

N A B C E P

Solar Heating Installer Job Task Analysis





Raising Standards. Promoting Confidence.

NABCEP's mission is to establish and operate high quality credentialing programs for renewable energy professionals. NABCEP certifications promote worker safety, provide value to practitioners and consumers, and set the standard for measurable cognitive skill levels.

Job Description and Task Analysis

for NABCEP Certified Solar Heating Installers



Introduction

This document presents a comprehensive Job Task Analysis (JTA) for individuals who install solar water and pool heating systems on buildings. It is important to note that these tasks are applicable to installation personnel—not to the system designer. This task list assumes the certified installer starts with an approved solar system design package, complete with major components, manufacturer installation manual, system schematics, and assembly and troubleshooting instructions. While the certified installer may not design the system, in many cases he or she must be knowledgeable about many aspects of systems design, and may be required to adapt certain designs to fit a particular application or customer need.

In this JTA, tasks are categorized according to their priority or importance using three levels:

- **Critical** items are considered high priority tasks and are expected competencies for all installers. These include items involving safety and other tasks with a high chance of error that could lead to system failure, destruction of components to which the system is attached, etc.

- **Very important** items are medium priority tasks, and are generally expected of all quality installers.

- **Important** items are considered low priority tasks, but are usually performed by all installers.

This document is divided into two sections. The first section, on page 3 provides a high-level view of the JTA and lists the main tasks and their criticality. The second section, which begins on page 4, provides a detailed view of the sub topics for each of the tasks.

Job Description

for NABCEP Certified Solar Heating Installer

Given basic instructions, manufacturer installation manual, major components specifications, schematics, and drawings, the installer is required to install a solar water heating system that meets the performance and reliability needs of customers in the United States and Canada by incorporating quality craftsmanship and complying with all applicable codes and standards.

Fundamentally, this JTA assumes that the installer begins with adequate documentation for the system design and equipment, including manuals for major components, electrical and mechanical drawings, and instructions. While these tasks have been developed based on conventional designs, equipment, and practice used in the industry today, they do not seek to limit or restrict innovative equipment, designs, or installation practice in any manner. As with any developing technology, it is fully expected that the skills required of the practitioner will develop and change over time as new materials, techniques, codes, and standards evolve.

Solar Heating Installer Tasks

AREA AND TASK	LEVEL
A. PREPARE FOR PROJECT	
● Task 1. Review the construction plans	Critical
● Task 2. Assemble materials	Critical
● Task 3. Assemble and inspect safety protection equipment	Very Important
● Task 4. Assemble tools	Important
B. EVALUATE THE SITE	
● Task 1. Compare design to site	Critical
● Task 2. Inspect and document existing site conditions	Very Important
● Task 3. Ensure OSHA compliance	Very Important
● Task 4. Ensure code compliance	Important
C. PLAN SYSTEM INSTALLATION	
● Task 1. Lay out collector(s) installation	Critical
● Task 2. Plan solar loop pipe	Critical
● Task 3. Plan mechanical room/area	Critical
D. INSTALL SYSTEM	
● Task 1. Install solar collectors	Critical
● Task 2. Install solar loop	Critical
● Task 3. Install balance-of-system	Critical
● Task 4. Wire the system	Critical
● Task 5. Pressure test the system	Very Important
● Task 6. Fill the system	Very Important
● Task 7. Install insulation	Very Important
● Task 8. Implement site safety plan	Very Important
E. COMMISSION THE SYSTEM	
● Task 1. Verify system operations	Critical
● Task 2. Program the controllers	Very Important
● Task 3. Conduct customer walk-through	Very Important
● Task 4. Request final inspection	Important
F. SERVICE AND MAINTAIN THE SYSTEM	
● Task 1. Perform scheduled maintenance	Important
● Task 2. Troubleshoot and repair system	Important
● Task 3. Ensure OSHA compliance	Important

Solar Heating Installer Sub-Tasks

AREA, TASK, SUB-TASK	LEVEL
----------------------	-------

A: PREPARE FOR PROJECT

Task 1. Review the construction plans

● Read the construction plans	Critical
● Create the materials list	Critical
● Identify exceptions or special materials needed	Critical
● Identify special tools needed	Critical
● Identify safety equipment needed	Critical
● Prepare project schedule	Very Important

Task 2. Assemble materials

● Acquire materials for job	Critical
● Inspect materials	Critical
● Compare material availability to project schedule	Critical
● Prepare materials for transport	Very Important
● Arrange for equipment delivery	Very Important

Task 3. Assemble and inspect safety protection equipment

● Assemble required Personal Protection Equipment (PPE)	Critical
● Assemble required site-specific safety equipment	Critical
● Inspect required site-specific safety equipment	Critical
● Inspect required PPE	Very Important

Task 4. Assemble tools

● Acquire tools for job	Very Important
● Inspect tools	Very Important
● Arrange for tool delivery	Important
● Prepare tools for transport	Important
● Compare tool availability to project schedule	Important

AREA, TASK, SUB-TASK	LEVEL
----------------------	-------

B: EVALUATE THE SITE

Task 1. Compare design to site

● Verify site address	Critical
● Verify system type is appropriate for site	Critical
● Measure the roof	Critical
● Confirm collector location, tilt, and azimuth	Critical
● Evaluate present and future collector shading	Critical
● Verify tank storage size, location, and access	Critical
● Verify balance-of-system equipment suitability	Critical

Task 2. Inspect and document existing site conditions

● Walk the site and note hazards	Critical
● Document collector placement and location	Very Important
● Document deficiencies in existing roof conditions	Very Important
● Locate existing utility interconnections	Very Important
● Document existing damage in the planned work area	Very Important
● Document existing equipment deficiencies	Very Important
● Identify staging area	Very Important

Task 3. Ensure OSHA compliance

● Devise the site safety plan	Very Important
● Begin implementation of site safety plan	Very Important
● Mark hazards	Very Important

Task 4. Ensure code compliance

● Inform customer of any code violations	Critical
● Post permit (if necessary)	Important
● Document existing code violations	Important

AREA, TASK, SUB-TASK	LEVEL
----------------------	-------

C: PLAN SYSTEM INSTALLATION

Task 1. Layout collector(s) installation

● Locate and mark structural members	Critical
● Lay out attachment hardware	Critical
● Lay out structural modifications	Important

Task 2. Plan solar loop pipe

● Determine pipe layout from collector to balance-of-system	Critical
● Locate and mark building penetrations	Very Important

Task 3. Plan mechanical room/area

● Plan system interconnections	Critical
● Verify storage tank location	Critical
● Inform customer of utility service interruptions	Very Important
● Determine layout for balance-of-system	Very Important

D: INSTALL SYSTEM

Task 1. Install solar collectors

● Install safety equipment	Critical
● Install mounting hardware	Critical
● Seal and flash penetrations	Critical
● Attach panels to mounting hardware	Critical
● Place panels on roof	Very Important

Task 2. Install solar loop

● Seal and flash pipe penetrations	Critical
● Install pipe	Very Important
● Drill pipe penetrations	Very Important
● Install pipe supports	Very Important
● Pressure test collector loop	Very Important
● Insulate pipe	Very Important

AREA, TASK, SUB-TASK	LEVEL
----------------------	-------

Task 3. Install balance-of-system

● Install valves	Critical
● Install pumps	Critical
● Install system safety devices	Critical
● Place storage tanks	Very Important
● Install heat exchangers	Very Important
● Install meters	Important

Task 4. Wire the system

● Install controller(s)	Critical
● Connect sensors	Very Important
● Install sensor wires	Very Important
● Wire the pump(s)	Very Important
● Make final AC connections	Very Important
● Protect wires	Very Important

Task 5. Pressure test the system

● Inspect for leaks	Critical
● Isolate the expansion tank	Very Important
● Attach pressure test fittings	Very Important
● Pressurize the system	Very Important
● Monitor pressure	Very Important

Task 6. Fill the system

● Verify valve positions for filling	Very Important
● Close all drains	Very Important
● Connect charging systems	Very Important
● Fill system with heat transfer fluid and label	Very Important
● Flush system	Important

Task 7. Install insulation

● Wrap the pipes with insulation	Critical
● Install labels	Critical
● Install UV protection	Very Important
● Cut and seal corners	Very Important
● Seal edges	Very Important
● Insulate required components	Very Important

AREA, TASK, SUB-TASK	LEVEL
Task 8. Implement site safety plan	
● Identify unsafe practices	Very Important
● Correct unsafe practices	Very Important
● Check safety equipment for defects	Very Important

E: COMMISSION THE SYSTEM

Task 1. Verify system operations

● Verify valve positions, orientations, and functions	Critical
● Check pump operation	Critical
● Check temperature difference	Very Important
● Verify flow rates	Very Important
● Bleed air vents	Very Important
● Check system temperatures	Very Important
● Check collector flow direction	Important

Task 2. Program the controllers

● Verify sensor connections	Critical
● Verify functions	Critical
● Read the manual	Very Important
● Set temperature parameters	Very Important
● Set flow rates	Very Important

Task 3. Conduct customer walk-through

● Deliver and review owner's manual	Very Important
● Document baseline settings (normal readings)	Very Important
● Explain emergency procedures	Very Important
● Record model and serial numbers	Important

Task 4. Request final inspection

● Verify system meets code	Important
● Request inspection(s)	Important
● Coordinate inspection(s)	Important

AREA, TASK, SUB-TASK	LEVEL
----------------------	-------

F: SERVICE AND MAINTAIN THE SYSTEM

Task 1. Perform scheduled maintenance

● Test freeze protection method	Important
● Drain and flush the system	Important
● Perform visual degradation check	Important
● Check controls and sensors	Important
● Check and replace anodes	Important

Task 2. Troubleshoot and repair system

● Identify problem	Very Important
● Solve the problem	Very Important

Task 3. Ensure OSHA compliance

● Use site safety	Critical
● Use PPE	Critical
● Observe OSHA standards	Very Important

Exam Blueprint

The table below shows the blueprint (test specifications) for the NABCEP Certified Solar Heating Installer Examination. It is provided for candidates' and educators' use to determine which specific knowledge areas to focus on when preparing for the examination.

NABCEP Certified Solar Heating Installer Exam Blueprint

	% of exam	# of items
A. Prepare for project	12%	7
B. Evaluate the site	13%	8
C. Plan system installation	19%	11–12
D. Install the system	30%	18
E. Commission the system	14%	8–9
F. Service and maintain the system	12%	7
TOTAL	100%	60

NABCEP thanks the following volunteer committee members for their expertise and assistance in creating this JTA:

Jessica Baldwin
Solar Plumbing Design
Brooklyn, NY

Adam Gusse
H&H Solar Energy
Services, Inc.
Madison, WI

Les Nelson
Western Renewables Group
Rancho Santa Margarita, CA

Bill Stewart
SolarCraft
Novato, CA

Bo DeAngelo
Automatic Solar
Boulder, CO

Dell Jones
Regenesys Solar Power
Lakeland, FL

Patrick Redgate
Ameco Solar, Inc.
Paramount, CA

Daimon Vilppu
Simply Efficient
Lakewood, CO

Steve Elkin
SolarUS Inc.
Branford, CT

Larry Mapes
Valverde Energy
Taos, NM

Karl Schwingel
Northwind Renewable Energy
Stevens Point, WI

Jim Wood
SOLARHOT
Morrisville, NC

Greg Gahagan
UMA Solar
Fairfield, CA

NABCEP™

Raising Standards. Promoting Confidence.

North American Board of
Certified Energy Practitioners
56 Clifton Country Road, Suite 202
Clifton Park, NY 12065
800-654-0021 / info@nabcep.org

www.nabcep.org

Expertise looks good on you.



As the industry mark of excellence, NABCEP Certification provides you with unparalleled opportunity for job advancement, salary growth and consumer trust. NABCEP Certified professionals are recognized as leaders who are committed to providing exceptional quality and value.

Experience. Quality. Professionalism. Our promise has never changed. And our new look only makes certification more attractive.

Solar Professionals, visit nabcep.org

to learn about the benefits of certification (including exclusive discounts on products, services, trainings, and events). Check the calendar page for the next application deadline.



PV Installation Professional
PV Technical Sales Professional
Solar Heating Installer



**Meet the faces of NABCEP:
Will Herndon**

CEO of Ambassador Energy

"My NABCEP certification provided me with knowledge I can pass on to the 15 field construction teams I am responsible for. There is nothing else out there like it. It is the clear solution to fill company field operation needs."

NABCEP™

Raising Standards. Promoting Confidence.