

Training Package	Electrotechnology (UEE07)		HSC Requirements and Advice
Unit title	Dismantle, assemble and fabricate electrotechnology components		HSC Indicative Hours
Unit code	UEENEEE002B	Competency field	30
		Electrotechnology	

Unit descriptor	This unit covers basic fitting and fabrication techniques as they apply in the various electrotechnology work functions. It encompasses the safe use of hand, fixed and portable power tools; cutting, shaping, joining and fixing using metallic and non-metallic materials; dismantling and assembling equipment; basic mechanical measurement and marking-out and reading diagrams.
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 units 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 <i>Appendix 1</i> of this Syllabus. Reading 3 Writing 3 Numeracy 3
Licence to practise	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 contracts of training such as new apprenticeships.

Required Skills and Knowledge	HSC Requirements and Advice
<p>This describes the essential skills and knowledge and their level required for this unit.</p> <p>Evidence shall show that knowledge has been acquired of safe working practices and dismantling, assembling and fabricating electrotechnology components.</p> <p>All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.</p> <p>The extent of the essential knowledge and associated skills (EKAS) required is given in <i>Appendix 2</i> of this Syllabus. It forms an integral part of this unit.</p> <p>2.11.1 Hand tools</p> <p>2.11.2.1 Power tools</p> <p>2.11.4 Dismantling and assembling techniques</p> <p>2.18.1 Occupational Health and Safety principles</p> <p>2.20.1 Sustainable energy principles.</p>	<p>Key Terms and Concepts</p> <ul style="list-style-type: none"> • calculation of quantities • circuits/machines/plant • clean-up procedures • compliance test/checks • dismantle and assemble electrotechnology apparatus • electrical and electronic components • electrical and electrotechnology components • electrotechnology work environment • fabricate electrotechnology components • faulty tools and equipment • final approval and sign-off • geometry • hand and power tools and equipment • handling and application of hazardous and non-hazardous materials • isolating a device • isolation tag • lines of reporting and communication • material safety data sheet (MSDS) • measurement and calculation • measuring devices • metallic and non-metallic components • modes of communication • non-routine event • numerical operations • obtaining, understanding and clarifying instructions/procedures • occupational health and safety (OHS) • personal protective equipment (PPE) • personnel roles and responsibilities • quality assurance • quality checks • quality system • reading diagrams/drawings • risk management • safe work practices and procedures • safe working with electricity • schedule of work

	Key terms and concepts cont/d
	<ul style="list-style-type: none"> • scope of work • selection and safe use of tools and equipment • sharpening tools and methods/techniques • sources of information/instructions • standard operating procedures (SOP) • storage of components and parts • techniques for marking/tagging of components • terminology and symbols • transport and storage of hazardous and non-hazardous materials • units of measurement • work instructions and procedures • work materials • working safely with electricity • workplace/enterprise policies 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
<p>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.</p> <p>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.</p> <p>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.</p> <p>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.</p>	<p>Before the critical aspects of evidence are considered all prerequisites must be met.</p> <p>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:</p> <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> - 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: <ul style="list-style-type: none"> - dismantle, assemble and fabricate electrotechnology components as described in the Range Statement including: <ul style="list-style-type: none"> ▪ dismantle and assemble an apparatus relevant to the discipline in which competency is sought and that requires selection and safe use of a variety dismantling/assembling tools ▪ sharpening a drill bit for at least two different types of material ▪ fabricating a component that requires the selection and safe use of a variety of fabrication tools ▪ 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
<p>This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace.</p> <p>This should include:</p> <ul style="list-style-type: none"> • OHS policy and work procedures and instructions • suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit. <p>These should be used in the formal learning/assessment environment.</p> <p>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.</p> <p>The resources used for assessment should reflect current industry practices in relation to dismantling, assembling and fabricating electrotechnology components.</p>	<p>This unit shall be assessed by methods given in <i>Appendix 3</i> of this Syllabus.</p> <p>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.</p>	<p>For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:</p> <ul style="list-style-type: none"> • UEENEEE005B Fix and secure equipment • UEENEEE007B Use drawings, diagrams, schedules and manuals. <p>The critical aspects of Occupational Health and Safety covered in UEENEEE001B and other discipline specific Occupational Health and Safety units(s) shall be reassessed in relation to this unit.</p>

Element	Performance Criteria	Range Statement	HSC Requirements and Advice
<p>1 Prepare for dismantling, assembling and fabrication work</p>	<p>1.1 OHS procedures for a given work area are obtained and understood through established routines and procedures.</p>	<p>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.</p> <p>This unit shall be demonstrated in relation to installation, fault finding, maintenance or development work functions in any of the following disciplines:</p> <ul style="list-style-type: none"> • appliances • business equipment • computers • data communications • electrical • electrical machines • electronics • fire protection • instrumentation • refrigeration and air conditioning • renewable/sustainable energy, and • security technology. <p>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 <i>Appendix 4</i> of this Syllabus.</p>	<p>Learning experiences for the HSC must address:</p> <p>Strategies for obtaining, understanding and clarifying instructions/procedures including:</p> <ul style="list-style-type: none"> • correct sourcing and selection of information • consulting appropriate personnel • active listening • open and closed questions. <p>An awareness of sources of information regarding occupational health and safety (OHS) in the workplace including:</p> <ul style="list-style-type: none"> • 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. <p>An awareness of various modes of communication to receive work instructions including:</p> <ul style="list-style-type: none"> • verbal <ul style="list-style-type: none"> - face to face (supervisor to employee) - telephone/mobile phone - workplace meetings • written <ul style="list-style-type: none"> - work plans - memos/messages - job descriptions/statements - workplace forms - rosters • non-verbal <ul style="list-style-type: none"> - signage - diagrams.

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			<p>A basic understanding of OHS legislation.</p> <p>An awareness of safe work practice and procedures for a workplace within the electrotechnology environment.</p> <p>Working safely with electricity.</p>
	<p>1.2 Established OHS risk control measures and procedures in preparation for the work are followed.</p>		<p>Learning experiences for the HSC must address:</p> <p>A basic understanding of risk management including how to:</p> <ul style="list-style-type: none"> • identify hazards • assess associated risks • use appropriate control measures to eliminate or minimise risks • monitor and review the control measures. <p>A basic awareness of the hierarchy of risk control measures:</p> <ul style="list-style-type: none"> • Level 1 – eliminate the risk (such as discontinue the activity and not use the equipment) • Level 2 – minimise the risk by: <ul style="list-style-type: none"> - 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 including: <ul style="list-style-type: none"> - adopting administrative controls and safe working practices - using personal protective equipment (PPE).
	<p>1.3 Safety hazard not previously identified are reported and advice on risk control measures is sought from the work supervisor.</p>		
	<p>1.4 The nature of the work is obtained from documentation and from work supervisor to establish the scope of work to be undertaken.</p>		<p>Learning experiences for the HSC must address:</p> <p>A range of sources for work instructions and procedures including:</p> <ul style="list-style-type: none"> • schedule of work/work plan

Element	Performance Criteria	Range Statement	HSC Requirements and Advice
			<ul style="list-style-type: none"> • job card/sheet/specifications • standard operating procedures (SOP) • material safety data sheets (MSDS) • diagrams/sketches • regulations/legislation/codes of practice • manufacturer/workplace guidelines, policies and procedures • Australian Standards.
	<p>1.5 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others.</p>		<p>Learning experiences for the HSC must address:</p> <p>An understanding of the relationship between individual roles and the role of the team/group and/or others in the workplace/enterprise.</p> <p>A basic understanding of the primary role(s) and duties/services performed by a range of personnel.</p>
	<p>1.6 Materials required for the work are obtained in accordance with established routines and procedures.</p>		<p>Learning experiences for the HSC must address:</p> <p>A working knowledge of the following to enable the calculation of quantities for projects:</p> <ul style="list-style-type: none"> • appropriate units of measurement • scale drawings • stock sizes • materials lists • waste minimisation. <p>Measurements, calculations and determination of material quantities for a range of projects of varying complexity.</p> <p>An awareness of the consequences of incorrect measurements and calculations for:</p> <ul style="list-style-type: none"> • the client • the organisation/company • the environment. <p>Correct handling, application, transport and storage of hazardous and non-hazardous materials used in a range of electrotechnology projects.</p> <p>An awareness of information provided in material safety data sheets (MSDS):</p>

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	<p>1.7 Tools, equipment and measuring devices needed to carry out the work are obtained and checked for correct operation and safety.</p>		<ul style="list-style-type: none"> • 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. <p>How and where to obtain required MSDS.</p> <hr/> <p>Learning experiences for the HSC must address:</p> <p>Working knowledge of a range of hand and power tools and equipment and measuring devices including:</p> <ul style="list-style-type: none"> • 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). <p>Hand tools and equipment for metallic and non-metallic components including those used for:</p> <ul style="list-style-type: none"> • cutting <ul style="list-style-type: none"> - pliers - hacksaw - hand saw - wood chisel • shaping <ul style="list-style-type: none"> - file - rasp - plane • drilling <ul style="list-style-type: none"> - hand drill - bradawl

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			<ul style="list-style-type: none"> • threading <ul style="list-style-type: none"> - stock and die - die nut • tapping <ul style="list-style-type: none"> - tap - tap wrench • finishing <ul style="list-style-type: none"> - abrasive papers and holding devices - scraper. <p>Hand tools and equipment including those used for:</p> <ul style="list-style-type: none"> • measuring <ul style="list-style-type: none"> - tape measure - rule - vernier calliper - micrometer • marking out <ul style="list-style-type: none"> - square <ul style="list-style-type: none"> ▪ try ▪ combination - scriber. <p>Hand tools and equipment for electrical and electronic components including those used for:</p> <ul style="list-style-type: none"> • dismantling <ul style="list-style-type: none"> - pliers - screw driver <ul style="list-style-type: none"> ▪ slotted ▪ Philips ▪ torx ▪ hex ▪ Pozidriv - socket set - wire strippers - crimpers • assembling <ul style="list-style-type: none"> - spanner - multigrip - wrench - cold chisel - centre punch. <p>Power tools and equipment for metallic and non-metallic components including those used for:</p>

Element	Performance Criteria	Range Statement	HSC Requirements and Advice
			<ul style="list-style-type: none"> • cutting and shaping <ul style="list-style-type: none"> - angle grinder - power sanders <ul style="list-style-type: none"> ▪ belt ▪ orbital - jig saw - circular power saw • drilling <ul style="list-style-type: none"> - power drill - battery drill • finishing <ul style="list-style-type: none"> - power sander. <p>Portable power tools and equipment for structural components.</p> <p>Measuring devices specific to electrical work including:</p> <ul style="list-style-type: none"> • multimeter <ul style="list-style-type: none"> - voltmeter - ohmmeter - ammeter • insulation resistance tester. <p>Considerations for the selection of tools and equipment including:</p> <ul style="list-style-type: none"> • skills/training • licensing requirements • time • cost • OHS requirements <ul style="list-style-type: none"> - JSA/safe work method statement - risk assessment - emergency procedures • appropriateness for purpose • environmental factors <ul style="list-style-type: none"> - confined space - noise restrictions - pollution. <p>Safe work practices for using tools and equipment including:</p> <ul style="list-style-type: none"> • following SOP and manufacturer's specifications before, during and after use

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			<ul style="list-style-type: none"> • 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. <p>Pre-operational checks including:</p> <ul style="list-style-type: none"> • safety • consumables • adjustment/alignment for job task. <p>Procedures and documentation for identifying faulty tools and equipment including:</p> <ul style="list-style-type: none"> • malfunctions • worn, broken, loose or missing components • broken or missing safety guards. <p>An awareness of the signs of poor performance and inefficiency including:</p> <ul style="list-style-type: none"> • noise • quality of end product • appearance • vibration • excessive temperature • rough running • failure to start/operate correctly • presence of smoke and odours • consumption of fuel and other consumables • blockages • amount of maintenance required • time taken to complete the job. <p>Solutions to a range of potential faults.</p> <p>Reporting of serious faults including:</p> <ul style="list-style-type: none"> • verbal notification to appropriate personnel <ul style="list-style-type: none"> - supervisor/manager - supplier/manufacturier

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	<p>1.8 Cutting tools such as drills and chisels are sharpened to suit the material on which they are to be used.</p>		<ul style="list-style-type: none"> • recording on job card/maintenance log • safety/lockout tagging where appropriate. <p>Reasons for safety/lockout tagging including:</p> <ul style="list-style-type: none"> • ease of identification • evidence of serviceability • preventing use until repaired. <p>SOP for a range of power tools including:</p> <ul style="list-style-type: none"> • alignment • adjustment • clamping • start up and shut down. <p>Understanding of the importance of securing work pieces when using power tools.</p> <p>Learning experiences for the HSC must address:</p> <p>Knowledge of cutting-tool sharpening methods and techniques to correct geometry.</p> <p>SOP for tool sharpening equipment.</p> <p>An awareness of:</p> <ul style="list-style-type: none"> • the benefits of using correctly sharpened tools • the consequences of incorrect tool sharpening.
<p>2 Dismantle and assemble electrotechnology apparatus</p>	<p>2.1 Established OHS risk control measures and procedures for carrying out the work are followed.</p> <p>2.2 Circuits/machines/plant are checked as being isolated where necessary in strict accordance with OHS requirements and procedures.</p> <p>2.3 Appropriate tools are selected and used correctly and safely in dismantling and assembling apparatus.</p>		<p>Learning experiences for the HSC must address:</p> <p>Define and describe the process of isolating a device.</p> <p>Describe the potential consequences of incorrectly removing an isolation tag.</p> <p>Learning experiences for the HSC must address:</p> <p>Correct use/application of a range of tooling appropriate for dismantling and assembling apparatus.</p>

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	2.4 Manufacturer apparatus dismantling and assembling guides are used where applicable.		<p>Learning experiences for the HSC must address:</p> <p>An understanding of techniques for dismantling and assembling electrotechnology apparatus including:</p> <ul style="list-style-type: none"> • purpose of sequencing dismantling and assembling • importance of marking/labelling and storing parts • SOP for dismantling and assembling • techniques for dismantling and assembling close-fitting parts • use of gasket and seals • use of flow charts.
	2.5 Components are marked or tagged during the dismantling to help ensure correct and efficient reassembly.		<p>Learning experiences for the HSC must address:</p> <p>Techniques to mark/tag components and parts.</p>
	2.6 Dismantled components and parts are stored to protect them against loss or damage.		<p>Learning experiences for the HSC must address:</p> <p>Issues relating to the storage of components and parts including:</p> <ul style="list-style-type: none"> • security • climatic effects • OHS considerations • stability • ease of access.
	2.7 Apparatus is dismantled and assembled efficiently without waste of materials and energy and/or damage to apparatus and the surrounding environment or services.		
	2.8 Procedures for referring non-routine events to immediate supervisor for directions are followed.		
	2.9 Routine quality checks are carried out in accordance with work instructions.		

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			<p>Acknowledgement of:</p> <ul style="list-style-type: none"> • the importance of <ul style="list-style-type: none"> - workers understanding the quality requirements for their own job - workers checking/clarifying their understanding of work instructions to ensure quality outcomes - using accepted industry workplace techniques/ practices and procedures • the effects on the workplace/enterprise if workers do not take responsibility for the quality of their own work. <p>An understanding of quality system procedures as they apply to the individual's own job/task/duties.</p> <p>Knowledge of compliance tests/checks to be undertaken to ensure quality assurance of finished product.</p> <p>SOP for non-compliance of work outcome to specifications.</p>
3 Fabricate electrotechnology components	3.1 Established OHS risk control measures and procedures for carrying out the work are followed.		
	3.2 Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures.		
	3.3 Appropriate tools are selected and used correctly and safely in fabricating components.		
	3.4 Drawings and instruction for the fabrication of components are followed.		
			<p>Learning experiences for the HSC must address:</p> <p>Correct use/application of a range of tooling appropriate for fabricating components including:</p> <ul style="list-style-type: none"> • electrical soldering iron • wire wrapping tool • insulation displacement tool for connectors. <p>Learning experiences for the HSC must address:</p> <p>Terminology and symbols commonly used in documentation for fabrication of components.</p>

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	<p>3.5 Component dimensions are determined directly or by calculation from information given in job drawings and instructions.</p> <p>3.6 Components are fabricated efficiently without waste of materials and energy and/or damage to the surrounding environment or services.</p> <p>3.7 Procedures for referring non-routine events to immediate supervisor for directions are followed.</p> <p>3.8 Routine quality checks are carried out in accordance with work instructions.</p>		<p>Identification of:</p> <ul style="list-style-type: none"> • version status of the drawing • unit(s) of measurement used in the drawing • object(s) represented in the drawing • instruction(s) contained in the drawing • action(s) to be taken in response to these instructions. <p>Learning experiences for the HSC must address:</p> <p>Units of measurement and numerical operations within the scope of the unit of competency and as appropriate to the work context/discipline.</p>
4 Complete work and report	<p>4.1 OHS risk control work completion measures and procedures are followed.</p> <p>4.2 Work site is cleaned and made safe in accordance with established procedures.</p>		<p>Learning experiences for the HSC must address:</p> <p>Clean-up procedures with proper consideration of the environment and OHS.</p> <p>A range of cleaning techniques including:</p> <ul style="list-style-type: none"> • wiping • washing • brushing • sweeping • scraping • use of cleaning agents (chemicals, solvents and detergents).

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	<p>4.3 Work supervisor is notified of the completion of the work in accordance with established procedures.</p>		<p>Cleaning equipment including:</p> <ul style="list-style-type: none"> • high-pressure water cleaner • wet/dry vacuum • brooms and brushes • scrapers. <p>Learning experiences for the HSC must address:</p> <p>Understanding lines of reporting and communication with supervisor/team leader and others in the workplace.</p> <p>A knowledge of workplace/enterprise practices for final approval and sign-off.</p>