

[Back](#)

# Install And Maintain Solar Thermal Facilities

## ▣ Description

This is the online tool isused for remotely and collaboratively implementing the initial stages of the conceptualisation, design and 'reality anchoring' of the competence framework for the selected job category, as well as for providing the initial content for the 'equivalence'-generating tool being developed and tested as part of the GREEN project.

## ▣ KPAs/Key Performance Areas

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### ▣ [KPA1. INSTALL AND MAINTAIN SOLAR THERMAL FACILITIES](#)

Perform the coordination of the assembly and maintenance of solar thermal systems within the framework of the safety and quality rules in accordance with the regulations

Performance Criteria Description: Study  
Preparation of implementation  
Development of a solar thermal system  
Setting and commissioning  
Maintenance  
Communication

### ▣ [LO1. INSTALL AND MAINTAIN SOLAR THERMAL FACILITIES](#)

*LO Performace Criterias / Performance Indicators:*

<i>Name</i>	<i>Description</i>	<i>Means of Criticality/Priority verification</i>
1. Study	<ul style="list-style-type: none"> <li>• Check the contents of the file and analyze</li> <li>• Make statements and measures</li> <li>• Check the feasibility</li> </ul>	
2. Preparation of implementation	<ul style="list-style-type: none"> <li>• Find further technical information</li> <li>• Identify stakeholders and allocate activities within the team</li> <li>• Identify the working environment</li> <li>• Choose accessories, consumables and tools required</li> <li>• Develop site safety and identify potential risks and pollution</li> <li>• Adapt to weather conditions</li> <li>• Verify compliance of the supports</li> <li>• Check the power supplies and networks</li> </ul>	

- Receive materials
  - Plan tasks taking into account the activities of other trades and the workload of the company
  - Check accreditations and authorizations of stakeholders
3. Development of a solar thermal system
- use and make use means of protection, safety devices
  - Organize, store, supply site
  - Identify and mark the passage of different networks
  - Implement and secure equipment and accessories
  - Shaping networks, assemble and connect components and equipment
  - Seal all
  - Provide connections to different networks (electrical, fluidic, ...)
  - Label, locate and identify circuits and networks
  - Perform sorting and disposal of waste
  - Verify compliance of work performed in relation to the work required
4. Setting and commissioning
- Perform adjustments and tests
  - Set up the installation
  - Inform commissioning documents and retrospective documentation drawings
  - Prepare the receipt of completed installation
5. Maintenance
- Perform preventive maintenance intervention
  - Perform corrective maintenance intervention
  - Check the adequacy of the performance achieved vis-à-vis the expected performance
6. Communication
- Contribute to the representation of the company
  - Identify customer complaints and argue with his requests for information
  - Collect and transmit oral and / or written information
  - Communicate the results of the intervention with the customer and the hierarchy
  - Present the operation and use of the facility to the customer
  - Explain the characteristics of a maintenance contract

  [LU1. Study](#)  

Facility implementation file, drawings, diagrams, nomenclature, quotation, order, manufacturers catalogs, standards and specific regulations, organization of site, execution file, workload and resource allocation

*Competency list:*

	<i>Name</i>	<i>Strata</i>	<i>Reference Description</i>	<i>Criticality Alias</i>
<i>Knowledge / Cognitive</i>	1. Regulatory, administrative and legal knowledge	1. <i>Evaluation</i>	<ul style="list-style-type: none"> <li>• Stakeholders.</li> <li>• Administrative Procedure</li> <li>• Qualifications, warranties</li> </ul>	

			and liability
			<ul style="list-style-type: none"> <li>• The thermal regulations</li> <li>• The acoustic regulations</li> <li>• Regulations concerning local financial aid, tax returns and special “green” loans</li> </ul>
	2. Knowledge of building and technical communication	1. <i>Evaluation</i>	<ul style="list-style-type: none"> <li>• Tools, standards and representation</li> <li>• Architectural drawings and drawings</li> <li>• Freehand sketch</li> <li>• Descriptive and quantitative documents</li> <li>• Talking/writing technical</li> </ul>
	3. Scientific knowledge	1. <i>Evaluation</i>	<ul style="list-style-type: none"> <li>• Heat exchange</li> <li>• Identification of a facility</li> <li>• Energy performance of buildings</li> <li>• Solar energy (incident radiation, radiation and irradiance, energy received)</li> <li>• Energy recovery and transfer (conduction, convection, radiation)</li> </ul>
<i>Skills / Performance</i>	1. Characterize the intervention site	1. <i>Problem solving</i>	
	2. Collect information specific to the intervention	1. <i>Problem solving</i>	
	3. Make a solar diagram	1. <i>Problem solving</i>	
	4. Calculate solar cell efficiency based on location	1. <i>Problem solving</i>	
	5. Identify the documents	1. <i>Problem solving</i>	
	6. Identify the values to meet	1. <i>Problem solving</i>	
	7. Analyze the installation environment		

		<i>1. Problem solving</i>
	8. Study of the framework/roof structure including necessary support and modifications in cover waterproofness (each attachment is adapted to each tile)	<i>1. Problem solving</i>
	9. Plan installation layout according to roof structure (chimneys, roof windows)	<i>1. Problem solving</i>
	10. Check the feasibility	<i>1. Problem solving</i>
	11. Identify the risks to people and property, including electrical hazards (security clearance)	<i>1. Problem solving</i>
	12. Identify potential risks of pollution	<i>1. Problem solving</i>
	13. Identify and characterize the fluid and energy networks	<i>1. Problem solving</i>
	14. Collect additional information on intervention	<i>1. Problem solving</i>
	15. Identify stakeholders and their function	<i>1. Problem solving</i>
	16. Identify equipment	<i>1. Problem solving</i>
	17. Characterize the work environment	<i>1. Problem solving</i>
	18. Installation evolution - plan modification possibilities in order to expand installation at a later date	<i>1. Problem solving</i>
<i>Affective / Verification</i>	1. Create mandatory self-assessment checklist	<i>1. Value characterisation</i>
	2. The location of the intervention and the operating characteristics provided for installation are identified.	<i>1. Value characterisation</i>
	3. Parts are listed, their relevance is checked, missing data are reported, the customer is identified.	<i>1. Value characterisation</i>
	4. The surrounding environment is identified; environmental constraints are identified	<i>1. Value characterisation</i>
	5.	

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|--|----------------------------------|
| The power and outlets are located, their characteristics are identified, supplies and evacuations expected comply  | 1. <i>Value characterisation</i> |
| 6. Identify the building's energy performance level (with thermal camera)  | 1. <i>Value characterisation</i> |
| 7. The missing technical information is identified, the relevant resource is identified, the information collected is recorded.  | 1. <i>Value characterisation</i> |
| 8. Stakeholders, internal and external to the company are identified.  | 1. <i>Value characterisation</i> |
| 9. The existing equipment is identified, components and sub-assemblies are identified.   | 1. <i>Value characterisation</i> |
| 10. Access is recognized cantonments are located, are marked provisional power, storage locations are located  | 1. <i>Value characterisation</i> |
| 11. Deadlines are relevant, human resources are identified, the necessary resources are mobilized, the orders of magnitude are estimated; inconsistencies are reported, the presence of administrative permits is checked. | 1. <i>Value characterisation</i> |
| 12. Risks are identified, actions are proposed   | 1. <i>Value characterisation</i> |

## [LU2. Preparation of implementation](#)

General planning, site data, site installation drawings, available equipment, team composition, timing of intervention, weather report, execution file, drawings, diagrams, nomenclature, quotation, order

*Competency list:*

	<i>Name</i>	<i>Strata</i>	<i>Reference Description</i>	<i>Criticality Alias</i>
<i>Knowledge / Cognitive</i>	1. Organization, planning and monitoring of a project	1. <i>Evaluation</i>		
	2. Managing the workstation	1. <i>Evaluation</i>		
	3. Time management	1. <i>Evaluation</i>		
	4. Quality Management.	1. <i>Evaluation</i>		
	5. Environmental management and waste	1. <i>Evaluation</i>		
<i>Skills / Performance</i>	1. Quantify the needs	1. <i>Problem solving</i>	<ul style="list-style-type: none"> <li>• Interpret a work schedule</li> <li>• Identify the risks</li> </ul>	

	2. Plan the intervention	1. <i>Problem solving</i>	associated with the intervention
	3. Organize activities	1. <i>Problem solving</i>	<ul style="list-style-type: none"> <li>• List the hardware requirements and tools</li> <li>• Scheduling Tasks</li> <li>• assign tasks</li> <li>• Take into account the uncertainties</li> <li>• Check the access</li> <li>• Receive equipment and monitor compliance</li> <li>• Store the equipment</li> </ul>
<i>Affective / Verification</i>	1. Tasks are planned taking into account the activities of other trades and the workload of the company.	1. <i>Value characterisation</i>	
	2. The necessary approvals and authorizations are listed.	1. <i>Value characterisation</i>	
	3. Tasks are assigned according to qualifications	1. <i>Value characterisation</i>	
	4. The timing of intervention is established	1. <i>Value characterisation</i>	
	5. The organization of work takes into account the weather conditions to allow a safety intervention	1. <i>Value characterisation</i>	
	6. The provided access are acknowledged, any adjustments allow supply and security implementation	1. <i>Value characterisation</i>	

### [LU3. Development of a solar thermal system](#)

- use and make use means of protection, safety devices
- Organize, store, supply site
- Identify and mark the passage of different networks
- Implement and secure equipment and accessories
- Shaping networks, assemble and connect components and equipment
- Seal all
- Provide connections to different networks (electrical, fluidic, ...)
- Label, locate and identify circuits and networks
- Perform sorting and disposal of waste
- Verify compliance of work performed in relation to the work required

*Competency list:*

	<i>Name</i>	<i>Strata</i>	<i>Reference Description</i>	<i>Criticality Alias</i>
<i>Knowledge / Cognitive</i>	1. Types of systems	1. Evaluation		
	2. constituents	1. Evaluation		
	3. Organization of the workstation	1. Evaluation		
	4. Time management	1. Evaluation		
	5. Quality Management	1. Evaluation		
	6. Environmental management and waste	1. Evaluation		
	7. Prevention, knowledge of the principal risks	1. Evaluation		
	8. Risk of accidents	1. Evaluation		
	9. Methodology for risk management	1. Evaluation		
	10. Risks to health	1. Evaluation		
	11. Hygiene	1. Evaluation		
	12. What to do in case of accident	1. Evaluation		
	13. Manual and mechanical handling, workstation	1. Evaluation		
	14. Protection of the workstation and the environment	1. Evaluation		
	15. Specific risks	1. Evaluation		
<i>Skills / Performance</i>	1. Verify data on site	1. Problem solving	<ul style="list-style-type: none"> <li>• Measure quantities. Dimensional surveys are made</li> <li>• Identify energy, fluidic and communication networks, and check their characteristics</li> </ul>	
	2. Install workstations	1. Problem solving	<ul style="list-style-type: none"> <li>• Implement safety devices</li> <li>• Use and make use means of protection and safety devices</li> </ul>	
	3. Implement hardware	1. Problem solving	<ul style="list-style-type: none"> <li>• Identify the passing of different networks.</li> <li>• Locate and secure the equipment and accessories.</li> <li>• Implement additional supports and suitable anchoring</li> <li>• Assemble and connect components and equipment</li> </ul>	

4. Sealing the support

1. *Problem solving*

- Conduct a seal between the equipment and its support

5. Connect networks

1. *Problem solving*

- Shaping networks on site or prefabrication
- Provide connections to different networks (electrical, fluidic, ...)
- Label, locate and identify circuits and networks

*Affective / Verification*

1. Physical quantities required are identified.

1. *Value characterisation*

2. The presence of networks, their characteristics and their availability is checked.

1. *Value characterisation*

3. The markup is implemented, access and work areas are secure.

1. *Value characterisation*

4. Accreditations and authorizations are checked.

1. *Value characterisation*

5. The presence and use of safety devices are checked.

1. *Value characterisation*

6. The route of networks is consistent with the implementation plan. Their path preserves the characteristics of components using (roof, wall, floor, insulation, ...).

1. *Value characterisation*

7. The track layout is consistent with the implementation plan.

1. *Value characterisation*

8. Handling means are present, adapted and implemented.

1. *Value characterisation*

9. Equipment and accessories are installed in accordance with the implementation plan.

1. *Value characterisation*

10. Safety of persons is ensured, the integrity of the equipment is maintained.

1. *Value characterisation*

11. The realization is consistent with drawings and adapted to the elements to be put into place.

1. *Value characterisation*

12. Equipment and components are assembled and connected in accordance with the implementation plan and / or manufacturers instructions.

1. *Value characterisation*



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|---|---------------------------|
| 13. For sensors fixed onto rails, the seal is maintained.   | 1. Value characterisation |
| 14. For systems for sensors integration, flashings are made either in sheet metal work or devices provided by the system. | 1. Value characterisation |
| 15. Characteristics of crossed elements are preserved.  | 1. Value characterisation |
| 16. Networks are shaped in accordance with the implementation plan and the rules of the art.                              | 1. Value characterisation |
| 17. Private networks are connected in accordance with the drawings.   | 1. Value characterisation |
| 18. The network connection of a distributor is prepared according to the regulations.                                     | 1. Value characterisation |
| 19. Circuits and networks are identified legally and in accordance with specifications.                                   | 1. Value characterisation |

#### [LU4. Setting and commissioning](#)

- Perform adjustments and tests
- Set up the installation
- Inform commissioning documents and retrospective documentation drawings
- Prepare the receipt of completed installation

##### Competency list:

	<i>Name</i>	<i>Strata</i>	<i>Reference Description</i>	<i>Criticality Alias</i>
<i>Knowledge / Cognitive</i>	1. Commissioning procedures	1. Evaluation	<ul style="list-style-type: none"> <li>• Flushing installation</li> <li>• Filling</li> <li>• Powering</li> <li>• Presets</li> </ul>	
<i>Skills / Performance</i>	1. Respect clearly identified methodology	1. Problem solving		
	2. Select flushing technique - water or glycol - based on type of facility	1. Problem solving		
	3. Select filling technique - manual or pump - and specify optimal filling pressure level and duration	1. Problem solving		
	4. Identify valves to open or shut for flushing and filling	1. Problem solving		
	5. Perform a preset of a balancing device, control or safety	1. Problem solving		

*Affective /  
Verification*

6. Perform leak tests and strength	1. <i>Problem solving</i>
7. Perform the operations planned in the installation test program	1. <i>Problem solving</i>
8. Evaluate consequence of flexible stainless steel tubes and bubbles in installation	1. <i>Problem solving</i>
9. Verify potential equalization system, solar and hot water expansion tank pressure	1. <i>Problem solving</i>
10. Complete the startup application	1. <i>Problem solving</i>
11. Update drawings and plans	1. <i>Problem solving</i>
12. Prepare the installation delivery acceptance	1. <i>Problem solving</i>
1. The work of commissioning be accepted	1. <i>Value characterisation</i>
2. Checking presets can allow the putting into service	1. <i>Value characterisation</i>
3. The tests are performed in accordance with protocols	1. <i>Value characterisation</i>
4. The possibly detected faults are corrected	1. <i>Value characterisation</i>
5. Equipment testing procedures are applied	1. <i>Value characterisation</i>
6. The intervention approach is logical, relevant and appropriate to the context.	1. <i>Value characterisation</i>
7. The settings to optimize system operation	1. <i>Value characterisation</i>
8. The tests and performances are recorded	1. <i>Value characterisation</i>
9. DOE folder is completed in accordance with the installation performed	1. <i>Value characterisation</i>
10. The elements necessary for receiving were held (facility in service, documents, ...)	1. <i>Value characterisation</i>



**LU5. Maintenance**



- Perform preventive maintenance intervention
- Perform corrective maintenance intervention
- Check the adequacy of the performance achieved vis-à-vis the expected performance

*Competency list:*

	<i>Name</i>	<i>Strata</i>	<i>Reference Description Criticality Alias</i>
<i>Knowledge / Cognitive</i>	1. Procedures for preventive and corrective maintenance	1. Evaluation	
<i>Skills / Performance</i>	1. Respect identified standard maintenance procedures (maintenance contract)	1. Problem solving	
	2. Use recommended tools accordingly	1. Problem solving	
	3. Implement ways to protect people and property	1. Problem solving	
	4. Perform maintenance operations specified in the contract	1. Problem solving	
	5. Record maintenance, measurements and settings in the installation monitoring file	1. Problem solving	
	6. Analyze detected data and measurements	1. Problem solving	
	7. Perform tests, adjustments and corrections	1. Problem solving	
	8. Clean the site, recover sort and store waste	1. Problem solving	
	9. Diagnose the cause of a malfunction	1. Problem solving	
	10. Troubleshoot an installation	1. Problem solving	
	11. Implement remedial or precautionary solutions	1. Problem solving	
	12. Inspect the work	1. Problem solving	
	13. Monitor the performance of the installation	1. Problem solving	
	14. Control work commissioned by a third party	1. Problem solving	
<i>Affective / Verification</i>	1. Means of protection in place are adequate and allow the realization of the intervention without risk to stakeholders and third parties.	1. Value characterisation	
	2. Operations are performed under the contract, the anomalies are corrected and / or recorded.	1. Value characterisation	
	3. The various operations are logged and can monitor the installation.	1. Value characterisation	
	4. The measurements are carried out safely (temperature, voltage, current, ...).	1. Value characterisation	
	5. The settings are adapted for the operation of the installation.	1. Value characterisation	
	6. Waste management respects regulations and the environment.	1. Value characterisation	

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| 7. The diagnostic approach is logical and appropriate to the context, it takes into account the operation of the system and information from the client. | 1. <i>Value characterisation</i> |
| 8. The proposed intervention is made wisely.   | 1. <i>Value characterisation</i> |
| 9. Troubleshooting allows operation according to the installation.   | 1. <i>Value characterisation</i> |
| 10. Remedial and / or precautionary actions allow a degraded mode operation.   | 1. <i>Value characterisation</i> |
| 11. Control is methodical, the work conform to the specifications  | 1. <i>Value characterisation</i> |
| 12. The anomalies are listed and / or corrected  | 1. <i>Value characterisation</i> |
| 13. The expected performance is compared to the performance provided.  | 1. <i>Value characterisation</i> |
| 14. Gaps are identified  | 1. <i>Value characterisation</i> |

## [LU6. Communication](#)

- Contribute to the representation of the company
- Identify customer complaints and argue with his requests for information
- Collect and transmit oral and / or written information
- Communicate the results of the intervention with the customer and the hierarchy
- Present the operation and use of the facility to the customer
- Explain the characteristics of a maintenance contract

### *Competency list:*

	<i>Name</i>	<i>Strata</i>	<i>Reference Description</i>	<i>Criticality Alias</i>
<i>Knowledge / Cognitive</i>	1. Administrative and legal environment of the company	1. <i>Evaluation</i>		
	2. Building and technical communication	1. <i>Evaluation</i>		
<i>Skills / Performance</i>	1. Talk with the customer and with the hierarchy	1. <i>Problem solving</i>	<ul style="list-style-type: none"> <li>• Present operation and manual installation</li> <li>• Argument with the customer's requests for information</li> <li>• Explain the characteristics of a maintenance contract</li> <li>• Ask the customer</li> </ul>	

*Affective / Verification*

- |  |                                  |
|--|----------------------------------|
| 2. Fill documents  | <i>1. Problem solving</i>        |
| 1. The presentation is done with a clear and appropriate, by referring to key points of the manual. The general principle of operation is described. | <i>1. Value characterisation</i> |
| 2. The description reflects the facility provided.   | <i>1. Value characterisation</i> |
| 3. The answers are relevant.   | <i>1. Value characterisation</i> |
| 4. Presentation of other solutions to improve energy efficiency is correct.  | <i>1. Value characterisation</i> |
| 5. Different types of maintenance contracts, their characteristics and advantages are explained.   | <i>1. Value characterisation</i> |
| 6. Known faults are taken into account.  | <i>1. Value characterisation</i> |
| 7. The written or oral presentation is clear and precise.  | <i>1. Value characterisation</i> |
| 8. The documents are filled and usable.  | <i>1. Value characterisation</i> |
| 9. Traceability of interventions is ensured  | <i>1. Value characterisation</i> |
| 10. Receiving documentation of the installation is completed.  | <i>1. Value characterisation</i> |
| 11. Retrospective documentation drawings are modified in accordance with the schematic   | <i>1. Value characterisation</i> |

- dysfunctions observed
- Transmit the results of the intervention with the client and its hierarchy
  - Fill commissioning documents
  - Control retrospective documentation

## Framework

This web service uses the [VCP](#) (Virtual Community Platform)

VCP is a top of the line platform for powerful online interaction, networking and collaboration.