



**Australian Government**

**Department of Education, Employment and Workplace Relations**

# **MEM09205A Produce electrical schematic drawings**

**Release: 1**

## **MEM09205A Produce electrical schematic drawings**

### **Modification History**

Release 1 - New unit of competency

### **Unit Descriptor**

This unit of competency covers the skills and knowledge required to produce electrical schematic drawings to comply with Australian Standard (AS) 1102.101–1989 Graphical symbols for electrotechnical documentation – General information and general index, or equivalent, using predetermined design specifications. The unit also covers the production of layout or block diagrams to show the physical arrangement of components.

### **Application of the Unit**

This unit is suitable for those working within a drafting work environment. The unit applies to the production of schematic drawings to show electrical circuits and connections between devices, including power and signal connections. It includes the use of appropriate symbols and production of a matching reference list of circuit components. Types of electrical drawings or diagrams may include block, single line, interconnecting, wiring, circuit, telephonic and telegraphic or cable form diagrams, and notations.

Drawings may be carried out with or without the use of computer-aided design (CAD) systems and are completed to AS 1102.101–1989 Graphical symbols for electrotechnical documentation – General information and general index, or equivalent.

If CAD systems are to be used, the unit MEM30031A Operate computer-aided design (CAD) system to produce basic drawing elements, should also be selected.

Drawings are completed under supervision.

### **Licensing/Regulatory Information**

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

### **Pre-Requisites**

MEM09002B	Interpret technical drawing
MEM09204A	Produce basic engineering detail drawings

## Employability Skills Information

This unit contains employability skills

### Elements and Performance Criteria Pre-Content

Elements describe the essential outcomes of a unit of competency.

Performance criteria describe the performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.

### Elements and Performance Criteria

1	Determine schematic drawing requirements	1.1	Check purpose, scope and information requirements for drawing
		1.2	Interpret available information relevant to project and work requirements, and identify and address further information needs
		1.3	Identify and prepare equipment required to complete work
		1.4	Identify and access organisational files, templates and symbols as required for work
2	Identify system requirements	2.1	Identify and apply relevant codes, standards and symbols used for electrical diagrams and drawings
		2.2	Identify function and purpose of circuit and its components and assemblies
		2.3	Identify environmental implications of inefficient systems and strategies for minimising impact
3	Prepare electrical drawings and diagrams	3.1	Lay out drawing in accordance with the sketches and specifications
		3.2	Prepare an electrical block diagram in accordance with Australian Standards
		3.3	Draw cable run and riser diagrams from schedules

- 3.4 Produce switchboard layout drawings
  - 3.5 Prepare single line and interconnecting electrical diagrams in accordance with Australian Standards
  - 3.6 Prepare wiring and circuit diagrams in accordance with Australian Standards
  - 3.7 Ensure drawing accurately reflects specifications, is presented according to organisational requirements and contains all relevant information, including correct line work, scales, notation and dimensioning
  - 3.8 Apply workplace occupational health and safety (OHS) and environmental procedures
- 4 Prepare materials list
- 4.1 Where required, select components and/or materials from supplier/manufacture catalogues using predetermined specifications
  - 4.2 Produce a parts list in accordance with workplace procedures
  - 4.3 Store drawings and/or materials list according to workplace procedures
- 5 Consult appropriately with other disciplines
- 5.1 Verify the parameters of the brief and clarify specifications with appropriate personnel
  - 5.2 Identify and consult with support services
  - 5.3 Present and explain drawings at appropriate stages of the project

## Required Skills and Knowledge

### Required skills

Required skills include:

- literacy skills sufficient to read and interpret instructions, relevant codes of practice and specifications for drawings work
- using computer technologies and navigating software
- numeracy skills sufficient to interpret technical information and conduct mathematical problem solving as required in the scope of this unit
- using and maintaining drawing equipment
- applying spatial principles to achieve scale and proportion
- interpersonal skills to consult with other disciplines
- drafting skills
- applying symbols, schedules and legends to the drawing
- arranging the views in a logical manner and in accordance with AS 1102.101–1989 Graphical symbols for electrotechnical documentation – General information and general index, or equivalent
- correctly using line thickness and construction to identify parts
- using engineering and manufacturer catalogues, tables, standards and specifications
- drawing electrical/electronic schematics correctly and indicating the relative position of the components
- producing electrical/electronic drawings with all relevant specifications
- obtaining the circuit/component specifications
- planning and sequencing operations
- checking and clarifying task related information
- filing drawings according to workplace procedures

### Required knowledge

Required knowledge includes:

- general knowledge of different approaches to drawing
- awareness of copyright and intellectual property issues and legislation in relation to drawing
- requirements of AS 1102.101–1989 Graphical symbols for electrotechnical documentation – General information and general index, or equivalent with respect to electrical/electronic schematics/drawings
- environmental and OHS issues associated with the tools and materials used for drawing
- quality assurance procedures
- company standards for CAD
- order of drawing process
- company checking procedures for drawings
- layout and presentation

- the standards applicable to the work to be undertaken
- the process of checking the completed drawing
- the process of storing paper drawings and electronic drawing files
- the International System of Units (SI)
- terminology associated with the preparation of electrical diagrams and drawings
- basic components used in electrical installations
- wiring types used in electrical installations
- functions of components, such as:
  - resistors
  - capacitors

## Evidence Guide

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria required skills and knowledge range statement and the Assessment Guidelines for the Training Package.

<p><b>Overview of assessment</b></p>	<p>A person who demonstrates competency in this unit must be able to interpret and apply drawing specifications in the production of electrical diagrams and drawings to Australian Standard AS1102.101–1989 Graphical symbols for electrotechnical documentation – General information and general index, or equivalent.</p>
<p><b>Critical aspects for assessment and evidence required to demonstrate competency in this unit</b></p>	<p>Assessors must be satisfied that the candidate can competently and consistently perform all elements of the unit as specified by the criteria, including required knowledge, and be capable of applying the competency in new and different situations and contexts.</p> <p>Specifically the candidate must be able to:</p> <ul style="list-style-type: none"> <li>• work within typical site/teamwork structures and methods</li> <li>• apply worksite communication procedures</li> <li>• comply with organisational policies and procedures, including quality requirements</li> <li>• participate in work meetings</li> <li>• comply with quality requirements</li> <li>• use industry terminology</li> <li>• apply appropriate safety procedures</li> <li>• obtain required information for work and produce detailed electrical/electronic schematic drawings in accordance with AS1102.101–1989 Graphical symbols for electrotechnical documentation – General information and general index, or similar.</li> </ul>
<p><b>Context of and specific resources for assessment</b></p>	<p>This unit may be assessed on the job, off the job or a combination of both on and off the job. Where assessment occurs off the job, that is the candidate is not in productive work, then an appropriate simulation must be used where the range of conditions reflects realistic workplace situations. The competencies covered by this unit would be demonstrated by an individual working alone or as part of a team.</p> <p>Where applicable, reasonable adjustment must be made to work environments and training situations to</p>

	<p>accommodate ethnicity, age, gender, demographics and disability.</p> <p>Access must be provided to appropriate learning and/or assessment support when required. Where applicable, physical resources should include equipment modified for people with disabilities.</p> <p>This unit could be assessed in conjunction with any other units addressing the safety, quality, communication, materials handling, recording and reporting associated with drafting or other units requiring the exercise of the skills and knowledge covered by this unit.</p>
<b>Method of assessment</b>	<p>Assessors should gather a range of evidence that is valid, sufficient, current and authentic. Evidence can be gathered through a variety of ways, including direct observation, supervisor's reports, project work, samples and questioning. Questioning techniques should not require language, literacy and numeracy skills beyond those required in this unit of competency. The candidate must have access to all tools, equipment, materials and documentation required. The candidate must be permitted to refer to any relevant workplace procedures, product and manufacturing specifications, codes, standards, manuals and reference materials.</p>

## Range Statement

<b>Available information</b>	<p>Available information may include:</p> <ul style="list-style-type: none"> <li>• construction documents</li> <li>• building and coordination information</li> <li>• work specifications</li> <li>• information for plant services equipment</li> <li>• industry codes, standards and regulations</li> <li>• catalogues and manuals</li> <li>• design brief</li> </ul>
<b>Components and assemblies</b>	<p>Components and assemblies may include:</p> <ul style="list-style-type: none"> <li>• resistors: fixed (composition and wire wound), variable (rheostats, potentiometers and trimmers), and non-linear (thermistors)</li> <li>• capacitors: fixed (ceramic, plastic and electrolytic), variable, magnetic, transformers, chokes, relays, contactors, rectifiers, smoothing filters, voltage regulators and feedback</li> </ul>
<b>Electrical layouts</b>	<p>Electrical layouts may include:</p> <ul style="list-style-type: none"> <li>• domestic lighting</li> <li>• domestic power</li> <li>• commercial</li> <li>• lighting schedule</li> <li>• power schedule</li> <li>• factory electrification</li> <li>• flame proofing</li> <li>• buzz bar systems</li> <li>• 3 phase</li> <li>• 240 V and 415 V</li> </ul>
<b>Cable runs</b>	<p>Cable runs may include:</p> <ul style="list-style-type: none"> <li>• racking</li> <li>• schedules</li> </ul>
<b>Riser diagrams</b>	<p>Riser diagrams may include:</p> <ul style="list-style-type: none"> <li>• multi-storey</li> </ul>
<b>Switchboards</b>	<p>Switchboards may include:</p> <ul style="list-style-type: none"> <li>• layouts</li> <li>• wiring schedules</li> </ul>
<b>Appropriate personnel</b>	<p>Appropriate personnel may include:</p> <ul style="list-style-type: none"> <li>• designer</li> </ul>

	<ul style="list-style-type: none"><li>• engineer</li><li>• supervisor</li><li>• contractor/consultant</li><li>• builder</li></ul>
<b>Support services</b>	Support services may include: <ul style="list-style-type: none"><li>• estimating department and personnel</li><li>• engineering department and personnel</li><li>• drafting department and personnel</li><li>• project manager</li><li>• factory manager or staff</li></ul>

## **Unit Sector(s)**

Drawing, drafting and design

## **Custom Content Section**

Not applicable.