

# OCCUPATIONAL QUALIFICATION STANDARD

## Chartered Engineer in Heating, Ventilation and Air Conditioning (HVAC), 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 Engineer in Heating, Ventilation and Air Conditioning (HVAC), EstQF Level 8	8

### Part A DESCRIPTION OF WORK

#### A.1 Description of work

An engineer in heating, ventilation and air conditioning (hereinafter referred to as an HVAC engineer) is a specialist, involved in the designing, setting up, expansion and reconstruction of buildings' heating, ventilation, humidification, drying and air conditioning systems and related installations (hereinafter referred to as indoor climate control systems) as well as local heat production and district heating and air conditioning systems within a property, and also in the demolition of systems (within the meaning of the Building Code and other relevant norms).

The main task of an HVAC engineer is developing engineering and technological solutions and implementing project solutions for indoor climate control with regard to social, economic and ethical aspects, environmental protection and occupational health and safety. An HVAC engineer cooperates with specialists from related fields.

The following occupational qualification standards have been developed in the profession of HVAC engineer:

- Engineer in Heating, Ventilation and Air Conditioning (HVAC), Level 6
- Certified Engineer in Heating, Ventilation and Air Conditioning (HVAC), Level 7
- Chartered Engineer in Heating, Ventilation and Air Conditioning (HVAC), Level 8

When applying for the qualification of Chartered Engineer in Heating, Ventilation and Air Conditioning, Level 8 at least one of the following fields must be chosen:

- a) compiling an indoor climate control system project
- b) managing construction operations
- c) managing construction
- d) performing owner's supervision
- e) providing expert assessment of an indoor climate control system project
- f) performing audits of an internal climate control system
- g) managing design work<sup>1</sup>
- h) training engineers and development work

Chartered Engineer in Heating, Ventilation and Air Conditioning, EstQF Level 8 is a specialist who is responsible for the results of both their own work and that of their team.

The occupational qualification of Chartered Engineer in Heating, Ventilation and Air Conditioning, Level 8 entitles the bearer, on a statutory basis, to act as a competent person independently and at their own risk within the limits described as follows:

#### I COMPILING AN INDOOR CLIMATE CONTROL SYSTEM PROJECT

No technical limitations

#### II CONSTRUCTING AND MANAGING CONSTRUCTION OF INDOOR CLIMATE CONTROL SYSTEMS

No technical limitations

### III OWNER'S SUPERVISION

No technical limitations

### IV PROVIDING EXPERT ASSESSMENT OF AN INDOOR CLIMATE CONTROL SYSTEM PROJECT

No technical limitations

### V PERFORMING AUDITS OF AN INDOOR CLIMATE CONTROL SYSTEM

No technical limitations

### VI MANAGING DESIGN WORK<sup>1</sup>

No technical limitations

<sup>1</sup> Design management refers not to the management of a narrow speciality but to project management for an entire construction design project

#### A.2 Tasks

##### A.2.1 Mandatory competences of HVAC engineer

1. Following the requirements of professional ethics
2. Professional self-improvement
3. Participating in teamwork and managing a team
4. Applying the principles of environmental protection and energy efficiency
5. Applying specialised knowledge to work
6. Digital competence and language skills

#### Elective areas of work

##### A.2.2 Compiling an indoor climate control system project

1. Preparing the project within the limits of competence provided by the occupational qualification standard
2. Collecting and analysing source data
3. Designing technical solutions
4. Forwarding source data to other parties involved in the project
5. Compiling the explanatory letter
6. Compiling and formulating the indoor climate control system project
7. Issuing energy performance certificates under simplified procedure
8. Cooperating with the design team
9. Performing designer's supervision
10. Preparing additional documents

##### A.2.3 Managing construction operations

1. Compiling tenders
2. Planning the construction of an indoor climate control system
3. Planning construction resources
4. Organising subcontractor procurements and entering into contracts
5. Procuring construction supplies
6. Organising construction operations during construction of an indoor climate control system
7. Organising quality control and surveying of an indoor climate control system
8. Preparing construction site transfer documentation
9. Arranging the transfer of the construction site

##### A.2.4 Managing construction

1. Managing construction within the limits of competence provided by the occupational qualification level
2. Conducting needs assessment surveys
3. Preparing procurements and compiling procurement documentation
4. Planning the life cycle of technical systems
5. Performing construction cost calculations
6. Preparing design work and organising work
7. Selecting designers and preparing contracts

8. Preparing for construction work
9. Tender documentation preparation
10. Selecting subcontractors
11. Coordinating the construction process as the client's representative
12. Transferring the construction site and taking it into use
13. Overseeing warranty-period procedures

#### A.2.5 Performing owner's supervision

1. Performing owner's supervision within the limits of competence provided by the occupational qualification level
2. Developing a supervision programme
3. Verifying the compliance of the design project with requirements
4. Verifying the compliance of construction work with the contract
5. Performing and assessing quality control
6. Verifying compliance with safety requirements
7. Verifying required documentation
8. Accepting the building
9. Distributing information
10. Making proposals

#### A.2.6 Providing expert assessment of an indoor climate control system project

1. Conducting expert analysis of an indoor climate control system within the limits of competence provided by the occupational qualification standard
2. Familiarising themselves with the project, collecting and analysing source data
3. Determining the volumetric accuracy of the design project
4. Determining the compliance of project solutions with their purpose and requirements
5. Compiling an expert analysis report

#### A.2.7 Performing audits of an internal climate control system

1. Conducting internal climate control system audits within the limits of competence provided by the occupational qualification level
2. Familiarising themselves with the system, collecting and analysing source data
3. Organising additional studies and tests
4. Performing control calculations and additional measurements
5. Compiling an audit report

#### A.2.8 Managing design

1. Managing design within the limits of competence provided by the occupational qualification standard
2. Preparing the design contract
3. Assembling the design team
4. Organising the exchange of information
5. Coordinating design and managing quality
6. Arranging designer's supervision

#### A.2.9 Training engineers and development work

1. Conducting seminars and educational work
2. Compiling study and instructional materials
3. Conducting scientific or applied research

### A.3 Work environment and specific nature of work

Civil engineers work both indoors and outdoors. The workload may be distributed unevenly.

### A.4 Tools

In addition to conventional office equipment and software, special computing programmes and equipment (measuring and marking tools etc.) are used.

<b>A.5 Personal qualities required for work: abilities and characteristics</b>
Engineering requires analytical abilities, accuracy, spatial imagination, creativity, independence, decision-making, adaptability and communication, leadership and cooperation skills.
<b>A.6 Professional preparation</b>
A Master's degree or equivalent five-year integrated higher education diploma in the field of heating, ventilation and air conditioning or another technical specialty, which includes the specified volume of specialist subjects. Additional practical work experience and training in the volume needed to apply for the qualification. All requirements are specified in more detail in documentation on the procedure for granting the occupational qualification.
<b>A.7 Most common occupational titles</b>
designer, person performing owner's supervision, construction manager, site manager, consultant
<b>A.8 Regulations governing profession</b>
Building Code and its relevant implementing acts. Other professional standards, guidelines and norms.

## Part B COMPETENCY REQUIREMENTS

<b>B.1 Structure of occupation</b>
In obtain the qualification of Chartered Engineer in Heating, Ventilation and Air Conditioning, EstQF Level 8, mandatory competence B.2.1 and at least one optional competence from B.2.2, B.2.3, B.2.4, B.2.5, B.2.6, B.2.7, B.2.8 or B.2.9 must be certified.

<b>B.2 Competences</b>
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### MANDATORY COMPETENCES

<b>B.2.1 Mandatory competences of HVAC engineer</b>	<b>EstQF Level 7</b>
<p>1. Is guided in their work and occupational activities by generally accepted personal and occupational ethics (see Annex 1 – Engineer's professional ethics). Acts in accordance with agreements and takes responsibility for their decisions and actions. Respects and takes into account the best practice and standards underlying the behaviour of specialists in other occupational sectors.</p> <p>2. Keeps up to date on technological changes and developments in the sector and contributes to the development of engineering culture directed at innovation and creativity, where possible. Maintains and develops occupational competence through constant self-improvement. Acquires new techniques and methodologies.</p> <p>3. Actively contributes to teamwork in a result-oriented manner with the goal of achieving the best possible result. Is helpful and open, sharing knowledge and experience with their colleagues. Perceives their role in a team and is able to work in a multidisciplinary team. Leads and organises the work of working groups: delegates tasks and responsibility, verifies implementation of agreements, motivates and advises colleagues and solves problems and conflicts that may arise in the work process.</p> <p>4. Is guided by the principles of environmental preservation and sustainable development, keeps up to date on and implements the principles of energy efficiency in their activities.</p> <p>5. Implements knowledge of engineering on the level necessary to accomplish duties that are within the limits of their competence and to find functioning and optimal solutions to any problems that may occur. Is familiar to the necessary extent with engineering disciplines, including thermo-, aero- and hydrodynamics, the basics of air-processing, the nature of indoor climate and the principles of controlling it, the basics of construction physics, calculations of air exchange, heat loss and cooling loads and their application principles, the theoretical basics and principles of heating ventilation and air-conditioning systems and the theoretical basics and principles of heat supply systems.</p>	

6. Uses a computer for information processing, communication, safety, content creation and problem-solving at the Independent user level (see Annex 2 – Scale of self-assessment in digital competence). Uses the specialty-specific software solutions, programmes and information technology tools necessary for work.  
Uses Estonian while working and compiling documents at least at the B2 level of language proficiency (see Annex 3) and at least one foreign language at the B1 level. Uses correct occupational terminology.

## OPTIONAL COMPETENCES

In obtain the qualification of Chartered Engineer in Heating, Ventilation and Air Conditioning, EstQF Level 8 at least one optional competence from B.2.2, B.2.3, B.2.4, B.2.5, B.2.6, B.2.7, B.2.8 or B.2.9 must be certified.

<b>B.2.2 Compiling an indoor climate control system project</b>	<b>EstQF Level 8</b>
<p>1. Compiles indoor climate control system projects within the limits of competence of Chartered Engineer in Heating, Ventilation and Air Conditioning, Level 8 as listed in the A.1 description of work in the occupational qualification standard, i.e. without technical limitations.</p> <p>2. Collects and examines source data (indoor climate class, energy efficiency class, technology, architecture, purpose of use of building, quality class, lifespan, environmental impact, etc.) and determines applicable legal acts, standards, rules and instruction materials.</p> <p>3. Develops technical solutions based on source data. Compares them, selects the most suitable option and submits it to the client for approval. Where necessary, obtains additional source data or uses simulations and modelling during design.</p> <p>4. Calculates the energy consumption required to control the indoor climate and the dimensions and location of the openings required for vertical and horizontal connections and defines the space requirements necessary for the installation of indoor climate systems. Forwards information to fellow designers.</p> <p>5. Compiles an explanatory note according to the stage of design.</p> <p>6. Prepares and finalises the indoor climate control project (textual and graphic part) according to the design stage. Where necessary, is able to prepare and use building information modelling (BIM).</p> <p>7. Applies the principles of designing energy-efficient buildings throughout the design process. Proves that a building being designed or significantly reconstructed meets the requirements of energy efficiency using a simplified method and awards the corresponding energy label.</p> <p>8. Cooperates with the parties involved in the project, participates in design and expert assessment meetings, etc. Analyses the information obtained and evaluates its impact on their part of the project.</p> <p>9. Performs supervision during construction activities and provides consultation on project-related issues. Participates in the handover of the completed facility to the client, where necessary.</p> <p>10. Prepares a demolition project, implementation documentation, operating and maintenance instructions, draws up product drawings, etc. as agreed.</p>	
<b>B.2.3 Managing construction operations</b>	<b>EstQF Level 8</b>
<p>1. Examines design and procurement documentation and other relevant materials. Evaluates the volume of the tender based on the construction project and requests a quote for the necessary materials, equipment and subcontracting work. Determines potential administrative costs, profits and the level of risk and provides a tender. Completes and formulates the final tender.</p> <p>2. Enters into the construction contract. Compiles a plan for work (incl. work safety measures and a work schedule) and a goal budget. Commissions the work project if no such project has been prepared.</p> <p>3. Supplies the construction site with the necessary resources (mechanisms, materials, workforce, energy, etc.). Determines the tasks and extent of responsibility of each member of the site management team.</p> <p>4. Arranges for the procurement of the necessary building materials, equipment, means of transport, construction mechanisms and contractors and enters into contracts.</p> <p>5. Orders or creates product sketches, ensuring their compliance with construction norms and quality requirements. Procures and/or orders the necessary construction products, organises their reception and storage.</p> <p>6. Organises and coordinates construction work in accordance with the goal budget of the project. Ensures compliance with occupational health and safety requirements, environmental safety regulations and the general upkeep of the construction site. Constantly ensures the proper documentation of construction work for the indoor climate control system (incl. acts of work to be covered), the compliance of construction work with the contract and</p>	

design and the fulfilment of construction norms and quality requirements. Conducts construction consultations, if necessary.

7. Organises quality control to assess compliance with construction norms and quality requirements and the performance of the necessary surveying work before the transfer of the construction site.

8. Compiles or orders the documentation necessary for the transfer of the construction site, incl. performance sketches, documentation for equipment and materials and instructions for maintenance and use.

9. Arranges for the transfer of the construction site.

#### **B.2.4 Managing construction**

**EstQF Level 8**

1. Manages construction operations within the limits of competence of Chartered Engineer in Heating, Ventilation and Air Conditioning, Level 8 as listed in the A.1 description of work in the occupational qualification standard, i.e. without technical limitations.

2. Carries out a needs assessment survey to clarify the source data of the project (intended purpose of use, spatial programme, temporal and volumetric purpose of facility, requirements of project, etc.). Compiles the technical part of the project implementation decision based on the needs assessment survey.

3. Examines the initial conditions (construction surveys, technological solution, spatial programme, functional and operational quality requirements, energy balance, etc.) and prepares the procurement or compiles procurement documentation.

4. Compiles a schedule for construction work based on their technological processes.

5. Prepares a financial plan for construction work based on the estimated cost of construction, general and personalised cost calculations and time and payment schedules and taking into account the need for self-financing and the conditions presented in the procurement documentation.

6. Formulates the principles of carrying out the construction project and plans the organisational scheme of the project. Plans the necessary permit activities, prepares a schedule for carrying out the project and the division of project contractors. Compiles a design programme.

7. Selects designers and prepares design contracts.

8. Determines the principles of organisation of construction work incl. labour methods and distribution. Compiles the organisational scheme of construction work.

9. Formulates the time- and cost-related goals of construction work and prepares tender documentation based on these goals.

10. Selects the necessary contractors and enters into contracts with them if corresponding agreements have been made.

11. Coordinates construction work as a representative of the customer: communicates with contractors, the design team and the customer, holds meetings and discussions, exchanges information between the parties involved, processes additional work due to changes made to the project during construction work and monitors the compliance of the construction work with the design.

12. Carries out inspections. Plans and manages acceptance procedures, ensures the availability of necessary operating and maintenance instructions and other documentation and their handover to the client or user.

13. Conducts warranty-period procedures for technical systems.

#### **B.2.5 Performing owner's supervision**

**EstQF Level 8**

1. Performs owner's supervision within the limits of competence of Chartered Engineer in Heating, Ventilation and Air Conditioning, Level 8 as listed in the A.1 description of work in the occupational qualification standard, i.e. without technical limitations.

2. Compiles a programme of supervision procedures, bearing in mind relevant legislation.

3. Assesses the compliance of the design documentation forming the basis for construction with applicable legislation and the construction design on the basis of which a construction permit was issued.

4. Monitors the compliance of construction activities with the conditions and quality agreed upon by the construction company and the owner of the building.

5. Monitors the compliance of the technical system or parts thereof under construction with the construction project and the compliance of work to be covered and as-built drawings with requirements, reality and the construction project.

6. Monitors compliance with environmental and occupational safety and maintenance requirements in the area involving construction.

7. Verifies the existence of construction documents drafted during construction activities and their proper and timely drafting, presentation and revision. Monitors the validity of the documentation of the construction products, materials



<p>and equipment permanently installed in the facility and, on the basis of the submitted documents, the validity and compliance with the construction project of the construction product, materials and equipment.</p> <p>8. Evaluates the stage of completion of the technical system and participates in its testing and delivery during the acceptance of the building.</p> <p>9. Notifies the relevant persons or agencies of any deficiencies identified in the course of owner's supervision.</p> <p>10. Proposes additional quality control, measurements, tests and expert analyses of construction work, if necessary.</p>	
<b>B.2.6 Providing expert assessment of an indoor climate control system project</b>	<b>EstQF Level 8</b>
<p>1. Provides expert assessment of indoor climate control system projects within the limits of competence of Chartered Engineer in Heating, Ventilation and Air Conditioning, Level 8 as listed in the A.1 description of work in the occupational qualification standard, i.e. without technical limitations.</p> <p>2. Examines the project, determines applicable legislation, standards, rules and instruction materials. Verifies the compliance of the project with the primary task and the associated normative and instruction materials. Verifies the compliance of the people compiling the project with competence requirements.</p> <p>3. Determines and analyses factors that have an impact on the indoor climate control system (e.g. constant and variable load, service life and environmental impact).</p> <p>4. Performs the necessary control calculations and/or verifies the calculations and calculation schemes of the designer, assessing the validity of the technical solutions implemented. Assesses whether the stability, safety and economy of the system or its parts presented in the project documentation serve the intended purpose.</p> <p>5. Prepares an expert assessment report on the indoor climate control system project in accordance with legal requirements, participates in expert assessment meetings. Assesses the corrected design project, where necessary.</p>	
<b>B.2.7 Performing audits of an internal climate control system</b>	<b>EstQF Level 8</b>
<p>1. Performs audits of indoor climate control systems within the limits of competence of Chartered Engineer in Heating, Ventilation and Air Conditioning, Level 8 as listed in the A.1 description of work in the occupational qualification standard, i.e. without technical limitations.</p> <p>2. Performs initial visual inspection of the system and collects the information needed for the auditing of the structure or part(s) thereof (construction project, measurements, surveys, photographs, etc.).</p> <p>3. Compiles a programme for and estimates the cost of further research and audits based on the goal and carries out or organises the carrying out of the necessary research and tests.</p> <p>4. Examines existing and procured documents and additional research reports, performs the necessary control calculations and additional measurements.</p> <p>5. Compiles an audit report in accordance with the goal of the audit and relevant legislation, wherein they assess whether the system is in accordance with its documentation and technically sound; for verification of use (whether using the system for its intended purpose and in the intended way is safe); and for documentation verification (whether documentation about the system and of its safe use and upkeep exists and meets the requirements).</p>	
<b>B.2.8 Managing design</b>	<b>EstQF Level 8</b>
<p>1. Performs activities related to design management according to the competence limits of Certified Engineer in Heating, Ventilation and Air Conditioning, Level 8 listed in the description of occupational qualification standard A.1, i.e. without technical limitations.</p> <p>2. Collects and examines source data, determines applicable regulations, standards, rules and instruction materials. Estimates the amount and limits of work, prepares and clarifies the work schedule, where necessary, and prepares the design contract(s).</p> <p>3. Assembles a design team, involving relevant contractors and specialists.</p> <p>4. Organises and carries out design meetings, documents decisions and develops and establishes principles of information exchange.</p> <p>5. Leads and monitors the design process and solutions and verifies the integrity of the design documentation and the compatibility of its parts. Controls data exchange and collaboration between the general construction and other specialties involved in the project. Documents changes and additional work that occur in the course of design. Verifies the compliance of solutions with the primary task and contract and the compatibility between individual parts of the design documentation. Formulates the design documentation, applies for approval from the relevant authorities and arranges the transfer of the project to the customer.</p> <p>6. Organises designer supervision during the construction process.</p>	
<b>B.2.9 Training engineers and development work</b>	<b>EstQF Level 8</b>
<p>1. Compiles study programmes and organises teaching. Gives lectures, leads theoretical discussions and gives practical workshops. Supervises study projects and laboratory work.</p>	

2. Compiles study and instructional materials for the field.
3. Plans research activities and conducts or supervises research. Prepares and submits study reports and scientific articles, presenting the results of studies, where necessary.

## Part C

### GENERAL INFORMATION AND ANNEXES

<b>C.1 Information concerning compilation and certification of occupational qualification standard and reference to classification of occupations</b>	
1. ID of occupational qualification standard in register of occupational qualifications	22-04102018-3.6/11k
2. Occupational qualification standard compiled by:	Heiki Meos, EstKonsult OÜ Tiit Kerem, Telora-E AS Taavi Ränk, BI Inseneribüroo OÜ Teet Tark, Hevac OÜ Ants Raja, Ants Raja Ehituskorraldus FIE Andres Piirsalu, OÜ Entec Eesti Andres Piir, Projektbüroo KODA OÜ Peeter Parre, IB Aksiaal OÜ
3. Occupational qualification standard approved by:	Architecture, Geomatics, Construction and Real Estate
4. No. of decision of Sectoral Council	16
5. Date of decision of Sectoral Council	04.10.2018
6. Occupational qualification standard valid until	13.11.2023
7. Occupational qualification standard version no.	11
8. Reference to International Standard Classification of Occupations (ISCO 08)	2142 Civil Engineers
9. Reference to European Qualifications Framework (EQF)	8
<b>C.2 Occupational title in foreign language</b>	
English:	Chartered Engineer in Heating, Ventilation and Air Conditioning (HVAC), EstQF Level 8
<b>C.3 Annexes</b>	
Lisa 1 <a href="#">Engineer's Professional Ethics and Code Of Conduct</a>	
Lisa 2 <a href="#">Scale of self-assessment in digital competence</a>	
Lisa 3 <a href="#">Language skills level descriptions</a>	