

SOLAR THERMAL (120 Hours)

Course No.: 72-65-80

COMPETENCY CHECKLIST

Student Name _____

Teacher Name _____ School Site _____

Start Date _____ Completion Date _____ Certificate Date _____

Teacher Signature _____ Student Signature _____

(Signatures verify completion of course competencies)

A. ORIENTATION AND SAFETY (8 hrs)

- _____ 1. Scope and purpose of course
- _____ 2. Overall course content
- _____ 3. Classroom policies and procedures
- _____ 4. Different occupations in Energy & Utilities
- _____ 5. Gender equity
- _____ 6. Impact of EPA legislation
- _____ 7. Procedures: Contacting proper authorities
- _____ 8. NEC role: Photovoltaic installers/craftsmen
- _____ 9. SDS as it applies to the solar thermal field
- _____ 10. LEED Green Building Rating System
- _____ 11. LA/Safety Codes/Applications for industry
- _____ 12. CA Title 24 Energy Efficiency Standards
- _____ 13. First aid/emergency procedures: ARC
- _____ 14. OSHA governing PV installers/craftsmen
- _____ 15. Responsibilities to insure a safe workplace
- _____ 16. Safety test

B. RESOURCE MANAGEMENT (4 hr)

- _____ 1. Resources, Management, Sustainability
- _____ 2. Management: time, materials, personnel
- _____ 3. Examples of effective management
- _____ 4. Profitability/sustainability
- _____ 5. Economic/environmental benefits/liabilities

C. TRADE MATHEMATICS (12 hrs)

- _____ 1. Practical applications
- _____ 2. Problem-solving: Whole # problems
- _____ 3. Problem-solving: Fraction problems
- _____ 4. Problem-solving: Decimal problems
- _____ 5. Fractions to decimals
- _____ 6. Decimals to fractions
- _____ 7. English & metric systems: Measuring length
- _____ 8. English & metric systems: Measuring weight
- _____ 9. English & metric systems: Volume or capacity

- _____ 10. Problem-solving: Measuring problems
- _____ 11. Using tools common to the trade
- _____ 12. Ascending and descending powers of 10
- _____ 13. English numbering system to metric system
- _____ 14. Metric system to English numbering system
- _____ 15. Square roots of English numbers
- _____ 16. Geometric problems
- _____ 17. Algebraic problems
- _____ 18. Percentages
- _____ 19. Interpreting graphs
- _____ 20. Using a calculator
- _____ 21. Convert BTU's into other units and vice versa

D. SOLAR ENERGY (10 hrs)

- _____ 1. Definition of solar energy terms
- _____ 2. Effects: Seasonal sunlight exposure
- _____ 3. Discuss listed fundamentals of solar energy

E. SOLAR THERMAL ENERGY: ALTERNATIVE ENERGY (8 hrs)

- _____ 1. Define/discuss: Sources of energy
- _____ 2. Need in today's economy
- _____ 3. History of PV
- _____ 4. Basic operational aspects of solar thermal

F. SOLAR THERMAL SITE ANALYSIS (20 hrs)

- _____ 1. Fundamentals of solar radiation
- _____ 2. Sun's annual path affects seasonal performance
- _____ 3. Shading analysis tools
- _____ 4. Compass declination
- _____ 5. Physical principles
- _____ 6. Roof types, materials, structures
- _____ 7. Structural roof and wind loads
- _____ 8. Installation area, orientation, and title
- _____ 9. Shading using sun path calculators/devices

- _____ 10. Structural integrity and suitability
- _____ 11. Soil conditions, footing design, pipe path

G. ADVANCED INSTALLATION SAFETY FOR NABCEPT (5 hrs)

- _____ 1. Organizations impacting solar thermal
- _____ 2. Safe practices and safety equipment
- _____ 3. Codes/standards/physical safety hazards
- _____ 4. Environmental hazards
- _____ 5. Identification tag and/or label

H. MAINTENANCE AND TROUBLESHOOTING (10 hrs)

- _____ 1. Proficiency using tools and materials
- _____ 2. Multi-meter and troubleshooting
- _____ 3. Manuals, diagrams, drawings, maintenance
- _____ 4. Maintenance requirements
- _____ 5. Determine evaluation points
- _____ 6. Evaluate acidity and freeze protection levels
- _____ 7. Cause of problems
- _____ 8. System modifications to restore system

I. SYSTEM TYPES, APPLICATIONS, SIZING, AND COMPONENTS (25 hrs)

- _____ 1. Components of solar systems
- _____ 2. Combination water and space systems
- _____ 3. Swimming pool heating solar systems
- _____ 4. Determine appropriate system types
- _____ 5. Thermal system sizing programs
- _____ 6. Size a system for specific loads
- _____ 7. Address low/high temperatures
- _____ 8. National certification programs
- _____ 9. National collector and system ratings

J. INSTALLATION METHODS (10 hrs)

- _____ 1. Layout/location/configuration
- _____ 2. Roof mounting strategies
- _____ 3. Collector/roof storage tank requirements
- _____ 4. Locations for foundation/structural
- _____ 5. Weather sealing
- _____ 6. Water heater ports
- _____ 7. Water heater dip tube strategy
- _____ 8. Water heater and storage tanks
- _____ 9. Expansion pipes
- _____ 10. Type, length, diameter of insulation
- _____ 11. Type of flashing and sealant
- _____ 12. Slope strategy of piping
- _____ 13. Pipe hangers and supports
- _____ 14. Identify plumbing components

- _____ 15. Location of all components
- _____ 16. Installation of valves and components
- _____ 17. Installation of sensors, controller, pump
- _____ 18. Ultraviolet radiation protective methods
- _____ 19. Structural integrity and weather sealed
- _____ 20. System start up, operation/shut down

K. COLLECTORS AND COMPONENT USAGE (25 hrs)

- _____ 1. Solar collectors
- _____ 2. Differential controllers and sensors
- _____ 3. Solar water heating system energy
- _____ 4. Circulators and pumps
- _____ 5. Valves used in solar water heating systems
- _____ 6. System monitoring components
- _____ 7. Requirements of solar water heating systems
- _____ 8. Insulation used in solar water heating systems
- _____ 9. Requirements of tanks and heat exchangers
- _____ 10. Heat transfer fluids
- _____ 11. Requirements of water supply

L. EMPLOYABILITY SKILLS (3 hrs)

- _____ 1. Employer requirements
- _____ 2. Identifying potential employers
- _____ 3. Role of social networking in job search
- _____ 4. Sample résumé/cover letters
- _____ 5. Accurate, legible, and complete job app
- _____ 6. Sample job applications forms
- _____ 7. Enthusiasm on the job
- _____ 8. Appropriate appearance on a job
- _____ 9. Upgrading of skills on a job
- _____ 10. Customer service to build relationships
- _____ 11. Appropriate interviewing techniques
- _____ 12. Materials/resources for successful interview
- _____ 13. Sample follow-up letters
- _____ 14. Appropriate follow-up procedures