

Course outline: 311 Cable Selection G107A
UEENEEG107A - Select wiring systems and cables for low voltage general electrical installations

Qualification:	Certificate III in Electrotechnology Electrician - UEE30811
Applicable to:	Learners, industry/employers, governments, community and Global Energy Training Solutions as the provider
Unit of competency:	Accessible from: http://training.gov.au/Training/Details/UEENEEG107A
Related policies:	<p>Policy & Procedure 1 – Enrolment Policy</p> <p>Policy & Procedure 2 – Credit Transfer & Recognition of Prior Learning</p> <p>Policy & Procedure 3 – Learner Support</p> <p>Policy & Procedure 4 – Assessment</p> <p>Policy & Procedure 5 – Academic Misconduct</p> <p>Policy & Procedure 6 – Alcohol & Other Drugs</p> <p>Policy & Procedure 7 – Access, Equity & Diversity</p> <p>Policy & Procedure 8 – Vulnerable People</p> <p>Policy & Procedure 9 – Work, Health & Safety</p> <p>Policy & Procedure 10 – Incident, Injury & Rehabilitation</p> <p>Policy & Procedure 11 – Competency, & Qualification Assessment Decisions</p> <p>Policy & Procedure 12 – Complaints & Appeals</p> <p>Policy & Procedure 13 – Privacy</p> <p>Policy & Procedure 14 – Fees</p> <p>Policy & Procedure 15 – Industry & Employer Engagement</p> <p>Policy & Procedure 16 – Trainers & Assessors</p> <p>Policy & Procedure 17 – Administration & Other Staff</p> <p>Policy & Procedure 18 – Quality Assurance</p> <p>Policy & Procedure 19 – Business & Financial Risk Management</p> <p>Policy & Procedure 20 – Changes to Qualifications or Business</p> <p>Policy & Procedure 21 – Conflict of Interest</p> <p>Policy & Procedure 22 – Records Management</p> <p>Policy & Procedure 23 – Marketing & Advertising</p>
Monitor and review:	Policy & Procedure 18 – Quality Assurance
Responsibility:	Ben Murphy – as Proprietor
Questions/queries:	Feedback and suggestions welcomed: office@gets.com.au (+61) 02 6262 0077

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1. Material requirements

- AS/NZS 3000:2007 incorporating amendment 1 and 2
- Scientific calculator, ruler, pens and pencils
- Note book
- Hand tools
- Covered footwear
- Internet access (provided)

2. Session summaries

Day 1		
Required Skills and Knowledge	T1	<p>Performance requirements - design and safety encompassing:</p> <ul style="list-style-type: none"> • harmful effects against which the design of an electrical installation must provide protection. • performance standards of a correctly functioning electrical installation. • supply characteristics that shall be considered when designing an electrical installation. • acceptable methods for determining the maximum demand in consumer's mains and sub-mains. • AS/NZS 3000 requirements limiting voltage drop in an installation. • reason for dividing electrical installations into circuits and the factors that shall determine their number and type. • typical external factors that may damage an electrical installation and that shall be considered in the installation design. • methods for protecting persons and livestock against direct and indirect contact with conductive parts and the typical application of each. • acceptable methods of protection against the risks of ignition of flammable materials and injury by burns from the thermal effects of current, in normal service. • likely sources of unwanted voltages and the methods for dealing with this potential hazard. • acceptable methods for protecting persons and livestock against injury and property against damage from the effects of over current. • requirement for protection against fault current. • requirement for protection against the harmful effects of faults between live parts of circuits supplied at different voltages. • need for protection against injury from mechanical movement and how this may be achieved.

	<ul style="list-style-type: none"> • features of 'fire rated construction' and how the integrity of the fire rating can be maintained in relation to electrical installation.
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Day 2	
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Required Skills and Knowledge	<p>T2 Final subcircuit arrangements encompassing:</p> <ul style="list-style-type: none"> • factors that shall be considered in determining the number and type of circuits required for an installation. • daily and seasonal demand for lighting, power, heating and other loads in a given installation. • number and types of circuits required for a particular installation. • current requirements for given final subcircuits. • layout/schedule of circuits for given installations.
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Day 3	
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Required Skills and Knowledge	<p>T3 Factors affecting the suitability of wiring systems encompassing:</p> <ul style="list-style-type: none"> • wiring systems typically used with various construction methods and particular environments. • installation conditions that may affect the current-carrying capacity of cables. • external influences that may affect the current-carrying capacity and/or may cause damage to the wiring system. • AS/NZS 3000 requirements for selecting wiring systems for a range of circuits, installation conditions and construction methods into which the wiring system is to be installed. Note: Wiring systems include cable enclosures, underground wiring, aerial wiring, catenary support, emergency systems, busbar trunking and earth sheath return.
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Day 4	
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Required Skills and Knowledge	<p>T4 Maximum demand on consumer's mains/submains encompassing:</p> <ul style="list-style-type: none"> • acceptable methods for determining the maximum demand on an installation's consumer's mains and submains. • maximum demand for the consumer's mains for given installations up to 400 A per phase. • maximum demand for given submains. <p>T5 Cable selection based on current carrying capacity requirements encompassing:</p> <ul style="list-style-type: none"> • installation conditions for a range of wiring systems and applications. • external influences that require the use of a derating factor. • AS/NZS 3000 requirements for coordination of cables and protection devices. • AS/NZS 3008 used to select conductor size based on the maximum current requirement for a given installation condition including any applicable derating factors.
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Day 5	
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Required Skills and Knowledge	<p>T6 Cable selection based on voltage drop requirements encompassing:</p> <ul style="list-style-type: none"> • AS/NZS 3000 requirements for maximum voltage drop in an installation. • relevant tables in AS/NZS 3008 for unit values of voltage drop. • calculation of the expected voltage drop in a given circuit. • selecting cables to satisfy voltage drop requirements in addition to current carrying capacity requirements. <p>T7 Cable selection based on fault loop impedance requirements encompassing:</p> <ul style="list-style-type: none"> • AS/NZS 3000 requirements for maximum fault loop impedance in an installation. • relevant tables in AS/NZS 3008 to determine cable impedances. • calculation of the expected fault loop impedance for a given circuit arrangement. • selecting cables to satisfy fault loop impedance requirements in addition to current carrying capacity requirements and voltage drop requirements.
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Day 6		
Required Skills and Knowledge	T8	<p>Selecting protection devices encompassing:</p> <ul style="list-style-type: none"> • acceptable methods of protection against indirect contact. • AS/NZS 3000 requirements for selecting methods and devices to protect against indirect contact for a range of installation types and conditions. • coordination between conductors and protection devices to ensures the protection of cables from over heating due to over current. • possible injuries to persons and livestock from hazards due to a short circuit. • AS/NZS 3000 requirements for selecting devices to protect against overload current for a range of circuits and loads. • AS/NZS 3000 requirements for selecting devices to protect against short-circuit current for a range of installation conditions.
	T9	<p>Selecting devices for isolation and switching encompassing:</p> <ul style="list-style-type: none"> • requirements for the provision of the isolation of every circuit in an electrical installation. • need for protection against mechanical movement of electrically activated equipment. • AS/NZS 3000 requirements for selecting devices for isolation and switching for a range of installations and conditions.

Day 7		
Required Skills and Knowledge	T10	<p>Switchboards encompassing:</p> <ul style="list-style-type: none"> • AS/NZS 3000 and local supply authority requirements for switchboards. • tariff structures for the supply of electricity. • equipment installed at the main switchboards with capacities up to 400 A per phase. • layout of a main switchboard for an installation supplied with single phase single tariff whole current metering. • layout of a main switchboard for an installation supplied with single phase multiple tariff whole current metering. • layout of a main switchboard for an installation supplied with multiphase single tariff whole current metering. • layout of a main switchboard for an installation supplied with multiphase multiple tariff whole current metering. • layout of a main switchboard for a multiple tenancy installation with whole current metering. • layout of a main switchboard, including metering, for an installation supplied with three phase CT metering. • local supply authority requirements for connection of an electrical installation to the electrical supply system

3. Elements and Performance Criteria

Elements and Performance Criteria require practice and demonstration in the work place.

Element	Performance Criteria	Work Performance	
1: Prepare to select wiring systems and cables for general electrical installations.	1.1	The extent and nature of the electrical installation is determined from job specifications.	<input type="checkbox"/> Satisfactory <input type="checkbox"/> Needs improvement <input type="checkbox"/> Not performed
	1.2	Safety and other regulatory requirements to which the electrical installation shall comply area are identified, obtained and understood.	<input type="checkbox"/> Satisfactory <input type="checkbox"/> Needs improvement <input type="checkbox"/> Not performed
	1.3	Cable routes, the route lengths of cables and the conditions in which the wiring system is to operate is determined from job specifications or from consultation with appropriate persons.	<input type="checkbox"/> Satisfactory <input type="checkbox"/> Needs improvement <input type="checkbox"/> Not performed

2:Select wiring systems and cables for general electrical installations.	2.1	Wiring systems are selected for suitability for the environments in which they are to operate.	<input type="checkbox"/> Satisfactory <input type="checkbox"/> Needs improvement <input type="checkbox"/> Not performed
	2.2	Cable conductor sizes are selected to meet current-carrying capacity requirements and voltage-drop and earth fault-loop impedance limitations.	<input type="checkbox"/> Satisfactory <input type="checkbox"/> Needs improvement <input type="checkbox"/> Not performed
	2.3	Circuit protective devices are selected to meet requirement for co-ordination with conductor current-carrying capacity.	<input type="checkbox"/> Satisfactory <input type="checkbox"/> Needs improvement <input type="checkbox"/> Not performed
	2.4	Earthing system components are selected to meet requirements of an MEN system.	<input type="checkbox"/> Satisfactory <input type="checkbox"/> Needs improvement <input type="checkbox"/> Not performed
	2.5	Evidence is obtained that electrical equipment selected complies with safety requirements.	<input type="checkbox"/> Satisfactory <input type="checkbox"/> Needs improvement <input type="checkbox"/> Not performed
3:Document electrical installation.	3.1	Evidence is obtained from manufacturers/suppliers that electrical equipment selected complies with safety requirements.	<input type="checkbox"/> Satisfactory <input type="checkbox"/> Needs improvement <input type="checkbox"/> Not performed
	3.2	Reasons for selections made, including calculations, are documented in accordance with established procedures.	<input type="checkbox"/> Satisfactory <input type="checkbox"/> Needs improvement <input type="checkbox"/> Not performed
	3.3	Electrical installation arrangement and specifications for all selected items are documented in accordance with established procedures and forwarded to appropriate person(s).	<input type="checkbox"/> Satisfactory <input type="checkbox"/> Needs improvement <input type="checkbox"/> Not performed

4. Assessments

Assessment	When	Satisfactory mark/outcome
Theory assessment 1	Day 4	70%
Theory assessment 2	Day 5	70%
Theory assessment 3	Day 6	70%
Theory assessment 4	Day 7	70%
Practical assessment 1	Day 7	100%
Workplace Observation	After theory and practical assessments	Must be valid, sufficient, authentic and current
Employer Competency report		
Structured workplace experience interview		

Note: Once all theory, practical and on-site assessments are complete, competency assessment decisions can be made in conjunction with the learner, employer and registered training organisation.

5. Version control

Version	Date of release	Author	Authorised by	Position	Rational for change
V1	5/10/2015	Ben Murphy	Ben Murphy	Proprietor	Initial release
V2	7/2/2017	Ben Murphy	Ben Murphy	Proprietor	Added Elements and Performance Criteria