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Application: **Designer in Solar photovoltaic energy - 'Equivalencies' Assessment Tool**

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Person:








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

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*Relevant*

*Capable?*

- Energy and Water  
- » ASSEMBLY AND MAINTENANCE OF SOLAR THERMAL INSTALLATIONS  
- » ASSEMBLY AND MAINTENANCE OF WATER NETWORKS  
- » ASSEMBLY AND MAINTENANCE OF GAS NETWORKS  
- ▼ ASSEMBLY AND MAINTENANCE MANAGEMENT OF WIND FARMS  
- ▼ Assemble and maintain wind power plants  
- ▼ Wind power plant assembly and maintenance work  
- » Prepare and organise the wind power plant assembly and maintenance work  
- Knowledge*  Technical documentation (3)
- Kind of plants (1)
- Assembly of wind parks and wind turbines (3)
- Methodological specifications for the assembly of wind turbines and wind parks (4)
- Procedures and operations to prepare and rearrange the plants (4)
- Assembly stages, organisation and safety plan (4)
- » Act according to the company's safety plan, carrying out the preventive, corrective and emergency works, implementing the established measures and complying with the standards and laws in force in the assembly and maintenance of wind power plants  
- » Assemble the wind turbines and their accessories and control and regulation elements according to the project, its drawings, standards and technical specifications, complying to regulatory requirements under the established quality and safety conditions  
- » Carry out the preventive maintenance of the wind power plant from drawings, standards and technical specifications, for its correct operation, complying with the regulatory requirements, under the established quality and safety conditions  
- » Carry out the corrective maintenance operations in the wind power plants, establishing the performance process, using instruction manuals and drawings and establishing the functional conditions with the required quality and safety  
- » Manage the maintenance of wind power plants  
- » Prevent labour hazards and act in emergency cases in wind plants  
- » ASSEMBLY AND MAINTENANCE OF SOLAR PHOTOVOLTAIC INSTALLATIONS  

- » ORGANIZATION AND CONTROL OF ASSEMBLY AND MAINTENANCE OF WATER AND SANITATION FACILITIES AND NETWORKS  
- ▾ ORGANIZATION AND PROJECTS OF PHOTOVOLTAIC SOLAR INSTALLATIONS  
- ▾ Determine the solar system project feasibility  
- ▾ Area Solar potential  
- » Determine the Solar potential of an area  
- Knowledge*
  - Basics of solar energy (5)
  - The sun as a source of energy. The Sun and the Earth. (5)
  - Converting solar energy (4)
  - Accumulating energy. (3)
  - Integrated energy systems (5)
- Skills / Performance*
  - The parameters of global solar radiation, average day temperature and temperature of the network cold water are got from official statistical data, or data reliable enough collected in charts (3)
  - The correlation between data is done when the required information is not directly given by the charts or statistics available (5)
  - The collaboration in the use of models to determine the direct, diffuse and global solar radiation is done using the necessary computing programs (5)
  - The measure and record of solar data is done by the use of the piranometer, the pyrheliometer, "datalogger", automatic stations and other systems in the required quality and safety conditions (5)
  - The use of the solar power is justified from the evaluation of the solar potential available (5)
- Affective / Behaviour*
  - Have initiative to promote projects (1)
- ▾ Solar systems proposals  
- » Formalise proposals for solar systems  
- Knowledge*
  - Classification of photovoltaic / thermal solar installations. Operating overview (5)
  - Solar panels. Operation, composition and connection. (5)
  - Elements of a photovoltaic / thermal solar installation connected to a network, and specifications. (4)
  - Size grid connected photovoltaic systems (4)
  - Stand alone systems (3)
  - Elements of a photovoltaic stand-alone solar installation, and specifications. (3)
  - Systems to back-up and accumulate energy. (1)
  - Solar cooling. (5)
  - Regulations applicable. (4)
  - Promotion of renewable energy. (5)
  - Energy models and policies. (4)
  - International, national and regional contexts of solar energy. (6)
  - Economic and financial studies on solar installations. (3)
  - Technical Building Code, Town planning and regulations applicable. (4)
  - Policy framework for subsidies. (6)
  - Legislation and tenders (3)
- Skills / Performance*
  - The survey of the required solar system components is done using the technical information rendered by the solar equipment manufacturers, carrying out the necessary calculations and fitting to the user's needs (5)
  -

The survey of the suitable site, the number and dimensions of the collectors or panels is done according to the building they are going to be placed in, as well as the conditions of shadows, obstacles and other factors determining the use of the solar power (5)


The survey of the system visual impact is done ensuring that it is as low as possible, according to the user's interests, the standard requirements and the placement possibilities (5)

The proposal is set and formalized incorporating the technical features, general schemes, complementary drafts and guidelines on the compliance with the standards, possible subsidies, depreciation and financing means (5)

The information and advice are given to the user meeting different questions he/she might make regarding the technical features, applicable standards, economic feasibility, maintenance requirements, supply reliability and guarantee and other aspects regarding the solar system (7)

*Affective / Behaviour*

Efficaciously communicate with the customers. (4)

▾ User's power needs and interests  

» Evaluate the user's power needs and interests and classify them  

*Knowledge*

Energy needs. Calculations (1)

Solar potential of an area. Tables and measuring systems. (5)

Site factors. Orientation, inclination and shadows. (4)

Architectural and structural systems. Architectural integration. (5)

Feasibility. Economic and financial factors. (3)

*Skills / Performance*

The user's power needs are classified according to the applications, the specifications of the receptors and the features of the power demand to be met (5)

The electric power needs are quantitatively determined and their basic parameters are established according to the kind of receptors (3)

The thermal power needs are quantitatively determined and their basic parameters are established, mainly the yearly seasonal average performances of the equipments and systems, depending on their maintenance state (5)

The variable of seasonal use, the times of use, the working temperatures and the simultaneity factor are determined and represented from recognised information sources and from the data rendered by the user. (3)


The formalisation of the diagnose and power needs of a user is carried out by determining the different possibilities of supply, the global economic costs and the plant depreciation (5)


*Affective / Behaviour*

Communicate efficaciously with the customers. (4)

Ability to adapt to a context and the people's needs. (3)

▾ Develop photovoltaic solar system projects  

▾ Photovoltaic solar system features  

▾ Define the features of the photovoltaic solar system  

*Knowledge*

General specifications. Installation systems. (5)

Protective tubes and channels. (6)

Sizing the module and string cable (5)

Lightning protection (6)





Surge protection. Over-voltage protection. Protection from direct and indirect contact. (6)




Interior installations in dwellings. Number of circuits and characteristics. (3)

General specifications for the installation. Installations in premises with special characteristics or purposes. (3)

Very low voltage installations. (5)

Installations at special voltages. (1)

- Low voltage generation installations. (4)
  - Installation of receivers, lighting, heating apparatus, cables and radiant heat-sheets in dwellings, motors transformers and autotransformers, reactance, rectifiers and condensers. (4)
  - Installations for systems of automation, technical energy management and health and safety in dwellings and offices. (4)
  - Authorised installers. Documentation and start-up of installations. (5)
  - Verification and inspection. (1)
- Skills / Performance*
  - The selected elements meet the standard technology in the sector and the homologation standards (3)
    - The features of the elements, equipments, components and materials are determined by technical calculations based on objective and reliable data, using manuals, charts and computing calculation programs. (3)
    - The calculations done have the required accuracy and are checked and compared with those of other systems with optimal operation (5)
      - The compatibility conditions among the different elements in the photovoltaic solar system and with other elements from auxiliary receiving installations is ensured, guaranteeing the performance, reliability and productive capacity of the system as a whole (5)
      - The selection of components is done taking into account the exchangeability, supply and cost guarantees. (3)
- ▾ Photovoltaic solar system projects reports and manuals  
- ▾ Elaborate reports and manuals justifying photovoltaic solar system projects  
- Knowledge*
  - Requirements to be taken into account in projects for setting up photovoltaic solar installations. (1)
  - Receiver installation. (5)
  - Information sources. (3)
  - Assessment of alternatives. (1)
  - Technological and economic criteria. (5)
  - Components in a project: data involved, standards required, specifications and supporting documents, plans, terms and conditions, budgets. (5)
  - Health and safety plan. (6)
- Skills / Performance*
  - The introduction and justification of the photovoltaic solar system project is done taking into account technological criteria of power supply, standard criteria and strategic criteria, among others (5)
  - The global technical description of the system is made through its functional analysis (5)
  - The global technical description of the system is made through its functional analysis (5)
  - The designed safety and protection systems, the automations used and other critical points of the system are analysed in the report (5)
    - The system operation and maintenance manual is written according to the kind of building and the different existing supporting systems, establishing the surveillance and maintenance activities and operations, according to the model required by standards (5)
    - The formal document corresponding to the report is written through general purpose computing applications (5)
- ▾ General outline and detailed drawings  
- ▾ Elaborate general outline and detailed drawings  
- Knowledge*
  - Design of panels and electrical circuits. (4)
  - Building mounting systems: roof constructions, snow and wind loads to constructions (4)
  - Civil works plans, as required. (1)
  - Electrical scheme drawings. (5)




- Exploded drawings. (5)
- Assembly diagrams for the elements comprising the installation. (5)
- Computer assisted design programs: Auto -Cad Basics, Sketch up. (4)
- Integration of solar installations. Passive solar architecture, photovoltaic solar power. Conventional power and solar power. (5)
- Distributed systems to produce electric power through photovoltaic systems. (4)
- Skills / Performance*  The necessary information to raise the building drawings, required for the project development, is directly got from the building or, if necessary, form the building project (3)
- The most singular points and accidents existing in the building and its structures affecting the solar system are systematically collected (3)
- The sketches comply with the proportion requirements and suitable graphic expression for their unmistakable interpretation (5)
- The system site drawings are done following the standards and optimising the drawing process by the incorporation of the drawings and/or technical specifications of the standardised elements (5)
- The representation of the different parts and circuits of the systems is done with the standardised symbols and conventionalisms of use (5)
- The placement of panels and equipments and the drawing, dimensions and technical specifications of the system are determined taking into account the calculations made in the report and complying with the requirements of exploitation and safety, as well as other regulations and laws of use (5)
- The structure resistance and waterproofing of the building are considered in the building solutions adopted in the assembly and maintenance of the installation (3)
- The material lists include the code and specifications of the project elements (3)
- The formal document with de drawings is elaborated with computer assisted design applications (5)
- ▾ Photovoltaic solar systems estimates  
- ▾ Elaborate estimates for photovoltaic solar systems  
  - Knowledge*  The most important variables and calculation factors. (3)
  - Methods used. (4)
  - Calculations for photovoltaic installations connected to a network. (1)
  - Number of panels. (1)
  - Calculations for stand-alone photovoltaic installations. (1)
  - Calculation for the accumulation system. (1)
  - Calculation of support systems using conventional generator groups. (1)
  - Calculation of support systems using wind power. (1)
  - Calculation of independent pumping and irrigation systems using photovoltaic systems. (1)
  - Computer assisted calculation programs. (4)
  - Skills / Performance*  The material lists include the commercial reference, code and the technical specifications of the project elements (3)
  - The unit price and the total price of each material and equipment is detailed, getting the total price of each item and of the whole system (5)
  - The manpower expenses are quantified for each professional taking part in the photovoltaic solar system assembly (5)
  - 4 The general expenses, industrial profit and Value Added Tax are applied to the different items with the legally established percentages (5)
  - The project and the budget coming from the installation are detailed and defined in such way that the unexpected expenses do not exceed 5% of the total budget. (5)
  - Affective / Behaviour*  Awareness of the transcendence of the calculations and designs for safety, operation and cost (1)
- ▾ Safety and health plan  

- ▾ Elaborate the safety and health plan  
  - Knowledge*
    - Risks from falls. (3)
    - Electrical hazard. (1)
    - Health and safety plan. (3)
    - Personal protection equipment. (4)
    - Environmental regulations. (4)
    - Dealing with accidents. (3)
    - Health and safety plan (4)
  - Skills / Performance*
    - The risks coming from falls, at the same or different level, getting trapped or object falling are identified and their importance are evaluated (5)
    - The thermal hazards coming from the solar plant are identified and their importance is evaluated (5)
    - The electrical hazards associated to the external circuits, high temperature and other extreme conditions are identified (5)
    - The prevision and planning of the emergency plan are integrated in the works documentation (3)
    - The work safety plan is formalised, identifying the different working risks and suggesting the corrective measures for their elimination, reasonable decrease and control (5)
    - The environmental affections are compared and the performance criteria are fixed to be minimised (5)
  - Affective / Behaviour*
    - Awareness of the transcendence of the calculations and designs for safety, operation and cost (1)

▾ Administrative paperwork

- ▾ Carry out the administrative paperwork  
  - Knowledge*
    - Policy framework for subsidies. (4)
    - Legislation and tenders. (3)
    - Processing subsidies. (3)
    - Technical and administrative documentation. (3)
    - Promoting and managing installations. (5)
    - Bid presentation. (2)
  - Skills / Performance*
    - The compliance of the technical and administrative standards of the installation are ensured previously to the elaboration of the authorisation paperwork in the corresponding official organisations (3)
    - The required technical and administrative documents to get the installation permits are filled in, and processed (5)
    - The compliance with the administrative requirements and other kind to access to the possible subsidies existing for this kind of installations is ensured previously to processing the application paperwork in the corresponding official organisations (5)
    - The required technical and administrative documentation to ask for the benefits for the installation is filled in, organised and processed (5)
    - The surveillance of the administrative processes related with the authorisation and permits to carry out the installation and those related with the request for subsidy are done avoiding the stop of records due to causes attributable to the installer (5)

- » ORGANIZATION AND PROJECTS OF THERMAL SOLAR INSTALLATIONS
- » BUILDING ENERGY EFFICIENCY
- » OPERATING MANAGEMENT AT THERMAL POWER PLANTS
- » ASSEMBLY AND MAINTENANCE MANAGEMENT OF GAS NETWORK
-

- » INSTALLATION, COMMISSIONING, MAINTENANCE, INSPECTION AND REVISION OF RECEPTION FACILITIES AND GAS APPLIANCES
- » OPERATING MANAGEMENT HYDRO POWER  
- » INSTALLATION, OPERATION AND MAINTENANCE MANAGEMENT OF ELECTRICAL SUBSTATION  
- » BASIC OPERATIONS ON ASSEMBLY AND MAINTENANCE OF RENEWABLE ENERGY FACILITIES  
- » EFFICIENT MANAGEMENT OF WATER  