REGISTERED
NATIONAL STANDARD

UNIT OF COMPETENCY

Title:	**Use drawings, diagrams, schedules, standards, codes and specifications for solar PV systems** Note: 1) Due to safety issues inherent in working with combustible substances, all training and assessment activities must be in accordance with local industry and regulatory requirements; 2) This unit of competency has been adapted from the Pacific regional unit standard SE3303 (B) *Use drawings, diagrams, schedules, standards, codes and specifications*				
TQF Level:	3	**Credits:**	4	**Version:**	1
National standard code:	NS089-03				
Associated qualification (and code):	National Certificate in Sustainable Energy (Solar) Level 3 (QR-03-NQ-018-05-0504-23-01)				
Approval date:	31 August 2023	**Review date:**	31 August 2028		
Purpose:	This unit standard involves working with *solar photovoltaic (PV)* systems. It encompasses the rudiments for communicating with schematics, wiring and mechanical diagrams, connection schedules, manuals, site and architectural drawings and plans showing the location of services, apparatus, plant and machinery and understanding the use and format of compliance standards and job specifications. Unless required by law, the application of the skills and knowledge described in this unit does not require a license to practice in the workplace. Persons credited with this unit standard are able to: 1. Prepare to use drawings, diagrams, schedules and manuals for the design and installation of solar PV systems; 2. Use drawings, diagrams, schedules and manuals to obtain solar PV system job information; 3. Use solar PV systems drawings, diagrams, schedules and manuals to convey information and ideas; 4. Prepare to use compliance standards, codes and specifications for solar PV systems.				

Learning Outcome 1 (LO1)	Prepare to use drawings, schedules and manuals for solar PV system design and installations.
Performance standards	1.1. Identify and adhere to established *Occupational, health and safety* (OHS) risk control measures and procedures. 1.2. Determine the need for drawings, diagrams, schedules or manuals for solar PV system work to be undertaken. 1.3. Identify and adhere to established routines and procedures to obtain drawings, diagrams, schedules or manuals required for the solar PV system work to be undertaken. 1.4. Identify and resolve any uneasiness due to customs and taboos to ensure it does not become a constraint to the feasibility of a solar PV system design.
Learning Outcome 2 (LO2)	Use drawings, diagrams, schedules and manuals to obtain solar PV system job information**.**
Performance Standards	2.1 Select drawings, diagrams, schedules and/or manuals, appropriate to the solar PV system work being undertaken. 2.2 Interpret solar PV system drawings, diagrams and schedules using knowledge of drawing layouts, conventions and symbols. 2.3 Extract dimensions from drawings and diagrams for application to solar PV system work undertaken. 2.4 Determine location of solar PV system equipment from equipment schedules and location diagrams. 2.5 Review manuals to ascertain their format and where information relevant to the solar PV system work to be undertaken is located. 2.6 Interpret information given in manuals in relation to the solar PV system work to be undertaken.
Learning Outcome 3 (LO3)	Use solar PV system drawings, diagrams, schedules and manuals to convey information and ideas.
Performance standards	3.1 Identify clearly all drawing scales from relevant documentation; 3.2 Neatly make freehand drawings, using drawing conventions, to convey information and ideas to others involved in the solar PV system work; 3.3 Neatly correct errors to original freehand solar PV system job drawing, in accordance with drawing conventions, to show final 'as-installed' arrangement; 3.4 Submit corrected solar PV system drawings to appropriate person(s) in accordance with established procedures;

Learning Outcome 4 (LO4)	Prepare to use *compliance standards, codes* and *specifications*
Performance standards	4.1. Describe orally or in writing what *compliance standards, codes,* and *specifications* are; 4.2. Identify and obtain compliance standards, codes, and specifications that apply to solar PV system works; 4.3. Describe the format of compliance standards and codes that apply to solar PV systems; 4.4. Review the format of compliance standards and codes that apply to solar PV system disciplines; 4.5. Describe the purpose and format and typical content of job specifications within the solar PV system; 4.6. Review the purpose and typical content of job specifications in PS 4.5 in light of compliance standards and codes.
Pre-requisites	N/A
Co-requisites	N/A
Underpinning skills and knowledge	The following knowledge and skill underpin this unit standard; **Knowledge:** • Knowledge of basic operation of a solar PV system • Knowledge of basic civil works involved in solar PV system installation and operation; • Knowledge of reading and interpreting technical diagrams of solar PV system designs and layouts; • Knowledge of the environmental and social impacts of solar PV system – development • Knowledge of relevant jobs in the market and their requirements • Knowledge of *compliance standards, codes, manuals, schedules, drawings, symbols* and *specifications* relevant to solar PV systems. **Skills:** • Interpreting solar PV system information such as *codes, manuals, schedules, drawings*, and *specifications* • Communicating solar PV system information using relevant codes, manuals, schedules, drawings, and specifications
Assessment requirements	**Methods of assessment:** A range of assessment methods should be used to assess students' knowledge and application of skills. These include but not restricted to the following: a) Direct observation of students performing certain tasks stated under context of assessment

b) Oral questions (e.g. Interviews) to test relevant skills and knowledge. These oral questions can be asked while a student is being observed demonstrating a task or doing a seminar.

c) Written assessment such as:

1) Pen and paper tests and exams;
2) Reports on specific projects - e.g. designing and installation or service jobs;
3) Student portfolios – containing other activities that demonstrate what a student can do – e.g. annotated photographs, video records, completed Activity logs, marked quizzes and assignments, etc., etc.
4) Reviews of workplace attachment reports (e.g. Supervisor/third party reports; testimonials from Project manager or supervisor)

Context of assessment:

To support student assessment and to ensure they are valid, reliable, flexible, and fair, provider institutions are encouraged to make the necessary arrangements to involve the relevant key industry organisations such as *Tonga Electricity Commission* (TEC), *Tonga Power Limited* (TPL) and other trusted licensed private energy and electricity entrepreneurs in the assessment of the required competencies. Such collaboration between provider institutions and the industry may include but not restricted to the following:

- Experts from the industry have input to the design and implementation of the curriculum and assessment activities;
- Experts from the industry are engaged as trainers, assessors, or assessment moderators;
- Students are placed in relevant industry organisations for workplace attachment;
- Industry experts act as supervisors of students on workplace attachment.
- Etc.

To show that students have the required competence they will need to demonstrate skills and apply knowledge in the workplace (or in an environment that closely resembles the workplace) in relation to the unit's learning outcomes:

a) LO1: Prepare to use drawings, diagrams, schedules and manuals for solar PV system design and installations.

b) LO2: Use drawings, diagrams, schedules and manuals to solar PV system job information.

c) LO3: Use solar PV system drawings, diagrams, schedules and manuals to convey information and ideas.

	d) LO4: Prepare to use compliance standards, codes and specifications. **Re-assessment** Candidates of assessment are eligible to three (3) attempts to achieve the required competency within 14 days of their first attempt: 1. Feedback must be provided to the candidate and sufficient time provided to prepare for re-assessment. 2. The trainer/assessor has the discretion to vary the assessment tasks used in each assessment attempt as long as the: a) same competencies are being assessed; b) principles of assessment are adhered to. Failure to achieve the required competency after three (3) attempts on the exam or specific part of the assessment will require the person studying this Unit to re-enrol for the same Unit.
Moderation arrangements	1. Training providers must have their own moderation system approved by TNQAB before accreditation is granted; a) Relevant internal moderation processes are documented; b) Assessment is planned for each unit, and moderation processes are integrated into such plan 2. External moderation is conducted by the national qualifications unit of TNQAB for all unit components of national qualifications; a) Samples of assessed activities are submitted for moderation; b) Moderation (external) forms are available on request from the National qualifications unit of TNQAB.
Resource requirements	1. Text Books or printed resources for solar PV system designs, standards, codes and specification at the discretion of the course/unit coordinator or trainer, 2. Student computers with internet access; 3. Conventional classroom furniture and resources: White/blackboard, tables or benches, chairs, student notice boards; 4. Resources on technical drawings, diagrams, standards, codes and specs (solar PV system) 5. Computer-aided design software, *AutoCAD* installed in all student computers.
Requirements to complete this unit	There are four (4) Learning outcomes and twenty (20) Performance standards to measure competence. To satisfy the competency requirement, the person studying this unit is:

	1. Require to demonstrate ALL learning outcomes to the expected standards of performance; 2. Required to attain an *Achieved* Grade (Competent) to fulfil the requirements of the Unit Standard. 3. Eligible to three (3) attempts to achieve the required competency within 14 days of the first attempt. Failure to achieve the required competency level after three (3) attempts of the exam or specific part of the assessment will require the person studying this Unit to re-enrol for the same Unit.
Important notes and definitions	**Notes**: 1. All activities associated with this unit standard must comply with the requirements of national codes of practice, regulations and legislation for workplace health, safety, and environmental protection and any subsequent amendments. 2. Work presupposes compliance with gas, electrical, environmental and occupational safety requirements; 3. Unless required by law, the application of the skills and knowledge described in this unit does not require a license to practice in the workplace. 4. In the event that relevant legislations, standards and codes are not available locally, training providers are encouraged to use those which are currently used in either Australia or New Zealand for their training. **Definitions:** 1. *Civil works* – refers to any work where the greater proportion involves earthworks in the construction of bridges, dams and the like, but excluding works involving the construction of a building, electrical and mechanical plant. 2. *Compliance code* – is not a law but a 'set of rules' that must be followed. Each code specifies the minimum acceptable requirements for a process or performance. Codes exist for the purpose of safety, quality or other benefit. For example, electrical codes exist to ensure system reliability and that building occupants are safe from shock risks. Even though a code is not a law, it can be adopted into a law or included in a business contract. 3. *Compliance* refers to the act of following set rules and guidelines; 4. *Compliance code* tells you what you need to do (compare to a compliance standard which tells you how to do it).

	5. *Compliance standard* – a statement that describes acceptable level of quality which must be followed; a compliance standard tends to be more detailed elaboration, providing the 'nuts and bolts' of meeting a compliance code. 6. *Silicon* is a chemical element with the symbol Si and atomic number 14. It is the semiconducting material from which most solar panels are made. 7. *Solar panel (*or *solar photovoltaic panel)* is a piece of flat semiconducting material (usually Silicon) that transforms the sun's rays into electricity. 8. *Solar photovoltaic (PV) system* or *solar power system* is an electric power system designed to supply solar power by means of photovoltaics. It is composed of one or more solar panels combined with an inverter and other electrical and mechanical components that use energy from the Sun to generate electricity. 9. *Specification* - a specification provides specific requirements for a product or service used in an application. Unlike a **code** or **standard**, which can apply broadly to an industry and region, specifications outline the requirements of a specific company or product. Sometimes, a specification will also dictate a standard installation or design layout of those components. 10. *Technical standards* refers to a common reference or benchmark that specifies performance within an industry.
Public comments on unit	Please contact TNQAB National Qualifications Unit (email EnquireNQ@tnqab.to or Telephone 28136) if you like to discuss or suggest changes to the details of this unit.