



Solar Hot Water – Detailed Course Outline

Identify and Advise on Efficient Solar Heated Water Design and Installation

This unit specifies the competency required to develop skills in effectively managing existing resources, increasing sustainability through water and energy efficient products and practices.

Plumbers are in *direct contact with end users on a daily basis*. A clear understanding of existing water efficient products, emerging technologies, best management practices and existing conservation programs is essential in fostering conservation, developing partnerships with local water utilities and authorities, and increasing business opportunities.

Work associated with this unit is undertaken within the plumbing and services sector in accordance with relevant US standards.

It is a pre-requisite that all participants seeking accreditation of the 'Course in GreenPlumbers Environmental Solutions' are required to be licensed and/or registered plumbing practitioners with a regulatory authority.

Nominal Hours - 4

Performance Criteria

Performance criteria specify the level of performance required to demonstrate achievement of the element.

1. Identify the history of Solar Heated Water Design and Installation.

1.1 Define differences in solar energy systems

1.1.1 Solar Thermal



1.1.2 Solar Photo-Voltaic

1.2 Define differences in efficiencies

1.2.1 Solar Thermal

1.2.2 Solar Photo-Voltaic

1.3 Market penetration

1.4 Specify potential problems and perceptions of solar heated water systems

1.4.1 *Does it really work?*

1.4.2 *Will it work on a cloudy day?*

1.4.3 *How does it work?*

2. Identify the characteristics of Solar Heated Water Design and Installation.

2.1 Determine the sizing requirements for solar heated water systems

2.1.1 Conducting a site survey

2.1.2 Orientation criteria

2.1.3 Shading considerations

2.2 Determine *the sizing requirements for heated water loads related to solar design.*

2.2.1 Load calculations

2.2.2 Collection area determination

2.2.3 Storage capacity requirement



- 3. Identify and understand *different solar heated water systems***
 - 3.1 Classic Collector Designs**
 - 3.1.1 Integral Collector Storage Systems (ICS)
 - 3.1.2 Unglazed Flat Plate collector
 - 3.1.3 Glazed Flat Plate collectors
 - 3.2 High Temperature Collector Design**
 - 3.2.1 Evacuated Tube collectors
 - 3.2.2 Concentrating collectors
- 4. Outline potential best practice design and installation of solar heated water systems.**
 - 4.1 Design Strategies**
 - 4.1.1 Pre-Heater design
 - 4.1.2 Thermo-syphon Systems
 - 4.1.3 Passive Systems
 - 4.1.4 Active Systems
 - 4.1.5 Open Loop Systems
 - 4.1.6 Closed Loop Systems
 - 4.1.7 Drain Back Systems
 - 4.2 Storage Tanks**
 - 4.2.1 Tank locations
 - 4.2.2 Single tank design



4.2.3 Two tank design

4.3 Control Strategies

4.3.1 Straight Pre Heater (no control)

4.3.2 Delta T Control

4.3.2a Delta T Control with Recirc. freeze protection

4.3.2b Delta T Control with Closed Loop

4.3.2c Delta T Control with Closed Loop and Drain Back Design

5. General Installation Considerations

5.1 Collector Location

5.1.1 Ground Mount

5.1.2 Roof Mount

5.2 Roof Condition

5.3 Roof Penetrations

5.3.1 Piping Penetrations

5.3.2 Mounting Hardware Penetrations

5.3.3 Professional Assistance

5.4 Exposed Pipe Insulations

5.5 Mounting Hardware Composition

5.6 Orphaned Systems



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6. Collector Orientation and Mounting

6.1 Perfection Required?

6.2 Hardware Decisions

6.2.1 Manufacturer Supplied

6.2.2 Do It Yourself

7. Identify the requirements of solar water heaters to meet regulations.

7.1 Demonstrate knowledge of the requirements to comply with the regulations

7.2 Identify installation certifications to meet the regulations.

8. Provide advice on solar hot water financial support programs and regulations.

8.1 Demonstrate knowledge of the *history and support initiatives*.

8.2 Outline and advise customers of *eligibility criteria*.

8.3 Identify installation certifications to meet support criteria.

9. Determine and install efficient solar water heating systems.

9.1 Use design and performance expectations with installation.

9.2 Identify applicable Occupational Health and Safety installation considerations.

9.3 Install water heating systems in accordance with standards, job specifications, manufacturers' specifications, and complies with authorities' requirements.



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- 9.4 Ensure pipe joints and fittings are installed correctly and in accordance with standards and manufacturers' instructions.
 - 9.5 Test and commission solar heated water systems in accordance with standards, manufacturers' specifications and requirements.