Guidance on using of the matrix

The matrix helps to describe new and on-going initial and further vocational training courses in the field of Building System Engineering (BSE) in a competence-based way providing a European focus. This systemic approach creates new quality requirements for the workers in the field of BSE.

The field of activity encompasses competences of the vocational fields of supply engineering, electrical engineering, information technology and structural engineering in initial vocational training as well as in further vocational training. Therefore, the units of the matrix are formulated in a very general manner and have to be referred to the vocational fields mentioned above. The definitions mentioned below (especially the definitions and examples of TGA) are used to identify the competences of the different vocational fields. To describe competences in the context of mobilities it makes sense to emphasize the connection to on-going initial vocational training courses.

The whole matrix refers to EQF-levels 3-6. The aspiration level of the matrix steadily increases vertically and horizontally. Therewith the degree of independence and responsibility increases, too.

Glossary (Definition of technical terms)

Building Systems	Building Systems encompass all technical components and processes of Building Systems during the stages of planning, constructing, operating and dismantling a building.
Processes of Building Systems	In accordance with Facility Management processes of Building Systems encompass all technical and service-related processes during the stages of planning, constructing, operating and dismantling a building (e.g. switch-on time of lighting, ventilating and air-conditioning systems, cycles of building cleaning, attendance time, energy flows, operating hours of monitoring systems).
Components of Building systems	Components of Building Systems encompass the particular technically relevant elements (building envelope and Technical Building Equipment [TGA]) during the stages of planning, constructing, operating and dismantling a building.
Building Envelope	The Building Envelope encompasses: - transparent components (glass facades, windows, doors, skylights...), - optically-opaque (light-tide) components (stonework, roof, insulation, doors...), - transitions between transparent and optically-opaque components (heat bridges: stonework<->windows)
Technical Building Equipment	TBE encompasses: - Installations and systems of heating technology including regenerative energies (e.g. condensing boiler, district heating, solarthermics, heat pumps, fuel cells) - Installations and systems of air-conditioning and ventilation technology including energy recuperation and regenerative energies (e.g. ventilating and air-conditioning systems, heat exchangers, heat recovery devices) - Installations and systems of sanitary technology including regenerative energies (e.g. drinking water storage tanks, solarthermics, heat pumps, drainage installations) - Installations and systems of electrical energy supply including energy recuperation and regenerative energies (e.g. PV systems, fuel cells, combined heat and power, power distribution systems, uninterruptible power supply, switchgears, measuring devices, compensation systems) - Installations and systems of lighting technology and emergency lighting (e.g. general lamps/illuminants, escape signs, ballasts, light control systems, dimmers, motion detectors, daylight sensors, lighting management systems [DALI]) - Installations and systems of building automation (e.g. sensors [feeler, motion detectors], actuators (shutters, valves), bus systems, access control systems, interior lighting, controlling heat and air-conditioning systems) - Installations and systems of information and communication technology (PBX-systems, intercom systems, Ethernet-based network technology, installations and systems of safety systems and emergency energy supply). - Installations and systems of safety technology and emergency power supply (alarm systems, access control systems, fire extinguishing systems, UPS-systems)

Overlaying for plant mechanic of sanitary, heating and air conditioning systems (m/f), Finland and Spain

The IT-BSE-matrix is mapped for:

- Installations and systems of heating technology including regenerative energies (e.g. condensing boiler, district heating, solarthermics, heat pumps, fuel cells)
- Installations and systems of air-conditioning and ventilation technology including energy recuperation and regenerative energies (e.g. ventilating and air-conditioning systems, heat exchangers, heat recovery devices)
- Installations and systems of sanitary technology including regenerative energies (e.g. drinking water storage tanks, solarthermics, heat pumps, drainage installations)

Overlapping
Spain Finland

Spain second year of training

Finland second year of training
Finland third year of training

	Competence areas (core working process)	Steps of competence development:				
1	**Assembling and dismantling of building systems or components**	He/She is able to assemble and dismantle particular components of building systems according to given assembly/disassembly schedules regarding established norms and standards and to carry out the associated wiring. He/She is able to properly dispose particular components of building systems in compliance with legal requirements.		He/She is able to plan and document the assembling and dismantling of components of building systems in consultation with authorities, architects and system builders according to customer specifications and in compliance with legal obligations.		He/She is able to customize concepts of assembling, dismantling and disposal of building systems or their components and to refine them in cooperation with customers and manufacturers of building system technology. He/She is able to apply the methods of project management.
2	**Service and maintenance of building systems or their components (in compliance with EN 13306)**	He/She is able to operate components of building systems according to instructions and to make settings and to check their proper function.	He/She is able to carry out inspections as well as maintenance and repair work on building systems by exchanging components and using test routines. He is able to document these work steps.	He/She is able to independently carry out complex and preventive inspections as well as maintenance and repair work on building systems, possibly using remote maintenance systems. He/She is able to prepare a documentation of complex inspections, maintenance and repair work on building systems.	He/She is able to prepare a service and maintenance concept for the improvement of processes of building systems. He/She is able to plan, control, supervise and document the necessary service and maintenance measures with the help of methods of project management. He/She is able to prepare deployment and work plans and to define the personnel and material resources of the team. He/She is able to interpret and apply legal requirements. and norms.	He/She is able to carry out service and maintenance management with the help of CAFM applications.
3	**Taking building systems or their components into operation**	He/She is able to take components of building systems into operation according to instructions and customer specification. He/She is able to install and configure relevant software systems.		He/She is able to take building systems into operation and configure them according to customer specification. He is able to prepare documentations and test protocols according to established norms and guidelines. He/She is able to identify target conflicts (e.g. fire prevention/user behaviour) and provide proposals for solution.	He/She is able to check, evaluate and document the start-up operations of complex building systems as regards compliance with norms and standards of established quality and safety requirements. He/She is able to program and parameterize central building control according to customer specification.	He/She is able to hand over the technical building system to the operator. He/She is able to brief the operator about the usage of the technical building system and about legal responsibilities. He/She is able to document the handing over to the operator according to established laws, norms, guidelines and recommendations.

	Competence areas (core working process)	Steps of competence development:					
4	**Monitoring and optimizing processes of building systems with the help of automated installations and components**	He/She is able to handle systems of building automation according to instructions and to check the system status to ensure safe operating conditions.	He/She is able to collect, document and analyse data of building systems during malfunctions.	He/She is able to develop solution strategies to handle malfunctions of the building systems with the help of central building control and the documentation of the building. He/She is able to initiate the implementation of solution strategies to handle malfunctions of the building systems in the work team.	He/She is able to customise automated technical building systems in case of changing conditions of use by remote servicing and on-site configurations. He/She is able to document these changes and configurations.	He/She is able to optimize processes of building systems with the help of data of building automation regarding costs, energy, staff and technology. He/She is able to implement and document the optimisation measures. He/She is able to prepare deployment and work plans for the work team and define personnel requirements.	
5	**Creating concepts for (processes of) building systems or their component-/sub-processes**	He/She is able to identify, structure and specify requirements for building service engineering in teamwork according to customer's needs and to define them in a user profile.	He/She is able to find out about legal requirements and take them into consideration (e.g. safety technology, energy efficiency, accessibility, room acoustics) for the conception of building service engineering.	He/She is able to scale and select components of building systems according to legal obligations and customer requirements, possibly with the help of planning software. He/She is able to identify and make necessary modifications of the total system. He/She is able to document scale and selection of components of building systems.	He/She is able to plan and realize processes of building systems and their components in terms of facility management. He/She is able to edit the technical characteristics, to calculate costs of operation and management of buildings, to specify service tasks and to compile corresponding statistics. He is able to use appropriate control, planning and management software.	He/She is able to organise the documentation of all relevant data for facility operations and to edit management data of buildings.	He/She is able to prepare tender documents on the basis of legal requirements and user profiles. He/She is able to make deployment and work plans and to define personnel resources. He/She is able to compile optimising potential for existing and new systems and to deploy personnel for its realization. He/She is able to document the overall process and to advise customers regarding ways to enhance energy efficiency.
6	**Identification, Realization and checking of legal requirements for the operation of building systems (operator responsibility)**	He/She is able to identify the legal requirements for operating a building system on the basis of guidelines and regulations.	He/She is able to implement and document legal requirements for operating building systems and their components.	He/She is able to independently prepare documents to check legal requirements.	He/She is able draw-up a risk assessment (risk analysis), if necessary in teamwork. He/She is able to consider the results during the organisation of the operation of building systems and during personnel deployment scheduling.	He/She is able to prepare /optimise a guideline (possibly in teamwork) for the realisation of legal requirements on the basis of work experience and to draw conclusions for future planning processes.	
7	**Monitoring costs and controlling**	He/She can calculate basic data to monitor costs (for the planning, construction, operation and dismantling) of building systems and their components considering specifications or requirements.	He/She is able to analyse basic data to monitor costs and calculate key figures. He/She is able to analyse key figures to monitor costs (for the planning, construction, operation and dismantling) of building systems and their components.	He/She is able to use key figures (for the planning, construction, operation and dismantling) of building systems and their components within a benchmarking system to identify optimising potential.	He/She is able to realise calculated optimising potential and to prepare an appropriate work and personal planning. He/She is able to document the overall process (planning costs, constructions costs, personnel costs, operating costs, demolishing costs).		

	Competence areas (core working process)	Steps of competence development:				
8	**Marketing**	He/She is able to identify customer needs and observe market trends.	He/She is able to conduct subject-oriented conversations on the basis of user profiles or market trends focussed on customer's aims.	He/She is able to initiate/recommend measures to improve customer satisfaction.	He/She is able to analyse and anticipate market trends and communicate them to the costumer.	He is able to assess his/her own market position and develop concepts and strategies safeguarding his/her future.
9	**Personal management**	He/She is able to define criteria for a suitable selection of personnel, possibly considering job descriptions, and to plan personnel requirements.	He/She is able to identify training requirements and select and organise need-oriented training.	He/She is able to conduct and document appraisal interviews. He/She is able to prepare personnel appraisals on the basis of defined criteria. He/She is able to identify individual and occupational development potentials of personnel and to promote it with the help of suitable measures.		