



SolTec

*Towards a European Qualification for Service and Maintenance in the Solar Energy-Sector
503219-Leonardo-2009-LLP -2009-2181*

General knowledge

- Factual and theoretical knowledge of/ about
 - o solar-energy
 - o electric systems, on-grid-connection, off-grid-system and variants of electric storage
- Knowledge of/ about
 - o facts and principles of technical drawings
 - o the practical steps for the installation
 - o environmental and safety protection
 - o mathematics
 - o PV installation plans
- Basic knowledge of
 - o structural mechanics
 - o electronics, automation and mechanics
 - o physics
 - o Astronomy

Skills

- To read and interpret the work plans of technical projects
- To always take into account health and safety measures

Competences

- Analytic competences
- To plan work processes and supervise other persons
- To be aware of the need for precise and accurate work
- Good Communication with other workers (and for small projects with the clients)
- Competences in Self-Management and Self-organisation
- To act reliable regarding the safety and environmental rules

I Installation

Competence Unit Assignments	Tasks Sub-Assignments	Knowledge Knowledge of/ about...	Skills To be able to....	Competences To be competent at....	NQF	EQF
Planning						
Analyses of needs and context	<ul style="list-style-type: none"> - To assess the needs of the users and determine the solar potential of an area 	<ul style="list-style-type: none"> - Knowledge about optimisation of energy consumption - Knowledge about the relevant criteria for needs analyses 	<ul style="list-style-type: none"> - to be able to analyze and calculate the monthly and annual irradiation considering orientation, shadowing, etc. - to be able to classify, quantify, analyze and optimize the energy needs of different types of users - to be able to analyze the needed connection to the grid or storage system 	<ul style="list-style-type: none"> - being aware of the importance of calculations and forecasts - being competent at advising the customers according to their real needs 		4
Planning of the PV-concept according to the needs analyses	<ul style="list-style-type: none"> - To define the characteristics of the PV-installation according to the user needs and the solar potential of an area - To select the equipment and necessary elements with their specifications 	<ul style="list-style-type: none"> - Knowledge about the characteristic of the equipment and technical elements of the PV-system - Knowledge about topography 	<ul style="list-style-type: none"> - To be able to define (possibly together with the designer) the best configuration of the PV-system - To be able to calculate the real costs considering the components, the installation and authorisation of the PV- 	<ul style="list-style-type: none"> - Initiating projects according to the real needs of the client in narrow collaboration with the designers - Selecting the best system and way of realisation (ability for co-operation with the de- 		4

Competence Unit Assignments	Tasks Sub-Assignments	Knowledge Knowledge of/ about...	Skills To be able to....	Competences To be competent at....	NQF	EQF
			system	signers) - Seeing the linkages in a system and thinking and acting in a holistic way		
Legal, formal and technical obligations	<ul style="list-style-type: none"> - To prepare the documents for the legal authorizations and possible subsidies - To apply for grid connection (if necessary) 	<ul style="list-style-type: none"> - Knowledge about legislation on PV-system-realisation and their authorisation procedures - Knowledge about the legislation and technical standards for grid-connection (if necessary) 	<ul style="list-style-type: none"> - To know how to prepare the documentation - To prepare and present the application 	<ul style="list-style-type: none"> - Presenting and communicating to customers, stakeholder and legal bodies in an appropriate and understandable way - Reacting and solving possible arising problems 		3
Planning of the execution (for small installations)	<ul style="list-style-type: none"> - To plan the work stages for the installation - To develop detailed work and time tables for the installation - To plan a monitoring strategy for the installation process (review) - To plan the logistic process 	<ul style="list-style-type: none"> - Knowledge about project and process management - Knowledge about environment and work safety - Knowledge about different delivery regulations, storage possibilities, the supplier market and types of materials 	<ul style="list-style-type: none"> - To know about the needed resources for the implementation (e.g. time, people, budget, etc.) and the work safety rules - To plan and organise the eventually needed collaboration with experts/ workers from the same or other areas - To have an holistic view on the whole execution process and forecast all steps and possible problems 	<ul style="list-style-type: none"> - Thinking abstractive and planning proactive - Taking responsibility for the planning and the supervision of the involved experts/ workers - Taking decisions concerning the procurement and delivery process 		4

Competence Unit Assignments	Tasks Sub-Assignments	Knowledge Knowledge of/ about...	Skills To be able to....	Competences To be competent at....	NQF	EQF
			<ul style="list-style-type: none"> - To select material, tools, suppliers and other technical resources and order them 			
Safety and Environmental Protection	<ul style="list-style-type: none"> - To create a health and safety plan for the installation process - To accomplish the safety measures according to the plan - To control the implementation of the health and safety plan - To define the necessary environmental protection measures 	<ul style="list-style-type: none"> - Knowledge about work safety regulations - Knowledge about individual work safety equipment - Knowledge about environmental protection legislation and concepts (e. g. recycling concepts) 	<ul style="list-style-type: none"> - To prevent risks and minimize the consequences of possible accidents - To know how to undertake the risk assessment - To know how to act in case of an emergency (first aid) - To create and maintain a safety environment for himself and other workers - To put in place the necessary measures for environmental protection - To be able to choose and use the personal safety equipment and appropriate methods and other equipment to 	<ul style="list-style-type: none"> - Being responsible that the work is carried out according to the safety plans - Making the team observe the safety rules 		3-4

Competence Unit Assignments	Tasks Sub-Assignments	Knowledge Knowledge of/ about...	Skills To be able to....	Competences To be competent at....	NQF	EQF
			prevent and minimize risks			
Execution						
Preparation of the installation	<ul style="list-style-type: none"> - To analyze the installation plan and define the installation process - To prepare and organize the installation 	<ul style="list-style-type: none"> - Knowledge about different materials, tools and equipment used during the installation process - Knowledge about reading project plans and technical drawings 	<ul style="list-style-type: none"> - To interpret PV installation projects - To identify the equipment needed, also considering the safety rules and the physical conditions being required for the installation of the PV-system - To identify the different work stages and the appropriate work methods - To prepare the installation site 	<ul style="list-style-type: none"> - Defining autonomously the appropriate working methods - Being responsible to check if the work place is prepared - Being responsible to promote a good collaboration process with other workers 		4
Practical Execution	<ul style="list-style-type: none"> - To install the system with regard to all safety rules - To commission and operate the test 	<ul style="list-style-type: none"> - Knowledge about safety rules - Knowledge about quality principles and functional controls - Knowledge on measurement equipment - Knowledge about ICT, communication protocol and monitoring sys- 	<ul style="list-style-type: none"> - To use the appropriate techniques to install all the equipment according to the state of the art - To be able to choose and use the personal safety equipment and appropriate methods and other equipment to 	<ul style="list-style-type: none"> - Being self-responsible for the own physical and psychological conditions for undertaking the practical execution - Maintaining a high quality and helping colleagues to meet the standards 		4

Competence Unit Assignments	Tasks Sub-Assignments	Knowledge Knowledge of/ about...	Skills To be able to....	Competences To be competent at....	NQF	EQF
		tems	<ul style="list-style-type: none"> prevent and minimize risks To be able to self-evaluate the quality To assess the efficiency and test the system 	<ul style="list-style-type: none"> Working honesty and accuracy and to declare any mistakes and unexpected problems which can compromise the functionality and efficiency of the system 		
Documentation	<ul style="list-style-type: none"> To develop the operational and maintenance manual 	<ul style="list-style-type: none"> Knowledge about the minimum requirements for the manual (all documentations of installed components, report of the first commission and test, users guide) Knowledge about technical standards on PV-components 	<ul style="list-style-type: none"> To understand the documentation and technical standards To be able to write an operational and maintenance manual according to the minimum requirements 	<ul style="list-style-type: none"> Having the sensibility to focus the important points for the manual Working honesty and accuracy in the documentation process Writing in an understandable and correct way 		3

II Service and Maintenance

Competence Unit Assignments	Tasks Sub-Assignments	Knowledge	Skills	Competences	NQF	EQF
Maintaining, inspecting, trouble-shooting						
Planning the Maintenance activity	<ul style="list-style-type: none"> - To identify tools and equipment required for maintaining and trouble-shooting - To identify maintenance needs on site 	<ul style="list-style-type: none"> - Knowledge about measurement equipment and working tools - Knowledge about typical maintenance needs and activities related to the different types of installation - Knowledge on work planning and organisation of maintenance work 	<ul style="list-style-type: none"> - To design a typical periodical maintenance plan for that kind of plant and select the typical needed equipments and tools - To analyse the technical documentation of PV installations, determining the activities and resources, to plan the maintenance process - To read and understand the operational and maintenance manual made by the installer - To analyse the past production report and fault reports - To know about possible ways to increase the performance of the PV-system 	<ul style="list-style-type: none"> - Taking responsibility for the planning - Seeing the linkages in a system and think and act in a holistic way 		4
Safety and Environmental Protection	See in the installation, with special attention to electrical hazards					
Execution of maintenance	<ul style="list-style-type: none"> - To implement service 	<ul style="list-style-type: none"> - Knowledge about typi- 	<ul style="list-style-type: none"> - To use the mainte- 	<ul style="list-style-type: none"> - Having the ability to 		4

Competence Unit Assignments	Tasks Sub-Assignments	Knowledge	Skills	Competences	NQF	EQF
	<p>procedures</p> <ul style="list-style-type: none"> - To perform diagnostic procedures and interpret results - To identify performance and safety issues and implement corrective measures - Test the systems after the maintenance measures 	<ul style="list-style-type: none"> - cal mistakes and faults that can effect performance and safety of the plants and the corrective measures - Knowledge about ways of undertaking tests and diagnoses - Knowledge on ICT, communication protocols and monitoring systems - Knowledge about environment and safety rules 	<ul style="list-style-type: none"> - nance and corrective techniques of the PV-system - To use the appropriate measurement techniques - To make the tests of the performance of the system - To analyse the performance and define the problems of the PV-system - To be able to choose and use the personal safety equipment and appropriate methods and other equipment to prevent and minimize risks 	<ul style="list-style-type: none"> - analyse the attitudes of the executing experts and taking the right measures (information, communication, influence-taking, etc.) for a successful maintenance process - Having a "problem-solving-attitude" - Taking the responsibility to keep or improve the performance of the system in the future 		
Maintenance documentation	<ul style="list-style-type: none"> - To demonstrate complete functionality and performance of the system - To document of work process 	<ul style="list-style-type: none"> - Knowledge about the forms of documentation - Knowledge about documentation procedures and tools 	<ul style="list-style-type: none"> - To be able to write the technical report taking into account all implemented measures and steps - To be able to document the work performance - To be able to make suggestions and recommendations for the further management of the system 	<ul style="list-style-type: none"> - Working honesty and accuracy in the documentation process - Writing in an understandable and correct way - Taking the responsibility to give all the needed information to manage and maintain the plant in a good way 		3

Competence Unit Assignments	Tasks Sub-Assignments	Knowledge	Skills	Competences	NQF	EQF
Repairing						
Planning of repair activities	<ul style="list-style-type: none"> - To diagnose the anomalies in the PV-system - To organise the process of repairing 	<ul style="list-style-type: none"> - Knowledge about manufacturer warranties - Knowledge about ways of undertaking tests and diagnoses - Knowledge about error records - Knowledge about quality standards required for the executed products - Knowledge about new technologies and their compatibility with old technologies - Knowledge about safety and environmental rules (e. g. systems of recycling old components) - Knowledge on ICT, communication protocols and monitoring systems 	<ul style="list-style-type: none"> - To be able to read "old" or not complete documents and find alternative ways of assessment - To check manufacturer warranty details before exchange of components - To read and understand the production and error records and select a proper troubleshooting procedures - To calculate the costs adequately - To select and involve the eventually needed experts - To negotiate and order new components, taking into account the different delivery regulations - To be able to choose and use the personal safety and environmental equipment and 	<ul style="list-style-type: none"> - Having the ability to discover the critical factors (human, technical, etc.) to regain the functionality and performance of the system - Having a "problem-solving-attitude" - Taking the responsibility to regain and keep the performance of the system in the future - Taking the responsibility of use the appropriate repair techniques in accordance with all environmental and safety procedures - Taking the responsibility for the supervision of the work carried out by other people involved and their safety 		4

Competence Unit Assignments	Tasks Sub-Assignments	Knowledge	Skills	Competences	NQF	EQF
			appropriate methods and other equipment to prevent and minimize risks			
Safety and Environmental Protection	See in the installation, with special attention to electrical hazards					
Execution and verification	<ul style="list-style-type: none"> - To repair the anomalies in PV-systems - To test the repaired PV-system - To dispose or recycle old components 	<ul style="list-style-type: none"> - Knowledge about repair techniques of PV-system - Knowledge about measurements and tools for repairing - Knowledge about the repairing process - Knowledge about safety and environmental rules (e. g. systems of recycling old components) 	<ul style="list-style-type: none"> - To be able to repair the damaged equipment - To use (computer-assisted) tools and equipment - To be able to choose and use the personal safety and environmental equipment and appropriate methods and other equipment to prevent and minimize risks - To be able to act in an ecologically sound manner 	<ul style="list-style-type: none"> - Having the attitude to undertake all measures to prevent predictable malfunctions in the future - Taking the responsibility of use the appropriate repair techniques in accordance with all environmental and safety procedures - Taking the responsibility for the supervision of the work carried out by other people involved and their safety - Working honestly and accuracy and to declare any mistakes and unexpected problems which can compromise the functionality and efficiency of the system 		4

Competence Unit Assignments	Tasks Sub-Assignments	Knowledge	Skills	Competences	NQF	EQF
Documentation	<ul style="list-style-type: none"> - To document the repair 	<ul style="list-style-type: none"> - Knowledge about the forms of documentation - Knowledge about documentation procedures and tools 	<ul style="list-style-type: none"> - To be able to write the technical report taking into account all implemented measures and steps - To be able to document the work performance - To be able to make suggestions and recommendations for the further management of the system 	<ul style="list-style-type: none"> - Working honestly and accuracy in the documentation process - Writing in an understandable, structured and correct way - Taking the responsibility to give all the needed information to manage and maintain the plant in a good way 		3