



*SLOVAK AUSTRIAN GERMAN ALIANCE
VOCATIONAL EDUCATION AND TRAINING*

CURRICULUM

OUTPUT IDENTIFICATION:

**O2 – Education of trainers for the course “ Liquidation of Waste and Recycling
– Wastewater”**

Project Number:

2015-1-SK01-KA202-008951

Description of the project:

Slovak-Austrian-German-Alliance for Vocational Education and Training

A short description of the project:

SAGA for VET

Start of project:

01.09.2015

End of project:

01.09.2017

Official Designation of Project Proposer:

Newport Group, a.s.

Education Program in the Disposal and Recycling of Waste Management

Training facility for the education program “Expert for Disposal and Recycling – Waste” Occupational Profile

Thanks to occupational preparation in the educational operation as well as in a vocational school there should be in this educational direction “Expert for Disposal and Recycling – Waste”, the trained student able to perform the following activities independently, professionally and of their own responsibility:

1. Equipment at the workplace,
2. Reading and processing of simple sketches and illustrations,
3. Maintenance and repair of devices, machinery and facilities used for the treatment of waste and residual substances,
4. Identification and classification of waste and residual substances,
5. Selecting the process method for treating waste and recycling,
6. Analyzing and documenting treatment and the disposal of waste and residual substances,
7. Safe and proper handling of devices, machinery and facilities for waste treatment,
8. Authorization to perform the relevant expert activities as the superintendent of a landfill and plenipotentiary for waste treatment,
9. Controlling the input of an imputed landfill,
10. Synergy in waste counseling and advice regarding residual substances.

General image of the profession

The following general image is provided for “Expert for Disposal and Recycling – Waste” for the educational branch. At the same time, it is necessary to convey the mentioned skills and knowledge later in the relevant stated beginning of the school year so that the apprentice is eligible for the performance of qualified activities, which mainly include stand-alone planning, performance, checking and optimization.

Professional teaching

NATURAL SCIENCE

Competence area “Chemical and biochemical materials, reaction and process”

The role of education and learning:

Pupils

- know the safety rules and regulations applicable to the given profession and be able to identify measures leading to workplace health, to the prevention of fire and explosions as well as the avoidance of occupational diseases, occurring in the working field,
- know the relevant standards of the environment and quality, related to the profession and be able to establish measures for dealing with hazardous work equipment and substances.
- know how to describe an ergonomically correct position in the implementation of work-specific work,
- know how to describe different states of matter and describe relationships between them,
- knowledge of chemical elements, know their place in the periodic table and its structure, and also how to explain the information included in the periodic table,
- know how to describe the structure of the atom, explain various methods of compounds, chemical formulas contrived for these connections, as well as deriving the names of these compounds,
- know ways of radiation and know how to explain its properties,
- know how to describe chemical reactions, verbally and through reaction equation,
- know how to explain the electrochemical processes based on chemical formulas,
- know how to describe processes related to electrolysis,
- know how to include inorganic and organic compounds corresponding to their rules of nomenclature, deduce their characteristics, describe a typical reaction, as well as draw out and justify the possibilities for their creation and use,
- know how to illustrate toxicity and the toxicity of relevant inorganic relevant compounds, as well as description of their use and know how to discuss,
- know how to identify, illustrate and explain the function of the organic compounds,
- know how to define the concepts of artificial substances, natural substances and noxious gases, and describe their characteristics,

- know how to describe biological and biochemical substance cycles as well as explain systems and compound bonds associated with relevant environments related to waste, wastewater and waste air,
- know the different types of microorganisms and illustrate their role in waste management, as well as describe their areas of application,
- know how to perform a project-specific work assignment.

Educational material:

Safety rules and regulations. Requirements for health protection. The environment and quality standards. Ergonomics. States of matter. Chemical elements. The structure of the atom and the periodic system. Chemical bonds. Radioactivity. Chemical reactions. Electrochemical processes. Voltage. Electrolysis. Inorganic and organic bonds as well as bond groups. Systematics. Artificial matter. Natural mass. Toxins in the environment. The life cycle of substances. Systems related to the relevant environment. Microorganisms. Project-specific work assignment.

Competence Technological Treatment of Waste and Recycling

The role of education and learning:

Pupils

- know the safety rules and regulations applicable to the given profession and be able to identify measures leading to workplace health, to the prevention of fire and explosions as well as the avoidance of occupational diseases, occurring in the working field,
- know the relevant standards of the environment and quality, related to the profession and be able to establish measures for dealing with hazardous work equipment and substances.
- know how to describe an ergonomically correct position in the implementation of work-specific work,
- know how to name the electrolysis resources used in waste management, as well as illustrate the progress of the electrolysis process,
- know how to describe and compare aerobic and anaerobic processes in waste management, explain their meaning and illustrates the process used for their controlled use,
- -know how to describe the technical production of inorganic substances related to waste management, as well as the relevant recycling process,
- know how to describe the processes used to reduce or eliminate the emissions of harmful gases and justify their use, know how to perform a project-specific work assignment.

Educational material:

Safety measures and regulations. Health protection requirements. Environmental and quality standards. Ergonomics. Electrolysis. Aerobic and anaerobic processes in waste management. Production of inorganic substances. Recycling process. Emission of harmful gases. Project-specific work assignment.

Competence area of Technical and Legal Documentation**The role of education and learning:**

Pupils

- know how to read data sheets related to the profession, as well as draw measures from them and justify them,
- know the rules and regulations relating to the organization and evaluation of the workplace and know how to describe their application,
- know how to read and interpret the documents related to the treatment of wastewater and to draw safety measures and measures from them relevant to the environment,
- know how to perform a project-specific work assignment.

Educational material:

Data sheets. Technical documents Project-specific work assignment.

WASTE PROCESSING TECHNOLOGY AND THE ENVIRONMENT**Competence area Chemical and Biochemical Substances, Reaction and Processes****The role of education and learning:**

Pupils

- know the rules and regulations specific to the profession and know how to explain measures to protect safety and health at work, protection against fire and explosions, as well as for the prevention of occupational diseases and accidents at work,

- know how to describe an ergonomically correct position in the performance of industry-specific work,
- know different types of work-relevant, business or remedial tools, as well as their properties, and describe wastewater management, relevant work or remedial tools, with a view to their possible use, processing, storage, processing and recycling,
- know how to describe the process of modification and processing of wastewater, as well as mechanical, thermal, physical, chemical and biological processing within the relevant processes; and to evaluate their use,
- know how to describe principles and methods of purification of exhaust gases,
- know how to enumerate initial emissions coming from a wastewater treatment plant, as well as explain and analyze their impact on the environment,
- know how to perform a project-specific work assignment.

Pupils of the performance group with a deepened educational offer, as well as those who are preparing for a final exam, are able to solve additional complex tasks for the individual content of educational materials.

Educational material:

Safety rules and regulations. Health protection requirements. Environmental and quality standards. Ergonomics. Working and auxiliary tools. Wastewater treatment Treatment process. Waste gas treatment Emissions. Project-specific work assignment.

The competence area Waste and Recycling Technology

The role of education and learning:

Pupils

- know the rules and regulations specific to the profession and know how to explain measures to protect safety and health at work, protection against fire and explosions, as well as for the prevention of occupational diseases and accidents at work,
- know how to describe an ergonomically correct position in the performance of industry-specific work,
- they know ways to describe processes, deployment and the functionality of the corresponding devices, machinery and equipment, as well as the justification for their use,
- know how to explain the technology needed to separate homogeneous and heterogeneous substance systems,

- know how to illustrate and describe the processes and technologies necessary to clean exhaust air,
- know how to illustrate and explain the currents of energy and energy transfers in wastewater treatment plants,
- know how to describe the devices to receive and evaluate bio-gas, as well as explain the way the connected process in the formation of energy,
- know the transport and support systems used in waste management and know how to process the relevant areas deployed for this system,
- know how to describe the methods of measurement used in the treatment of wastewater, as well as measuring instruments and control and regulating devices, and explain their use,
- know how to explain processes and devices, which are used for processing different types of mud in waste management,
- know how to name different types of wastewater treatment plants, as well as describe their equipment and ventilation systems,
- know challenges with location, as well as the ongoing operation of wastewater treatment plants and know how to develop appropriate measures,
- know how to explain technology used for the processing of sludge, as well as to justify its use,
- know how to perform a project-specific work assignment.

Pupils of the performance group with a deepened educational offer, as well as those who are preparing for a final exam, are able to solve additional complex tasks for the individual content of educational materials.

Educational material:

Safety measures and regulations. Requirements on safety and health protection. Environmental and quality standards. Ergonomics. Machinery, tools and equipment. Separating technology. Exhaust air treatment. Energy currents and energy conversion. Wastewater handling The acquisition and evaluation of bio-gas. Transport and Support Systems Equipment used for Measurement and Management. Handling of sludge. Equipment used for the preparation of wastewater. Ventilation. Handling of cleaned sludge. Project-specific work assignment.

Competence area of Technical and Legal Documentation

The role of education and learning:

Pupils

- know the rules and regulations for arranging and evaluating the location of the work and know how to describe their use,
- know how to read and interpret sketches, technical drawings of relevant instruments, machinery and equipment,
- know how to explain the construction of modern systems for the management of the environment, taking into account the organization as well as the principles of waste management and the limiting of waste creation in water management,
- know how to create and present waste management concepts,
- know the inclusion of wastewater currents at different types of wastewater treatment plants, describe the input flow, course and emission controls, as well as justify their necessity,
- know how to explain the documentation for a wastewater treatment plant, as well as illustrate and analyze relevant safety aspects and aspects of the environment,
- know how to analyze and explain the work-specific standards and the relevant laws,
- know the relevant authorities and institutions related to waste management and their role,
- know the specific reporting obligations and how to describe the structure and composition of these reports, as well as the necessary systems for these reports,
- know how to perform a project-specific work assignment.
- Pupils of the performance group with a deepened educational offer, as well as those who are preparing for a final exam, are able to solve additional complex tasks for the individual content of educational materials.

Educational material:

Arrange and evaluate the work performance location. Sketches and technical drawings. Environmental management system. Waste management concept. Wastewater treatment Standards and legal regulations. Authorities and institutions. Report obligation and reporting. Project-specific work assignment.

APPLIED MATHEMATICS

Competence area Chemical and Biochemical Substances, Reaction and Processes

The role of education and learning:

Pupils will know how:

- to calculate the temperature of the melting and boiling points, as well as calculate the energy intensity,
- to define and calculate physical quantities, include SI units, as well as perform conversions between different units,
- perform calculations of area and volume, as well as conduct accuracy tests for transferred calculations,
- explain the relationship between mass, amount, volume, density, and the quantity of the substance, to perform calculations for these data and present the results along with the corresponding unit,
- calculate the industry-specific values and interpret the results,
- perform the calculations of variables,
- calculate the voltage, current strength, power and resistance in terms of Ohm's Law,
- perform volumetric calculations and interpret the results,
- perform a project specific-work assignment.

Educational material:

- the value of the melting and boiling temperature. Physical measurements. SI Units. Surface and volume calculations. Weight. Density. Substance amount. Industry-specific values. Calculation variables. Ohm's Law. Volume calculations. Project specific calculations.

The competence area Waste and Recycling Technology

The role of education and learning:

Pupils will know how:

- perform the relevant calculations in relation to industry-specific technologies and assess the results,
- perform calculations of movement, pressure, and the law on balance lever,
- perform calculations of the thermal expansion of construction material, and to interpret the results,
- calculate the mechanical as well as electrical work and performance, as well as assess the effectiveness,
- perform calculations in connection with the processes of drying and preheating,
- perform calculations of flow-technical processes and interpret the results,

- perform calculations of the transformation of industry-specific processes and assess the results,
- perform calculations the work, performance and the efficiency of appliances and electro-technical equipment,
- perform the project-specific work assignment.

Educational material:

Safety and relevant calculations. Movement. Pressure. Force: The law of the balance lever. Thermal Expansion of Work. Performance. Efficiency. Loss of drying and corrosion. Current technical processes. Calculation variables. Project specific calculations.

Competence area of Technical and Legal Documentation

The role of education and learning:

Pupils will know how to:

- to research and document the compliance with the statutory limits on the basis of calculations,
- graphically illustrate the quality of relevant measurement results, their interpretation and presentation,
- perform a project-specific assignment.

Educational material:

Legally limited values. Measurement results. Project-specific calculations.

Project laboratory

The role of education and learning:

Pupils will know how:

- to expand a project idea, formulate project goals, create a project plan through milestones, as well as express necessary resources, essential for a project's implementation,
- to put together a project team, taking into consideration social forms of business process, set projected fragmental tasks and then delegated them to individual project members,
- to create a list of tasks that need to be done on the basis of the project plan and be able to justify them,
- to express individual project links to general-educational, linguistic, operational, theoretical and practical content,
- to argue, as well as take into consideration an argument with respect to project planning and the project implementation itself,
- to promote the project plan with respect to measures used for quality securing, this plan customized according to need and also control the information flow between individual project members,
- to draw up parts of the project documentation in a foreign language, if it is specific for a given sector,
- to document the implementation and project results, reflect, evaluate and present it, as well as to point out any improvement suggestions.

Educational material:

Project Concept. Project Planning. Project Implementation. Project Documentation. Project Presentation. Project Evaluation.

Final Exam – division

Final exam in the education program: "An expert on disposal and recycling – waste" is divided into a practical and theoretical exam.

- The practical exam consists of the examining work subjects and professional interview.
- The theoretical exam includes objects of specialized knowledge, special specialized knowledge and specialized calculations.
- The theoretical exam is cancelled when a candidate can achieve the study goals of the final course of high school in the field of Waste and Recycling Economy, or the passing of one of the spare study programs at high school or college.

Practical exam:

Examining work

The examining work has to contain, according to the examining board, the following tests:

1. Simple maintenance works on waste technical devices, machinery or equipment, whereas it is necessary to demonstrate particular diagnostic skills, fault finding and locating, repairing simple disorders and operation;
2. Managing work on the basis of documents, whereas it is necessary to show skill in the measurement, control, and optimize work processes handling equipment, machines and tools for waste management;
3. A work from waste technology, whereas it is necessary to show following skills:
 - A) collecting and exams preparation
 - B) carrying out of a simple analysis
 - C) processing.

The examining board determines for each student after taking into consideration the purpose of the final exam and work practice requirements. This takes around seven hours. Whereas the maintenance work under article 1 of 1, as well as the waste-technical works under article 1 of 3 can last for three hours and the process-technical works under article 1 of 2 may take one hour.

- It is necessary to complete the examining work after eight hours.
- Following criteria are determined for the evaluation of the examining work:
 1. For maintenance works on the waste-technical machines, devices and equipment:
 - a) a permanent functionality,
 - b) the professional use of the right equipment and tools;
 - c) a professional use of the right testing, measuring and control devices;
 2. For the technical examining work:
 - a) a proper function,
 - b) correct measuring and test results,
 - c) the professional use of the right equipment and devices;
 3. For waste-technical examining work:
 - a) purity,
 - b) Accuracy of results,
 - c) Professional work performance

Professional interview:

A professional interview is required to be done in front of the examining board.

- The professional interview is evolved from the practical activity. It is necessary to examine the applicant's practical knowledge through the use of technical terms.
- The topics' composition must correspond to the purpose of the final exam and demands
- of the work experience. Whereas, it is necessary to bring tools, demonstrative objects, or working aids or a table. It is also possible to include into the examining process questions related to logistics regarding waste and waste products collection and transport, including safety standards, protection measures or prevention against accidents.
- The professional interview of each candidate should take at least 15 minutes. The professional interview must be completed after twenty minutes. It is possible in some cases to extend the professional interview for 10 minutes, if the examining board cannot agree on the undoubted evaluation of the student's performance.

Theoretical exam - general assumptions

The theoretical exam must be carried out in written form. It can be carried out by many students together, if it is possible without any influence on the examining process. The theoretical exam can be carried out even through computer, in the case that it is protected. The examining board needs to know and understandably any significant steps in assembling the exam.

- The theoretical exam is carried out before the practical exam.
- The tasks must meet the scope, level and purpose of the final exam, and also the requirements of the practice exam.
- The student's written works must be signed.

Professional Knowledge

The exam must include brief answers always after one of the following fields:

1. Professional knowledge of waste and waste materials,
 2. Machineries, devices and equipment from waste technologies,
 3. Chemistry,
 4. Biology and Ecology.
- The exam can be carried out in the programmed form by means of the questionnaire. In this case, it is necessary to specify five questions from each field.
 - It is necessary to form tasks in such a way that they can be answered within 90 minutes.
 - The exam is necessary to complete after 120 minutes.

General specialized knowledge

The exam must include an illustration according to the sketches of the machine's work process or one from waste management.

- It is necessary to formulate a task in such a way that it can be answered within 60 minutes.
- It is necessary to complete the exam after 90 minutes.

Specialized calculations

The exam must include one of the following fields:

1. volume and weight calculation,
 2. percentage calculation,
 3. physical calculations (work performance, efficiency),
 4. chemical calculations.
- The use of legal devices, formulas and tables is allowed.
 - It is necessary to form tasks in such a way that they can be answered within 60 minutes.
 - It is necessary to complete the exam after 90 minutes.

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