

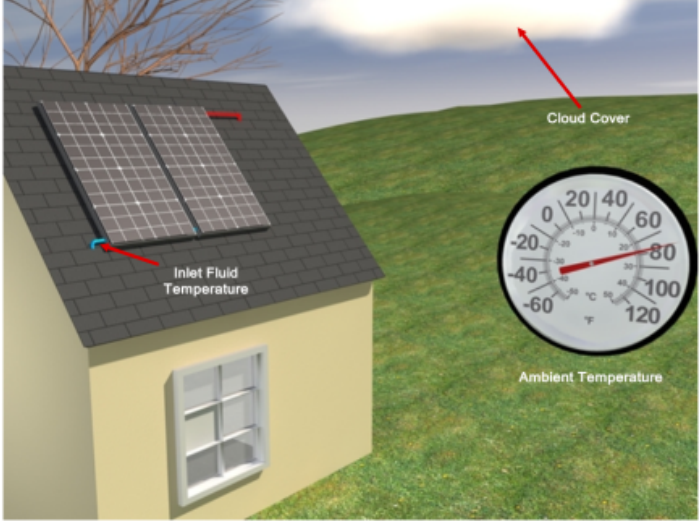
# Open-Loop Solar Thermal Troubleshooting| eLearning Course

Solar Collectors - W20101-XB01AEN-E1

Objective 4: Describe the Thermal Characteristics of a Solar Collector

Measures of Thermal Output

Heat output is determined by both the design of the collector and environmental factors. These include cloud cover, ambient temperature, wind, snow, and inlet fluid temperature.



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## eLearning Course: M20101

Amatrol's Solar Thermal Open-Loop Troubleshooting eLearning course teaches skills and knowledge needed for working with open-loop system configurations and situations. It emphasizes connection, programming, and troubleshooting problems system wide, supporting the knowledge needed for the NABCEP (North American Board of Certified Energy Practitioners) test for certified solar thermal system installer. It covers collectors, open-loop thermal systems, output measurement, solar collector specifications, pumps, solar storage tanks, air vent and vacuum valves, check valves, system charging, freeze protection, analog controllers, draindown system operation, and overall system operation and performance.

## Teach Open-Loop Solar Thermal Skills

### What is a Solar Thermal System?

Unlike solar photovoltaic (PV) systems, which harness solar power to generate electrical power, solar thermal systems collect energy from the sun and convert it into heat.

Solar thermal systems transfer the heat generated from their solar collectors to residential or business water systems. Solar thermal systems are especially effective for businesses and residential properties that have a large hot water requirement.

### What is the Difference between Open-Loop and Closed-Loop Solar Thermal Systems?

Solar thermal heating systems can be divided into categories: open-loop systems and closed-loop systems. So what's the difference between these two types of systems?

In open-loop systems, often called direct systems, the solar collector panels heat water and send it back to the cylinder where it is then sent directly to taps or appliances for household use. Open-loop systems usually feature a temperature-controlled pump or similar system that will circulate hot water through the panel to prevent freezing during cold weather.

In closed-loop systems, often called indirect systems, the solar collector panels contain a heat transfer fluid, such as a solution of antifreeze and water (glycol and water). This mixture absorbs heat and carries it to a heat exchanger in the cylinder, where heat is then transferred to the household water supply.

Closed-loop systems tend to be less efficient than open-loop systems, because some heat is lost through the heat exchanger in the process of heat transfer. However, closed-loop systems are preferable in cold climates due to their use of freeze-resistant fluid.

### **What Skills do Solar Thermal Technicians Need?**

The growing interest in alternative energy and renewable resources has created a shortage of qualified solar thermal technicians throughout the green energy sector. So what are some of the essential skills that solar thermal technicians need to succeed?

Solar thermal technicians need basic knowledge and hands-on skills in a variety of foundational technologies, such as electrical, electronics, and fluid power, as well as advanced abilities related directly to the latest solar thermal technologies.

## **Interactive eLearning**

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### **Highly-Interactive Multimedia Teaches Open-Loop Troubleshooting**

Amatrol's Open-Loop Solar Thermal Troubleshooting eLearning course (M20101) teaches a range of solar thermal troubleshooting skills for open-loop systems in a convenient and effective [eLearning format](#) that gives learners a solid foundation in solar technologies.

Amatrol's interactive multimedia eLearning curriculum teaches solar thermal troubleshooting topics using text, audio, video, interactive quizzes, and stunning 3D animations to appeal to a variety of different learning styles. Learners begin with the basic solar thermal components, such as solar collectors, pumps, solar storage tanks, air vent and vacuum valves, and check and ball valves.

From there, they steadily advance to more complex concepts and skills, including digital controllers; PV-powered solar thermal system operation and troubleshooting; freeze protection; and draindown system operation and troubleshooting.

This eLearning course is broken down into four convenient segments:

- Solar Collectors
- Solar Thermal Components
- PV-Powered System
- Draindown Systems

Learners using Amatrol's eLearning will find that its comprehensive, detailed curriculum teaches both the foundational knowledge and practical hands-on skills (using Amatrol's Solar Thermal Troubleshooting - Open-Loop Learning System ([950-STOL1](#))) they need to troubleshoot both draindown and pressurized open-loop solar thermal systems.

It will also help students and workers prepare for solar certifications from the North American Board of Certified Energy Practitioners ([NABCEP](#)), the premier solar technology certification organization.

## Additional Info

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### Requires:

- Computer ([see Computer Requirements](#))

### Options:

- Solar Thermal Open-Loop Troubleshooting Learning System (950-STOL1)
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#### Address

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