



## CONTRACTORS STATE LICENSE BOARD LICENSE EXAMINATION STUDY GUIDE



### SOLAR (C-46)

#### Content of the Examination

The Solar (C-46) Examination is divided into six major sections:

##### 1. Planning and Estimating (21%)

- Evaluate client needs and site feasibility
- Design and engineer systems
- Interpret plans
- Estimate job costs

##### 2. Solar Collector Installation (15%)

- Install roof mount collectors
- Install ground mount collectors
- Make weatherproof penetrations

##### 3. Solar Thermal Installation (9%)

- Install hot water systems
- Install pool heating systems

##### 4. Photovoltaic (PV) System Installation and Commissioning (22%)

- Install basic PV systems
- Install energy storage systems (ESS)
- Interface with the utility grid
- Install stand-alone PV systems
- Label PV components
- System testing, configuration, and monitoring; educating the client

##### 5. Service and Maintenance (18%)

- Evaluate PV systems
- Evaluate thermal systems
- Repair and replace components

##### 6. Safety (15%)

- Protect the public from safety hazards
- Identify and correct unsafe working conditions
- Handle hazardous materials

*\*Percentages are approximate\**

#### Test Site Policy

This is a closed-book examination. No reference materials may be used during the examination. All materials brought to the examination site must be left in an unmonitored area at your own risk.

#### Test Strategy

This is a multiple-choice examination with four choices per question. Examination questions are written to provide only one BEST answer. Some questions require mathematical computation. A calculator will be provided.

There is no penalty for guessing. If you are unsure about a particular question, it is better to try to answer the question than to leave the question blank.

Plenty of time is provided to answer all examination questions, so be sure to read each question and its four choices completely and carefully before selecting the BEST possible answer to the question.

#### Sample Questions

Following are three typical examination questions. The correct answer is underlined.

1. What is the unit of measurement for solar system battery capacity?

- a. Phase-hours
- b. Ampere-hours
- c. Watt amps
- d. Volt amps

2. As the temperature of a PV module increases, what will happen to the voltage?

- a. The voltage will increase.
- b. The voltage will decrease.
- c. The voltage will be unaffected.
- d. It depends on the module design.

3. If a swimming pool is 20' by 30' and filled to a depth of 8', what is the volume of water to be solar heated?

- a. 600 cubic yards
- b. 4,800 cubic yards
- c. 33,600 gallons
- d. 35,904 gallons

*\*All questions are written and reviewed by licensed contractors who are actively working in the trade\**

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## Resources

*Publisher information for reference books and code is provided below. Other sources for reference books may be found online. **California code books can be viewed online: [www.bsc.ca.gov](http://www.bsc.ca.gov)***

**2016 California Building Code.** California Code of Regulations, Title 24. International Code Council.  
PHONE: (800) 786-4452  
INTERNET: [www.iccsafe.org](http://www.iccsafe.org)

**2016 California Electrical Code.** California Code of Regulations, Title 24. BNI Publications, Inc.  
PHONE: (888) 264-2665  
INTERNET: [www.bnibooks.com](http://www.bnibooks.com)

**2016 California Energy Code.** California Code of Regulations, Title 24. International Code Council.  
PHONE: (800) 786-4452  
INTERNET: [www.iccsafe.org](http://www.iccsafe.org)

**2016 California Fire Code.** California Code of Regulations, Title 24. International Code Council.  
PHONE: (800) 786-4452  
INTERNET: [www.iccsafe.org](http://www.iccsafe.org)

**2016 California Mechanical Code.** California Code of Regulations, Title 24. International Association of Plumbing and Mechanical Officials (IAPMO).  
PHONE: (800) 854-2766  
INTERNET: [www.iapmo.org](http://www.iapmo.org)

**2016 California Plumbing Code.** California Code of Regulations, Title 24. International Association of Plumbing and Mechanical Officials (IAPMO).  
PHONE: (800) 854-2766  
INTERNET: [www.iapmo.org](http://www.iapmo.org)

**Go Solar California.** California Energy Commission and California Public Utilities Commission.  
INTERNET: [www.gosolarcalifornia.ca.gov](http://www.gosolarcalifornia.ca.gov)

**NEC Analysis of Changes, 2014 Edition.** National Fire Protection Association.  
PHONE: (800) 344-3555  
INTERNET: <https://catalog.nfpa.org/NEC-Analysis-of-Changes-P13954.aspx>

**Operating Guidelines for Certifying Solar Water Heating Systems (OG-300).** The Solar Rating and Certification Corporation.  
PHONE: (321) 213-6037  
INTERNET: [www.solar-rating.org](http://www.solar-rating.org)

**Photovoltaic Systems.** American Technical Publishers, Inc.  
PHONE: (800) 323-3471  
INTERNET: [www.go2atp.com](http://www.go2atp.com)

**Solar Hot Water Fundamentals: Siting, Design, and Installation. 2011.** Peter Skinner. E2G Solar.  
PHONE: (518) 369-3208  
INTERNET: [www.e2gsolar.com/page12.html](http://www.e2gsolar.com/page12.html)

**Solar Research.** National Renewable Energy Laboratory.  
INTERNET: [www.nrel.gov/solar](http://www.nrel.gov/solar)

**State of California General Industry & Electrical Safety Orders (Cal/OSHA) and State of California Construction & Electrical Safety Orders (Cal/OSHA). 2018.** California Code of Regulations, Title 8. Mancomm.  
PHONE: (877) 626-2666  
INTERNET: [www.mancomm.com](http://www.mancomm.com)  
VIEW ONLINE:  
[www.dir.ca.gov/dosh/LawsAndRegulations.htm](http://www.dir.ca.gov/dosh/LawsAndRegulations.htm)

**Ugly's Electrical References.** Jones & Bartlett Learning.  
PHONE: (800) 832-0034  
INTERNET: [www.uglys.net](http://www.uglys.net)

**Understanding NEC Requirements for Solar Photovoltaic Systems, 2014.** Mike Holt Enterprises.  
PHONE: (888) 632-2633  
INTERNET:  
[www.mikeholt.com/productitem.php?id=1229](http://www.mikeholt.com/productitem.php?id=1229)

**Uniform Solar Energy and Hydronics Code (2015).** International Association of Plumbing and Mechanical Officials (IAPMO).  
PHONE: (800) 854-2766  
INTERNET: [www.iapmo.org](http://www.iapmo.org)

*\*Publisher information is current as of 4/2018\**