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Application: **Maintenance technician in Wind energy - 'Equivalencies' Assessment Tool**

Person:

Response for: **BG - National Industry competence framework / NVQ Structure**

*Relevant*

*Capable?*

- ▾ Electronics and Energy
- ▾ **INSTALL AND MAINTAIN WIND POWER PLANTS**
- ▾ **Power facilities and installations mechanic**
- » General compulsory vocational training

*Skills / Performance*

- ▾ Performs job duties in strict compliance with OHS; (2)
- ▾ Applies basic rules for safe operation; (2)
- ▾ Fills in forms, prepares reports and others (5)
- ▾ Effectively communicates in a working team; (5)
- ▾ Applies the acquired economical and labour knowledge when exercising the profession; (7)
- ▾ Finds and stores information, including information in foreign language; (5)
- ▾ Evaluates specific situations in the workplace and performs labour activities in compliance; (5)
- ▾ Completes records of work activities; (3)
- ▾ Takes responsibility for the implementation of work tasks. (3)
- ▾ Able to provide first aid if necessary (3)
- ▾ Acts appropriately and responsibly in the management of emergencies; (9)
- ▾ Performs communication at different levels (9)
- ▾ Uses personal protective equipment and personal gear; (9)
- ▾ Indicates risks of pollution of the environment and its preservation activities; (3)
- ▾ Collects and stores hazardous products, respecting the technology for collection and recycling; (3)
- ▾ Performs maintenance operations without polluting the environment; (3)
- ▾ Can work with technological and business records; (2)
- ▾ Defines the objects and subjects of labour market and economic processes, phenomena and relations; (5)
- ▾ Creates electronic version of a document - text, graphics, table; (3)
- ▾ Demonstrates the ability to work in a team (9)

*Knowledge / Cognitive*

- ▾ Describes the organizational and functional structure of the company; (5)
- ▾ Knowledge of the basic rules for safe handling of the workplace and environmental protection; (6)
- ▾ Knowledge of market relations, rights and obligations as a participant in the labour process under CT; (6)
- ▾ Knowledge of the organization of the enterprise / company / and powers of the officials; (6)

- Understands the contractual relations between employers and employees; (5)
- Knowledge of regulations, laws, ordinances and regulations, and compliance with EU legislation; (6)
- Has basic knowledge of universal human values, democracy and civil society. (6)
- Knows the legal requirements for safe and healthy working environment, and how to provide first aid to accident victims; (5)
- Knows the legal requirements for fire safety; (6)
- Uses as intended means of Fire and Emergency; (4)
- Respects the workplace hygiene; (5)
- Knowledge of regulations, laws, ordinances and regulations, and compliance with EU legislation; (6)
- Explains the correlation between Bulgarian and European legislation in the profession; (3)

» Branch compulsory vocational training

*Skills /  
Performance*

- Performs operations to manufacture components in compliance with the technology; (1)
- Perform bench operations (cutting, bending, filing, sanding, etc..) (1)
- Reads technical, structural and technological documentation - ordinances, regulations, instructions, catalogues, diagrams, drawings, etc.; (5)
- Works safely with basic mechanical and assembly tools, machines and appliances; (3)
- Performs rigging operations (6)
- Performs mechanical and welding operations. (6)
- Performs assembly, disassembly and repair operations with machine components, parts and assemblies; (6)
- Produces elements of installations and equipment; (6)
- Assembles, disassembles hydraulic machines and heat exchangers of ready nodes. (6)
- Measures the main thermal and electrical quantities; (2)
- Performs thermal and electrical calculations; (2)
- Distinguish uses of energy-saving technologies; (3)
- Maintains tools in good condition; (3)
- Assembles, disassembles components and details in a technological order; (6)
- Repairs parts and assemblies after assessing their suitability; (6)
- Completes report and technology map for operations carried out; (5)

*Knowledge /  
Cognitive*

- Verifies the accuracy of effected operations in compliance with the structural documentation; (1)
- Explains the purpose and application of machine components, parts and assemblies; (1)
- Knows the requirements and the texts of laws documents regulating activities of Electrical Engineering and Energy sector; (6)
- Reads technical, structural and technological documentation - ordinances, regulations, instructions, catalogues, diagrams, drawings, etc.; (6)
- Has extensive knowledge in the field of training, individual fields of study or work (5)
- Has knowledge on the types of objects (raw materials, tools, machinery and equipment) of his area, their properties, function and relationship (technological sequence and performance requirements for various activities), occasionally their structure (components); (6)
- Knows the lifting transport facilities and requirements for working with them; (5)
- Knows the basic concepts, laws, regularities in electrical engineering; (6)
- Knowledge of energy saving technologies used in the profession; (6)

Applies the requirements and provisions of the normative documents regulating the

- activities in the energy sector; (4)
- Performs independently pre-learned actions; (4)
- Understand the meaning of instructions, tasks, explanations, formulated differently from his studies in the past; (5)
- Uses technical means for measuring electrical quantities (4)
- Shows a critical attitude for implementing of technologies studied (4)
- Able to classify raw materials. (3)
- Evaluates the quality of delivered raw materials in accordance with the requirements; (1)
- Explains the purpose of the main types of tools, appliances, machines, tools and technology for various mechanical and welding operations; (5)
- Selects the appropriate tools, equipment, machinery and appliances to carry out the operations; (4)
- Protects himself and others at work; (4)
- Explains the purpose of major lifting - transportation machinery, equipment and fixtures; (5)
- Selects rigging equipment depending on the type of the suspension elements; (4)
- Hangs cargo according to the technology for working with lifting - transport equipment; (4)
- Explains the technology of assembly, disassembly and repair of machine elements and the consequences of non-compliance; (5)
- Describes the properties, application methods of marking and storage of raw materials, construction and operational materials, fuel and work materials; (5)
- Identifies tools, equipment and components in drawings and diagrams in standard graphic and character abbreviations; (5)
- Extracts information about the size, type and method of assembly of the parts and nodes of the plans of the device; (3)
- Uses appropriate operating raw materials, work materials, tools, devices and spare parts, personal protection equipment, and individual equipment; (4)
- Checks the result of the operations carried out by controlling the dimensions and tolerances allowed; (1)
- Explains the contents of the technical, design and technological documentation for equipment and systems; (5)
- Retrieves information from the documentation on the size, shape and the manufacturing of components for production; (3)
- Explains the application of energy saving technologies, economic and environmental impact of the use of renewable energy, including equipment for biomass, heat pumps, surfaces, geothermal and solar photovoltaic converters and solar thermal systems; (5)
- Describe the principle of operation, structure and work processes in installations using renewable energy sources, including and equipment for biomass, heat pumps, shallow geothermal and photovoltaic converters and solar thermal systems; (5)
- Read diagrams for installations using different energy sources; (5)
- Make comparative conclusions on the use of installations using the energy-saving technologies; (2)

» Profession specific vocational training

*Skills /  
Performance*

- Makes full view of facilities and installations to identify defects or deviations from normal operation; (1)
- Uses standard graphic symbols and letters for components in equipment drawings and diagrams; (2)
- Performs assembly, disassembly and repair operations with machine parts, components and assemblies; (6)
- Distinguishes the methods of producing energy from renewable sources and its use; (5)
- Works safely with materials, specialized tools, measuring instruments and stands, used in the profession; (3)
- Complies the technological sequence of elements in the development of systems and equipment; (2)
- Performs operations in the technological sequence related to assembly, disassembly and mounts, in maintenance and repair of energy equipment and installations; (6)

- Removes failures and defects in equipment and piping; (1)
- Installs and dismantles equipment and installations for the production of renewable energy; (6)
- Participates in the preparation, start-up and putting into operation of equipment and systems for the production of renewable energy; (3)
- Performs maintenance of facilities and equipment for the production of renewable energy; (3)
- Performs repair of components and assemblies of equipment and installations for the production of renewable energy; (6)
- Performs operations of a complex nature in changing conditions. (6)
- Prepares the workplace by choosing tools for assembly, orders materials - cleaning, lubricating, corrosion, sealing, etc.; (3)
- Performs operations and follows the technological sequence in accordance with the technical documentation of the machinery or apparatus; (2)
- Compares operational characteristics of finished equipment in order to establish suitability for use; (5)
- Reports for execution of the work done; (5)
- Amount indications of the device; (2)
- Saves measurement data into a standard or daily protocol (3)
- Can read diagrams of equipment and installations for the production of renewable energy, incl. boilers and stoves for biomass, heat pumps, shallow geothermal systems, solar photovoltaic or solar thermal systems; (2)
- Prepares the site by choosing and checking the necessary basic and specialized equipment; (9)
- Performs operations for assembly and disassembly in technological sequence; (6)
- Performs electrical and heat operations in accordance with the technical documentation incl. boilers and stoves for biomass, heat pumps, shallow geothermal systems, solar photovoltaic or solar thermal systems; (6)
- Check the quality of the installation according to the installation scheme in order to meet customer requirements and ensure the reliability and effectiveness; (2)
- Complete record of activities carried out, if necessary, in electronic form; (5)
- Participates in the preparation of the site and the supply of resources for the installation; (3)
- Mounts measuring instruments and control systems according to their function; (2)
- Checks the operational and safety parameters of the equipment and the installation to establish suitability for use; (6)
- Monitor operational modes of equipment and installations for deviations from normal operation mode; (2)
- Restores normal functioning after removal of faults and damage; (1)
- Cleans components of equipment and installations with the instructions provided in the materials and tools; (3)
- Removes defective parts and assemblies of equipment and installations and the technological sequence, incl. boilers and stoves for biomass, heat pumps, shallow geothermal systems, solar photovoltaic or solar thermal systems; (1)
- Replace elements, components and assemblies of equipment and installations; (1)
- Removes failure to facilities and equipment, incl. boilers and stoves for biomass, heat pumps, shallow geothermal systems, solar photovoltaic or solar thermal installations, subject to the requirements of quality and safety; (1)
- Complete record of professional activities; (5)
- Knowledge / Cognitive*  Knows the requirements for training, start-up and putting into operation of equipment and systems. (1)
- Knows rules and requirements for conducting maintenance and repair of equipment, installations and networks; (1)
- Knowledge of the characteristics, structure and principle of operation of power equipment and systems and methods of installation; (1)
- Knowledge of standard graphic symbols and letters of appliances, components and equipment drawings and diagrams; (1)
- Knows the basic concepts, laws and processes in hydrodynamics, gas dynamics,

- thermodynamics and heat transfer and its application in energy facilities; (5)
- Knows the physical nature of the main electrical quantities and use of technical means to measure them; (5)
- Knows the characteristics and structures of machine parts, components, assemblies and equipment; (5)
- Know the structure, the principle of operation and the various designs of hydraulic machines; (5)
- Analyzes the performance of facilities and installations; (3)
- Can explain the structure, operation and construction of hydraulic machines and heat exchangers; (5)
- Can describe the technology of assembly and disassembly of hydraulic machines and heat exchangers; (5)
- Read the technical specifications and requirements of finished equipment or heat exchange systems; (5)
- Describes the nature of the main thermal and electrical parameters; (5)
- Can explain the purpose of equipment for measuring the basic thermal and electrical parameters; (5)
- Selects appropriate technical means for measurement. (4)
- Can explain the nature of the types of renewable energy sources; (5)
- Can explain the principle of operation, work processes, components and structures of installations for production of renewable energy, incl. boilers and stoves for biomass, heat pumps, shallow geothermal systems, solar photovoltaic or solar thermal systems; (5)
- Can explain the requirements, techniques and technologies of assembly and disassembly of installations and systems, and the consequences of non-compliance, incl. boilers and stoves for biomass, heat pumps, shallow geothermal systems, solar photovoltaic or solar thermal systems; (5)
- Can explain requirements, techniques and technology of preparation for release, start-up and putting into operation of equipment and systems for the production of renewable energy, incl. boilers and stoves for biomass, heat pumps, shallow geothermal systems, solar photovoltaic or solar thermal systems; (5)
- Checks with the team facilities and installations for compliance with all applicable codes and standards, including energy and environmental labeling; (4)
- Can explain the rules of prophylaxis in accordance with the technical documentation of machinery and installations for the production of energy from solar, wind, hydro and geothermal energy, including wave, tidal, waste heat, biomass, industrial and household waste ; (5)
- Describes the possible damage to equipment and installations for energy from renewable sources; (5)
- Describes correctly the technology of repair activities; (5)

**▼ Technician of energy equipment and installations**

» **General compulsory vocational training**

*Skills /  
Performance*

- Applies the basic rules for safe operation; (1)
- Able to conduct briefing and BT PAD and training of staff; (2)
- Performs preventive action to protect the environment; (7)
- Able to complete forms, prepare reports and more (3)
- Effectively communicates in a working team; (8)
- Finds and stores information on computer, incl. in a foreign language, using the Internet and e-mail; (7)
- Creates documents in electronic version (text, graphic, table); (5)
- Assess specific situations in the workplace and accordingly performs work activities; (4)
- Completes record of work activities; (5)
- Prepares supporting documentation; (5)
- Organizes production process in terms of the acquired from the training knowledge; (1)

- Monitors and evaluates the activities of the others; (1)
- Able to take decisions independently; (5)
- Applies acquired economic and employment knowledge in the profession; (7)
- Provides transfer of knowledge and skills between different areas of study or work in the performance of complex tasks and solves specific problems; (7)
- Observes the safety precautions and deals with responsibility to people and machines; (2)
- Acts appropriately and responsibly by dealing with emergencies; (4)
- Has awareness of environmental protection; (5)
- Knowledge / Cognitive*
- Has knowledge of the enterprise organization / company / and powers of officials; (1)
- Knows the basic rules for safe operation in the workplace; (4)
- Has knowledge of market relations, rights and obligations as a participant in the labor process under the Labor Code; (5)
- Understands the contractual relationship between employer and employee and implements economic and labor acquired knowledge in the profession; (5)
- Has knowledge of regulations, laws, ordinances and regulations, and compliance with EU legislation; (5)
- Uses specialized computer programs to solve tasks; (5)
- Understands his role in the company and is trying to acquire qualifications; (5)
- Has a thorough knowledge of democracy, civil society and the international legal order; (5)
- Develops criteria for evaluation; (5)
- Communicates freely with clients. Understands their needs and desires; (2)
- Affective / Behaviour*
- Takes responsibility for team work; (4)
- Organizes team activities (1)
- Makes an assessment of the quality of manufactured products, as well as the work of team members; (1)
- Monitors the compliance with sanitary norms and safety conditions at workplace; (4)
- Has a vision for the overall implementation process and is able to manage it, and if necessary to reallocate tasks; (2)
- Takes initiative and ability to set goals, plan and justify their own actions and those of the team and take responsibility; (4)
- Selects with responsibilities employees for specific job tasks according their skills and personal qualities; (3)
- Takes responsibility for team work; (4)
- Organizes team activities (2)

» Branch compulsory vocational training

- Skills / Performance*
- Applies the requirements and provisions of the regulations governing activities in the energy sector; (2)
- Uses technical, engineering and technological documentation, incl. in a foreign language; (3)
- Works safely with the basic mechanical and the general assembling tools, appliances, machines and devices; (6)
- Organizes the implementation of rigging operations during assembly, disassembly and repair of equipment; (9)
- Has a wide range of cognitive and practical skills to solve complex problems; (7)
- Performs complex operations using a variety of tools, machinery, apparatus and measuring instruments (5)
- Performs mechanical and welding operations; (6)
- Solves practical - applied tasks of hydro and gas dynamics, thermodynamics and heat transfer; (1)

*Knowledge /  
Cognitive*

- Knows the requirements and provisions of the regulations governing activities in Electrical Engineering and Energy; (5)
  - Reads technical, engineering and technological documentation - ordinances, regulations, instructions, catalogs, diagrams, drawings, etc., incl. in a foreign language; (4)
  - Knows the basic properties of the raw materials used in electrical engineering and energetics, their technology functions, transportation and storage; (5)
  - Knows the main lifting - transport facilities and requirements for handling; (6)
  - Knows the basic concepts, laws, regularities in electrical engineering, proper uses the technical means for measuring electrical quantities and values; (5)
  - Knows the basic concepts, laws and logics in automatic control of processes in electrical engineering and energetics and the technical means; (5)
  - Suggests ways of using energy saving technologies (4)
  - Performs measurement and regulation of basic thermal and electrical parameters; (2)
  - Manages the development of elements of installations and equipment; (3)
- Affective /  
Behaviour*
- Manages the operations of rigging lifting equipment; (4)
  - Manages assembly - disassembly and repair operations on machine parts, components and assemblies; (4)
  - Manages assembly - disassembly of hydraulic machines and heat exchangers and ready units; (2)
  - Suggests ways to use energy-saving technologies; (1)

» Specific for the profession professional education

*Skills /  
Performance*

- Uses specialized literature for assembly and disassembly and repair operations with machine parts, components and assemblies; (1)
  - Solves practical - applicable problems of hydrodynamics and gas dynamics, thermodynamics and heat transfer; (5)
  - Calculates and draws basic machine parts, components and assemblies; (5)
  - Uses standard graphic symbols and letters of appliances, components and equipment drawings and diagrams; (3)
  - Applies energy saving technologies used in the profession; (7)
  - Works safely with materials, specialized tools, gauges and test stands; (2)
  - Monitors activities for developing elements of installations and equipment; (9)
  - Applies methods of calculation and selection of facilities and installations; (5)
  - Organizes the assembling, preparation, start, putting in motion, maintenance and repair of equipment, installations and networks; (7)
  - Checks the quality performance of assigned tasks in accordance with the technical documentation; (9)
  - Maintains the technological modes of installations; (4)
  - Tests and adjusts the equipment and installations (1)
  - Performs diagnostics of equipment and installations; (9)
  - Organizes the team's actions in emergencies; (9)
  - Develops and applies creative thinking and alternative methods and actions in familiar and unfamiliar situation and environment; (7)
  - Critically rationalizes and evaluates different point of views on results by set criteria in solving problems and issues in a particular field of study or work; (7)
- Knowledge /  
Cognitive*
- Knows the basic physical nature of thermal and electrical parameters, selects and uses technical means to measure them; (4)
  - Knows the basic concepts, laws and processes in hydro-and gas dynamics, thermodynamics and heat transfer and its application in energy facilities; (6)
  - Knows the characteristics and structures of machine parts, components, assemblies and equipment; (4)
  - Knows the standard graphic and letter symbols on the appliances, components and

equipment drawings and diagrams; (4)

 ▼

Knows the characteristics, principles of operation, the unit of energy equipment and systems and their installation, including biomass equipment, heat pump, shallow geothermal and solar photovoltaic converters and solar thermal systems; (4)

 ▼

Knows the structure, principle of operation and construction of hydraulic machines; (4)

 ▼

Knows the technology of oxy-fuel welding and argon welding of metallic and non-metallic pipes; (4)

 ▼

Knows the rules and requirements for conducting maintenance and repair of equipment, installations and networks; (4)

 ▼

Knows the basic processes in plant and plant control; (3)

 ▼

Analyses the measurement data; (3)

 ▼

Analyzes the opportunities for using renewable energy sources; (3)