OCCUPATIONAL QUALIFICATION STANDARD

Diploma Thermal Energy Engineer, EstQF Level 7

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)
Diploma Thermal Energy Engineer, EstQF Level 7	7

Possible specialisation and titles on occupational certificate	
Specialisation	**Title on occupational qualification certificate**
Thermal technology equipment	Diploma Thermal Energy Engineer, EstQF Level 7 specialising in heat technology equipment
Energy conversion	Diploma Thermal Energy Engineer, EstQF Level 7 specialising in energy conversion
Thermal energy economy and fuels	Diploma Thermal Energy Engineer, EstQF Level 7 specialising in thermal energy economy and fuels

Part A
DESCRIPTION OF WORK

A.1 Description of work

Thermal energy engineers work in the fields of transforming heat into electricity, the use of energy of heat sources, fuel and the fuel economy and carry out the designing, building and maintenance of thermal energy equipment and thermal networks and systems, taking into account social, economic, environmental protection, occupational health and safety and ethical aspects.
Thermal energy engineers are prepared to work in a team with engineers and specialists from connected fields.
This occupational qualification standard contains a description and sets out of the professional requirements of Diploma Thermal Energy Engineer, Level 7.
Diploma Thermal Energy Engineer, Level 7
maintains and optimises existing technologies, applies new knowledge, technology, ideas and supports the transfer of technology.
Proposes solutions to problems and in the implementation of said solutions. The occupation involves managing resources and leading the work of others. They must take responsibility for both their own work and that of their subordinates.
Certified thermal energy engineers can also work as instructors or development specialists.

Other thermal energy engineering occupations:
Diploma Thermal Energy Engineer, Level 7 (primary occupation).
Chartered Thermal Energy Engineer, Level 8.
See the descriptions of the occupational qualification levels of thermal energy engineers in Annex 1.

A.2 Tasks

A.2.1. Application of engineering and thermal engineering knowledge.
A.2.2. Technical and business leadership.
A.2.3 Commitment to the occupation.
A.2.4 Work-related communication

Specialised areas of work
A.2.5 Heat technology equipment. A.2.6 Energy conversion. A.2.7 Thermal energy economy and fuels.
A.3 Work environment and specific nature of work
Thermal energy engineers work in offices and on site. When involved in dangerous stages of work, work safety and occupational safety requirements must be followed. Certain employers may request a certificate of competence compatible with the requirements of the workplace.
A.4 Tools
In addition to regular office technology (computers, communication devices, etc.) and software (word processing software, spreadsheets, Internet communication software, etc.), thermal energy engineers also use specialised calculation software and specialised tools and measuring equipment.
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
Diploma Thermal Energy Engineers have completed specialised education at an institution of higher education. They have periodically furthered their education and have independent, specialised work experience. The prerequisites for applying for the qualification and the requirements of further training can be found in Annexes 2 and 3. An occupational qualification certificate for certified thermal energy engineers is valid for five years.
A.7 Most common occupational titles
Thermal energy engineers work as mid-level or senior managers or specialists in positions such as Thermal Technology Engineer, Electric Energy Manufacturing Engineer, Thermal Automatics Engineer, Regime Dispatcher, Head Specialist of Energy Systems, Power Plant Manager, Energetics Engineer, Head Specialist of Power Nodes, Manager, Head Engineer, Engineer, Project Lead, Site Manager, Construction Manager, Consultant, Specialist, Development Lead, Department Head, Scientist and Chief Scientist.
A.8 Regulations governing profession
The occupational qualification standard of thermal energy engineers is required in order to work as a responsible specialist and in order to be added to the register of economic activity in certain fields. Relevant legal acts must be observed when planning, constructing or maintaining thermal energy equipment, networks and systems. When involved in dangerous stages of work, a certificate of competence compatible with the requirements of the workplace may be required.

Part B
COMPETENCY REQUIREMENTS

B.1 Structure of occupation
Competences B.2.1-B.2.4 and one competence from B.2.5-B.2.7 must be certified when applying for the qualification of Diploma Thermal Energy Engineer, Level 7.

B.2 Competences

MANDATORY COMPETENCES

B.2.1 Application of engineering and thermal engineering knowledge	EstQF Level 7
Performance indicators: 1. applies modern scientific, technical and technological principles;	

2. defines problems, identifies their sources and finds appropriate solutions; 3. develops solutions and assesses their effectiveness; 4. takes into account the user's needs, financial situation and limitations as well as expenses, safety, occupational safety, quality, environmental impact and other aspects; 5. uses solution methods from the fields of thermal energy technology and the thermal energy economy; 6. is experienced in the use of modelling, analysis and synthesis technologies and can choose the most suitable option.	
Knowledge: Knowledge gained by completing a Master's programme in Thermal Energetics: 1) basics of social sciences and humanities to ensure that engineering work is linked to social, economic, environmental and ethical aspects; 2) basics of mathematics and natural sciences, engineering specialising in thermal energetics, thermal dynamics, heat transfer, dynamics of hydrogen gas, fuels and combustion and graphics; 3) materials science (including the physical and chemical properties of materials), strength of materials; 4) basics of planning and building thermal technology equipment; 5) legislation, organisation of work and occupational safety pertaining to energetics.	
B.2.2 Technical and business leadership	**EstQF Level 7**
Performance indicators: 1. plans the efficient implementation of projects, taking into account risk factors; 2. manages project implementation and provides necessary resources and team motivation; 3. coordinates with customers, subcontractors, suppliers and other parties; 4. follows quality and environmental management systems; 5. plans and manages economic activities; 6. assesses the content and expedience of specialised procurements; 7. organises the supervision, construction and operation of thermal energy sites.	
Knowledge: 1) management methods and behavioural principles of organisations; 2) entrepreneurship and economic activity, principles of compiling business plans; 3) basics of teamwork, implementation of business ideas and establishment of companies; 4) methods of quality and environmental management; 5) concepts of supply chain realisation and management.	
B.2.3 Commitment to occupation	**EstQF Level 7**
Performance indicators: 1. assumes specialist responsibilities for their team; 2. is guided by the engineer's professional ethics and code of conduct (see Annex 4); 3. sets a good example to junior engineers; 4. makes proposals for the improvement of energy efficiency; 5. explains the nature of the engineering occupation and promotes studies of it; 6. is up to date on advances in their field; 7. maintains their qualifications through further training.	
Knowledge: 1) legislation pertaining to the occupation and updates to it; 2) institutions and networks associated with the occupation; 3) economic and educational trends associated with the occupation.	
B.2.4 Work-related communication	**EstQF Level 7**
Performance indicators: 1. uses spoken and written Estonian in their work and expresses themselves clearly; 2. gives presentations, compiles documents, letters and reports, etc.; 3. speaks at least one foreign language at the B2 level (see Annex 5); 4. participates actively in discussions and meetings;	

5. creates a positive communication environment.
Knowledge: 1) basics of adult education and the psychology of communication; 2) principles of public speaking.

COMPETENTCES RELATED TO SPECIALISATION

One competence from B.2.5-B.2.7 must be certified when applying for the qualification of Diploma Thermal Energy Engineer, Level 7.

Thermal technology equipment	
B.2.5 Thermal technology equipment	**EstQF Level 7**
Performance indicators: 1. organises the use of appropriate thermal technology equipment; 2. implements thermal processing technologies and processes developed for new materials; 3. participates in analysing thermal projects; 4. participates in compliance studies of pressure equipment; 5. analyses heat supply construction projects, carrying out the thermal technical part and supervising the installation of equipment on behalf of the client; 6. manages the construction of thermal equipment and heating systems in buildings; 7. organises the post-construction operation of energy sites; responds in the best way possible in emergency situations; 8. monitors the technical inspection dates of equipment and proposes that inspections be carried out; 9. compiles operation instructions for working with pressure equipment; 10. ensures the smooth operation of sites by having equipment in optimal, environmentally friendly operating modes.	
Knowledge: 1) materials, equipment and technological processes used in thermal energetics; 2) theoretic background of processes taking place in materials; 3) heat and mass distribution in homogeneous and porous bodies and equipment; 4) electro-technology and basics of electronics; 5) processes of synergy and thermal synergism.	

Energy conversion	
B.2.6 Energy conversion	**EstQF Level 7**
Performance indicators: 1. participates in choosing suitable energy conversion equipment for specific applications; 2. analyses the uses of different technologies; 3. participates in studies of the residue resources of high-capacity energy conversion equipment; 4. organises the post-construction operation of energy sites; 5. makes proposals for the emergency technical inspection of equipment; 6. ensures the smooth operation of sites by having equipment in optimal, environmentally friendly operating modes.	
Knowledge: 1) thermodynamic processes in thermal energy equipment and their analysis; 2) heat distribution and gas dynamic processes during energy conversion; 3) composition of fuels and combustion theory; 4) energy conversion technologies; 5) operation of energy systems; 6) requirements of boiler water and preparation of water.	

Thermal energy economy and fuels

B.2.7 Thermal energy economy and fuels	EstQF Level 7
Performance indicators: 1. participates in compiling an energy economy development plan for a company or region; 2. analyses the energy needs of thermal consumers; 3. assesses schematics of heat distribution and forwarding and makes proposals for their optimisation; 4. participates in analysing the expedience of heat transformation (cooling equipment and/or heat pumps); 5. finds ways to conserve energy during technological processes and makes proposals to implement them; 6. chooses a fuel that meets consumer requirements and is economically justified; 7. forecasts fuel resources currently in use and fuel resources that will be in use in the future; 8. assesses the possibility of implementing fuel and energy conservation measures.	
Knowledge: 1) environmental impact of the thermal economy; 2) theoretical basics of the thermal economy (the micro- and macro-economy) and their implementation; 3) analysis of the efficiency and risks of the thermal economy; 4) industrial piping and the principles of its calculation; 5) requirements of heat conveyors and preparation of water; 6) regional, national and global fuel and energy policies; 7) fuel storage and stability; 8) properties of fossil and bio-fuels, their composition, uses and combustion theory.	

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	07-24092018-2.1/5k
2. Occupational qualification standard compiled by:	Aadu Paist, Tallinna Tehnikaülikool Uudo-Rein Lehtse, ESTIS Aleksander Iivanainen, Tehnokontrollikeskus OÜ Mati Tatar, Adven AS Arvi Poobus, ESTIS Kuuno Külasalu, TS Energia OÜ
3. Occupational qualification standard approved by:	Energy, Mining and Chemical Industry
4. No. of decision of Sectoral Council	11
5. Date of decision of Sectoral Council	24.09.2018
6. Occupational qualification standard valid until	24.04.2019
7. Occupational qualification standard version no.	5
8. Reference to International Standard Classification of Occupations (ISCO 08)	2151 Electrical Engineers
9. Reference to European Qualifications Framework (EQF)	7
C.2 Occupational title in foreign language	
English:	Diploma Thermal Energy Engineer, EstQF Level 7
C.3 Annexes	
Lisa 1 Occupational levels of electrical engineers	
Lisa 2 Prerequisites for engineer's occupational qualification	
Lisa 3 Accounting of continuing education of engineers	

Lisa 4 Engineer's Professional Ethics and Code Of Conduct
Lisa 5 Language skills level descriptions