Australian Government

Department of Education, Employment and Workplace Relations

UEENEEA106A Use lead-free soldering techniques

Release: 1

UEENEEA106A Use lead-free soldering techniques

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor **1) Scope:**

1.1) Descriptor

This unit covers connecting/de-connecting electronic components using lead-free soldering. It encompasses working safely, high reliability soldering/de-soldering, checking components against job specifications, testing and following quality procedures.

Application of the Unit

Application of the Unit **2)**

This unit is intended as an additional competency to relevant competencies previously acquired. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice **3)**

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Pre-Requisites

Prerequisite Unit(s) **4)**

Competencies **4.1)**

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE101A	Apply Occupational Health Safety regulations, codes and practices in the workplace

Literacy and numeracy skills **4.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and Numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3

Employability Skills Information

Employability Skills **5)**

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit	Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT		PERFORMANCE CRITERIA	
1	Prepare to carryout lead-free soldering.	1.1	OHS procedures for a given work area are identified, obtained and understood
		1.2	OHS risk control measures for work preparation are followed
		1.3	The nature of the work is determined from documentation or from work supervisor to establish the scope of work to be undertaken
		1.4	Work is coordinated with others involved in the work to ensure work schedules are met and safety measures are followed.
		1.5	Materials required for the work are sourced and check for compliance with lead-free soldering requirements and in accordance with established procedures
		1.6	Tools and equipment required for the work are selected for their effectiveness and checked for correct operation and safety
2	Carry out lead-free soldering	2.1	OHS risk control work measures and procedures are followed
		2.2	Knowledge of lead-free soldering characteristic and requirements are applied to soldering/de-soldering operations
		2.3	Components are connected and de-connected in accordance with lead-free soldering principles and technology
		2.4	Work is carried out in compliance with quality

ELEMENT	PERFORMANCE CRITERIA	
		procedures and enterprise/industry standards
	2.5	Lead-free soldering is completed in acceptable timeframe and given environment and workplace conditions
3 Check quality of lead-free soldering work.	3.1	OHS risk control measures for work completion are followed
	3.2	Quality of lead-free is checked against enterprise/ industry standards.
	3.3	Functional tests on lead-free soldered connections are carried out in accordance with established routines
	3.4	Actions are taken to rectify defects within the scope of established routines.
	3.5	Report forms/data sheets on lead-free soldering work are completed accurately

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) This describes the essential skills and knowledge and their level, required for this unit.

Evidence must show that knowledge has been acquired of safe working practices and lead-free soldering techniques for connecting/de-connecting electronic components.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

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Evidence shall show an understanding of Lead-free soldering techniques, applying safe working practices and relevant Standards, Codes and Regulations to an extent indicated by the following aspects:

T1. Enterprise quality management system encompassing:

- purpose of a quality system
- procedures pertaining to the relevant work function
- work instructions pertaining to the relevant work function

T2. Lead-free solder issues encompassing:

- safety
- environmental

T3. Solder types and characteristics encompassing:

- solder wires and pastes - including bimetal and trimetal
- solder characteristics - including melt and wetting temperatures, soldering temperature and flow behaviour.
- characteristic differences between lead and lead-free solders.
- industry standards

T4. Types of fluxes and their activity level encompassing:

- water soluble, no-clean and cleanable fluxes

T5. Component requirements for lead-free soldering encompassing:

- printed Circuit board (PCB) - including HAZL, ID marking, conformance certificates and re-working old PCBs
    - component considerations - including lead/end cap material, temperature capability and the like.

T6. Lead-free soldering cleaning requirements encompassing:

- chemicals and consumable materials, when to clean, white residues and the like.

T7. Equipment requirements encompassing:

- temperature stability, recovery capability, tip size, tip shape, tip metal mass, tin erosion and the like.

REQUIRED SKILLS AND KNOWLEDGE

T8. Soldering techniques encompassing:

- soldering tip selection, temperature setting, preheating, use of soldering irons and the like.

T9 Completed soldered connections compliance requirements

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit. It must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment **9.1)**

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be ‘rich’ in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit **9.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit must be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE11'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
  - Apply lead-free soldering technology as described in 8) and including:

A	Following job specifications
B	Using high reliability lead-free soldering/de-soldering techniques
C	Handling components without damage

D	Adhering to quality procedures
E	Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items

Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment it must ensure that the conditions for assessment are authentic and as far as possible reproduce and replicate the workplace and is consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to applying lead-free soldering technology.

Method of assessment

9.4)

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units **9.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEA10 1A Assemble electronic components

UEENEEA10 4A Modify electronic sub assemblies

Range Statement

RANGE STATEMENT

10) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated by applying lead-free soldering technology to any of the following in an environment designed specifically for the purpose.

- printed circuit board assembly,
- electronic sub-assembly rework,
- discrete component connections, and
- electronic equipment repair

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Assembly