Training Package	Electrotechnology (UEE07)			HSC Requirements and Advice
Unit title	**Fix and secure equipment**			HSC Indicative Hours
Unit code	**UEENEEE005B**	Competency field	Electrotechnology	**15**

Unit descriptor	This unit covers fixing, securing and mounting techniques as apply in the various electrotechnology work functions. It encompasses the safe use of hand and portable power tools, safe lifting techniques, safe use of ladders and elevated platforms and the selection and safe application of fixing devices and supporting accessories/equipment.
Application of the unit	This unit shall apply to persons entering work in electrotechnology and may be used in school-based vocational programs.
Employability skills	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 Skills requirements.
Prerequisite unit(s)	**Competencies** There are no prerequisite competencies for this unit.
	Literacy and numeracy skills 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 *Appendix 1* of this Syllabus. Reading 3 Writing 3 Numeracy 3
Licence to practise	The skills and knowledge described in this unit may require a licence to practise in the workplace where they are applied to electrical work intended for voltage above 50 V a.c. or 120 V d.c. Practice in workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships. Note: 1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

Required Skills and Knowledge	HSC Requirements and Advice
This describes the essential skills and knowledge and their level **required** for this unit. Evidence shall show that knowledge has been acquired of safe working practices and fixing and security equipment. All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies. The extent of the essential knowledge and associated skills (EKAS) required is given in *Appendix 2* of this Syllabus. It forms an integral part of this unit. 2.11.1 Hand tools 2.11.2.1 Power tools 2.11.3.1 Fixing and support devices and techniques 2.18.1 Occupational Health and Safety principles 2.20.2 Environmental and building regulation.	**Key Terms and Concepts** • appropriate personnel • cleaning, maintenance and storage of tools and equipment • clean-up procedures • electrical and electronic components • electrical isolation • faulty tools and equipment • fixing devices and support accessories/equipment, techniques and application • handling, application, transport and storage of hazardous and non-hazardous materials • hazard identification and risk control • job specification • manufacturers' catalogues and data sheets • material safety data sheet (MSDS) • measurement and calculations • metallic and non-metallic components • modes of communication • obtaining, understanding and clarifying instructions/procedures • occupational health and safety (OHS) • reporting and recording • safe work practices and procedures • selection and safe use of tools and equipment • selection of fixing devices and supporting accessories/equipment • sources for work instructions and procedures • sources of information • sustainable energy practices • working knowledge of hand and power tools, equipment and testing devices • working safely with electricity • workplace/enterprise policy and procedures.

Evidence Guide

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 the unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of assessment	Critical aspects of evidence required to demonstrate competency in this unit
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 accordance 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 judgement. Activities associated with normal everyday 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.	Before the critical aspects of evidence are considered all prerequisites must be met. Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE07'. Evidence shall also comprise: • a representative body of performance criteria 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: - fix and secure equipment as described in the Range Statement and including: ▪ selecting fixing for loads of < 5 kg, < 20 kg and < 50 kg and suitable for the environment in which they are to be installed ▪ fixing to a hollow wall, brick, concrete and steel ▪ fixing support accessories/equipment relevant to the discipline in which competency is sought ▪ dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Evidence Guide cont/d

Context of and specific resources for assessment	Method of assessment	Concurrent assessment and relationship with other units
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, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy. The resources used for assessment should reflect current industry practices in relation to fixing and securing equipment.	This unit shall be assessed by methods given in *Appendix 3* of this Syllabus. Note: Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed 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.	For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with units covering other installation competencies. The critical aspects of Occupational Health and Safety covered in UEENEEE001B and other discipline specific Occupational Health and Safety unit(s) shall be reassessed in relation to this unit.

Element	Performance Criteria	Range Statement	HSC Requirements and Advice
1 Prepare to fix and secure equipment	1.1 OHS procedures for a given work area are identified, obtained and understood.	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 shall be demonstrated in relation to installation, fault finding, maintenance or development work functions in any of the following disciplines: • appliances • business equipment • computers • data communications • electrical • electrical machines • electronics • fire protection • instrumentation • refrigeration and air-conditioning • renewable/sustainable energy, and • security technology. 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 *Appendix 4* of this Syllabus.	**Learning experiences for the HSC must address:** Strategies for obtaining, understanding and clarifying instructions/procedures including: • correct sourcing and selection of information • consulting appropriate personnel • active listening • open and closed questions. An awareness of sources of information regarding occupational health and safety (OHS) in the workplace including:· • workplace/enterprise policies and procedures • schedule of work • standard operating procedures (SOP) • job safety analysis (JSA) • emergency plan • training manuals • WorkCover NSW and Australian Safety and Compensation Council (ASCC) [formerly National Occupational Health and Safety Commission (NOHSC)] publications/safety alerts • legislation/regulations/codes of practice • material safety data sheets (MSDS) • Australian Standards • manufacturer's specifications • trade unions • employer organisations. An awareness of various modes of communication to receive work instructions including: • verbal - face to face (supervisor to employee) - telephone/mobile phone - workplace meetings • written communication - work plans - memos/messages - job descriptions/statements - workplace forms - rosters • non-verbal - signage

Element	Performance Criteria	Range Statement	HSC Requirements and Advice
			- diagrams. A basic understanding of OHS legislation. An awareness of safe work practice and procedures for a workplace within the electrotechnology environment. Working safely with electricity.
	1.2 OHS risk control work preparation measures and procedures are followed.		**Learning experiences for the HSC must address:** A basic understanding of risk management including how to: • identify hazards • assess associated risks • use appropriate control measures to eliminate or minimise risks • monitor and review the control measures. A basic awareness of the hierarchy of risk control measures: • Level 1 – eliminate the risk (such as discontinue the activity and not use the equipment) • Level 2 – minimise the risk by: - substituting the system of work/equipment (with something safer) - modifying the system of work/equipment (to make it safer) - isolating the hazard (such as introducing a restrictive work area) - introducing engineering control • Level 3 – other controls - adopting administrative controls and safe working practices - using PPE.
	1.3 The scope of work to be undertaken is obtained from documentation or from work supervisor.		**Learning experiences for the HSC must address:** A range of sources for work instructions and procedures including: • schedule of work/work plan • job card/sheet/specifications • SOPs • MSDS

Element	Performance Criteria	Range Statement	HSC Requirements and Advice
			• diagrams/sketches • regulations/legislation/codes of practice • manufacturer/workplace guidelines, policies and procedures • Australian Standards.
	1.4 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others.		**Learning experiences for the HSC must address:** An understanding of the relationship between individual roles and the role of the team/group and/or others in the workplace/enterprise. A basic understanding of the primary role(s) and duties/services performed by a range of personnel.
	1.5 Sources of materials that may be required for the work are identified and accessed in accordance with established procedures.		**Learning experiences for the HSC must address:** A working knowledge of the following to enable the calculation of quantities for projects: • appropriate units of measurement • scale drawings • stock sizes • materials lists • waste minimisation • manufacturer's specifications and/or data sheets • product catalogues. Measurements, calculations and determination of material quantities for a range of projects of varying complexity. An awareness of the consequences of incorrect measurements and calculations for: • the client • the organisation/company • the environment. Correct handling, application, transport and storage of hazardous and non-hazardous materials used in a range of electrotechnology projects. An awareness of information provided in a MSDS including:

Element	Performance Criteria	Range Statement	HSC Requirements and Advice
			• manufacturer's/supplier's details physical description and properties • identification of substance • use • ingredients • health hazard information • first aid • precautions for use • safe handling information • control point. How and where to obtain required MSDS.
	1.6 Fixing devices are selected for their suitable ability for the environment, the load they are to support and substratums into which they are to be installed.		**Learning experiences for the HSC must address:** Identification of a range of fixing and support devices and techniques and their application. A working knowledge of manufacturers' catalogues and data sheets. Selecting fixing for loads of < 5 kg, < 20 kg and < 50 kg suitable for the environment in which they are to be installed.

	1.7 Supporting accessories/equipment is selected for suitability for the environment and ability to support and protect from damage that which they are intended to support.		**Learning experiences for the HSC must address:**
			
			An knowledge of the following in relation to a specific electrotechnology work context/discipline (for example, electrical, instrumentation, telecommunications, etc):
			• accessories for supporting, fixing and protecting wiring/cabling/piping
			• functional accessories.
			
			Devices for securing and mounting electrical/electronic accessories including:
			• types and safe application of
			  - screws
			  - bolts
			  - rivets
			  - similar devices
			• types and safe application of devices for fixing to
			  - timber

Element	Performance Criteria	Range Statement	HSC Requirements and Advice
			- metal - hollow structures - masonry and concrete • types and safe application of - fixing adhesives - tapes. Knowledge of: • hazards and safety measures when working with adhesives and chemical fixing devices • regulatory requirements for use of powder fixing tools.
	1.8 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety.		**Learning experiences for the HSC must address:** Working knowledge of a range of hand and power tools and equipment and testing devices including: • name • purpose • general features • limitation(s) • hazard(s) associated with use • risk control(s) • technique(s) for correct and safe use • care and maintenance • requirements for use on construction sites (if appropriate). Hand tools and equipment for metallic and non-metallic components including those used for: • cutting - pliers - hacksaw - handsaw - wood chisel - cold chisel - knife • shaping - file - rasp - plane • drilling - hand drill - bradawl

Element	Performance Criteria	Range Statement	HSC Requirements and Advice

			• threading
			  - stock and die
			  - die nut
			• tapping
			  - tap
			  - tap wrench
			• finishing
			  - abrasive papers and holding devices
			  - scraper.
			
			Hand tools and equipment including those used for:
			• measuring
			  - tape measure
			  - rule
			  - vernier calliper
			  - micrometer
			• marking out
			  - square
			  ▪ try
			  ▪ combination
			  - scribers.
			
			Hand tools and equipment for electrical and electronic components including those used for:
			• dismantling
			  - pliers
			  - screw drivers
			  ▪ slotted
			  ▪ Philips
			  ▪ torx
			  ▪ hex
			  ▪ Pozidriv
			  - socket set
			  - wire strippers
			  - crimpers
			• assembling
			  - spanner
			  - multigrip
			  - wrench
			  - cold chisel
			  - centre punch.
			
			Power tools and equipment for metallic and non-metallic components including those used for:

Element	Performance Criteria	Range Statement	HSC Requirements and Advice

			• cutting and shaping
			  - angle grinder
			  - power sanders
			  ▪ belt
			  ▪ orbital
			  - jig saw
			  - power saw (circular)
			• drilling
			  - power drill
			  - battery drill
			• finishing
			  - power sanders.
			
			Portable power tools and equipment for structural components.
			
			Safe work practices for using tools and equipment including:
			• SOP and manufacturer's specifications before, during and after use
			• risk management (identifying hazards and implementing control measures)
			• correct manual handling
			• safe handling, application and storage of hazardous substances
			• appropriate use of PPE
			• regular servicing and maintenance of tools and equipment
			• selection of appropriate tool for use.
			
			Pre-operational checks including:
			• safety
			• consumables
			• adjustment/alignment for job task.
			
			Procedures and documentation for identifying faulty tools and equipment including:
			• malfunctions
			• worn, broken or missing safety guards.
			
			An awareness of the signs of poor performance and inefficiency including:
			• noise
			• quality of end product

Element	Performance Criteria	Range Statement	HSC Requirements and Advice
			• appearance • vibration • rough running • failure to start • presence of smoke and odours • consumption of fuel and other consumables • blockages • amount of maintenance required • time taken to complete the job. Solutions to a range of potential faults. Reporting of serious faults including: • verbal notification to appropriate personnel - supervisor/manager - supplier/manufacturer • recording on job card/maintenance log • safety/lockout tagging where appropriate. Reasons for safety/lockout tagging including: • ease of identification • evidence of serviceability • preventing use until repaired. SOP for a range of power tools including: • alignment • adjustment • clamping • start up and shut down. Understanding of the importance of securing work pieces when using power tools. An awareness of: • safe lifting techniques • safe use of ladders • safe use of elevated platforms.
2 Install fixing and support devices	2.1 Electrical isolation is arranged where work is within arms reach of exposed conductive parts, plant or machinery in strict accordance OHS requirements and procedures.		**Learning experiences for the HSC must address:** Defining and describing the process for electrical isolation.

Element	Performance Criteria	Range Statement	HSC Requirements and Advice
	2.2 Other OHS risk control measures relevant to the work site are followed.		
	2.3 Fixing devices are installed in accordance with manufacturer instructions.		
	2.4 Support accessories/equipment is installed accurately and to comply with technical standards and job specifications.		**Learning experiences for the HSC must address:** A definition of job specification(s).
	2.5 Work is carried out efficiently without waste of materials or damage to apparatus, circuits, the surrounding environment or services and using sustainable energy principles.		**Learning experiences for the HSC must address:** A definition of sustainable energy practices.
3 Complete fixing and support work	3.1 OHS risk control work completion measures and procedures are followed.		
	3.2 Work site is tidied and tools and equipment cleaned and securely stored.		**Learning experiences for the HSC must address:** Clean-up procedures with proper consideration of the environment and OHS. Cleaning equipment including: • high-pressure water cleaner • wet/dry vacuum • brooms and brushes • scrapers. A range of cleaning techniques including: • wiping • washing • brushing • sweeping • scraping • use of cleaning agents (chemicals, solvents and detergents).

Element	Performance Criteria	Range Statement	HSC Requirements and Advice
			Tools and equipment cleaning/maintenance requirements as necessary including: • removal of dirt, dust, grease and oil • sharpening • anti-rust treatments • repair and/or replacement of missing/damaged parts/ or need for specialised repair • scheduled servicing • refuel and top-up consumables. Issues relating to the storage of hand tools and equipment including: • security • climatic effects • OHS considerations • stability • ease of access.
	3.3 Appropriate personnel are notified of the work completion.		**Learning experiences for the HSC must address:** An awareness of appropriate personnel including: • site manager • project manager • line manager • supervisor • team leader • customer representative • customer.