engineer, Energy Systems Specialist, Power Plant Operations Manager, Energetics Engineer, Energy Block Specialist, Head Engineer, Project Lead, Project Manager, Site Manager, Engineer of Cooling Devices, Consultant, Expert, Development Lead, Department Manager, Scientist, Chief Scientist, 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 Chartered Thermal Energy Engineer, Level 8. To specialise in heating devices and systems, district heating and district cooling systems, heat sources and heating centres, gas devices and appliances and industrial and commercial refrigeration devices and systems, at least one competence from B.2.8-B.2.10 must be certified.

B.2 Competences

MANDATORY COMPETENCES

B.2.1 Engineering work	**EstQF Level 8**
Performance indicators: 1. identifies and completes complex and unique engineering tasks innovatively and creatively, using appropriate contemporary knowledge of the natural sciences and engineering (mathematics, physics, engineering mechanics, material technology, programming, thermal dynamics, heat transfer, hydrogen gas mechanics, fuels and combustion, engineering graphics, strength of materials, etc.); 2. links engineering with social, economic, environmental and ethical aspects using knowledge of economics, social studies and humanities (business and economics, business processes, etc.); 3. utilises and develops solutions linked to fields related to thermal energetics (e.g. ICT, construction, electricity, automatics and mechanics); 4. assesses the applicability of technologies taking into consideration user needs, the market situation and restrictions; 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. compiles ICT tasks (e.g. programming and software development) and places orders with professionals to find solutions. 9. follows the occupational requirements of legal acts and standards, e.g. work organisation and occupational safety requirements. 10. 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); 11. supports the wider promotion of the work and occupation of engineering through their actions and protects the interests of the occupation; 12. maintains their qualifications, keeps up to date on technological developments and proposes innovations to improve energy efficiency; 13. mediates and provides technical information for everybody in a comprehensive manner and participates actively in discussions and meetings; 14. 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 8**
Performance indicators: 1. plans and initiates activities, collecting the information required for the high-quality performance of duties;	

2. guides, involves and encourages employees by applying the appropriate methods of management and remuneration; 3. assesses work performance, giving appropriate feedback in a timely manner; 4. determines the development needs of employees and creates development opportunities for them; 5. passes on professional skills and knowledge and coordinates the work of those supervised; 6. draws up plans for supervising employees, describing the required competences and setting goals for the process of supervision; 7. shapes appropriate professional attitudes through active inclusion; 8. helps employees make the most of their potential through both their personal goals and the business goals of the company.

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 Chartered Thermal Energy Engineer, Level 8.

Thermal energy economy	
B.2.3 Thermal energy economy	**EstQF Level 8**
Performance indicators: 1. plans heat supply on the basis of economic analysis, using statistical data to analyse the development of the energy sector; 2. chooses an appropriate energy source for heating systems and assesses the necessity of investment, taking into account the cost-benefits of investments; 3. assesses the cost-benefits of investments, energy conservation and energy conservation methods, taking into account energy policy trends in the European Union and trends in the Estonian energy sector. 4. performs energy and resource audits: assesses audited sites, compiles a report and makes proposals for improvement measures.	

Thermal equipment and systems	
B.2.4 Thermal equipment and systems	**EstQF Level 8**
Performance indicators: 1. develops unique and innovative technical solutions using 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.2.5 District heating and district cooling systems	**EstQF Level 8**
Performance indicators: 1. develops unique and innovative 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.2.6 Gas equipment and installations	**EstQF Level 8**
Performance indicators: 1. develops unique and innovative technical solutions using methods based on experience, skills and relevant, high-level knowledge: materials used in the construction of gas installations 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.2.7 Heat sources and heating centres	**EstQF Level 8**
Performance indicators: 1. develops unique and innovative technical solutions using methods based on experience, skills and relevant, high-level 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 (e.g. the indoor climate of a building, energy supply, automatics, constructions and water supply).	

Industrial and commercial cooling equipment and systems	
B.2.8 Industrial and commercial cooling equipment and systems	**EstQF Level 7**
Performance indicators: 1. develops unique and innovative technical solutions using methods based on experience, skills and relevant, high-level 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.).	

Research and education	
B.2.9 Research and education	**EstQF Level 8**
Performance indicators: 1. analyses and synthesises new and complex ideas related to the occupational qualification and devises practical solutions; 2. carries out research and development (applied research) to create new knowledge and skills and to help develop their company, cooperating with businesses, project teams, research institutions or universities;	

3. uses research results to develop new products, processes or services, or to improve existing products, processes or services; 4. uses research results on an ongoing basis to offer solutions to practical problems; 5. teaches in accordance with curricula or study programmes; 6. compiles study materials using appropriate methods.

OPTIONAL COMPETENCES

To specialise in heating devices and systems, district heating and district cooling systems, heat sources and heating centres, gas devices and appliances and industrial and commercial refrigeration devices and systems, at least one competence from B.2.8-B.2.10 must be certified.

B.2.10 Building design	**EstQF Level 8**
Performance indicators: 1. organises the development of technical solutions for the design task, using the best possible technology and following construction planning standards, norms and normative documents; 2. chooses and utilises appropriate expertise and software to fulfil the design task; 3. advises clients and makes sure they understand the solution; 4. develops the design process, including adopting new software; 5. organises the compilation and formalising of the project solution; 6. deals with necessary information materials (e.g. explanatory statements, charts, blueprints, graphic materials and other relevant documents) in accordance with the engineering content of the solution.	
B.2.11 Expert analysis of building projects	**EstQF Level 8**
Performance indicators: 1. assesses their own capabilities in regard to the complexity and volume of the expert analysis to be compiled and decides on the need to involve further experts; 2. checks whether the construction project is in accordance with valid requirements, data (customer needs, previous blueprints, etc.) and planning conditions; 3. checks whether the separate parts of construction projects are in accordance with the source data and concept and whether the concept is in accordance with best practice; 4. compiles an expert analysis report in which they outline the results of the analysis without contradictions and in a comprehensible manner.	
B.2.12 Construction management	**EstQF Level 8**
Performance indicators: 1. estimates the volume of construction work based on the project and requests a quote for the necessary materials, equipment and contractor work; 2. 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; 3. gathers the necessary resources for specialised work on the construction site; 4. 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; 5. commissions or compiles schematics of products, explanatory statements and other documents, making sure that they are in accordance with construction norms and quality standards; 6. organises documentation (e.g. completed work, measuring and testing acts, implementation schematics, equipment and material documentation and maintenance and user manuals) as required; 7. organises quality control to assess compliance with construction norms and quality requirements before the transfer of the construction site.	
B.2.13 Owner supervision	**EstQF Level 8**
Performance indicators: 1. assesses the compliance of the design documentation forming the basis for construction with applicable legislation;	

2. checks whether construction work is in accordance with the construction project for which the construction permit was issued; 3. verifies that environmental and occupational safety regulations and maintenance requirements are followed in areas related construction in their area of specialisation; 4. verifies the existence of construction documents drafted during construction activities and their proper and timely drafting, presentation and revision; 5. verifies the compliance of the documentation of the technical system or network being installed with requirements and on the basis of the documents submitted their compliance with requirements and accordance with the construction project; 6. notifies clients of any deficiencies identified in the course of owner supervision.

B.2.14 Building audits	**EstQF Level 8**
Performance indicators: 1. uses the client's terms of reference as the basis of their work or draws up terms of reference in cooperation with the client; 2. checks during audits whether the building is in accordance with documentation, the safety of the use of the building and the existence of the documentation necessary for its safe use, following building audit procedures. 3. assesses the building during the audit, as well as whether the building's documentation is correct, and ensures that the building corresponds to the requirements set out in legal acts; 4. compiles an audit report that outlines the results of the audit without contradictions and in a comprehensible manner; 5. provides a an overall assessment of the building.	

B.2.15 Organising equipment operations	**EstQF Level 8**
Performance indicators: 1. plans the maintenance and operations of technological systems and networks in accordance with the maintenance strategy of the company; 2. supervises the progress of technological processes (gas, district heating, refrigeration, etc.); 3. checks the accordance of technological system and network operations with the operations plan, assessing the risks associated with operations and compiling an action plan to minimise the risks; 4. identifies and analyses the root causes of equipment failures; 5. develops methods and guidelines for the elimination of potential deviations in the work of technological systems and networks; 6. develops a documentation system based on the maintenance strategy of the company; 7. organises and checks that documentation corresponds with requirements.	

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	07-30032023-2.10/7k
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.	7
8. Reference to International Standard Classification of Occupations (ISCO 08)	2151 Electrical Engineers
9. Reference to European Qualifications Framework (EQF)	8
C.2 Occupational title in foreign language	
English:	Chartered Thermal Energy Engineer, EstQF Level 8
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	