



Australian Government

**UEECD0030 Prepare
electrotechnology/utilities drawings using
manual drafting and CAD equipment and
software**

UEECD0030 Prepare electrotechnology/utilities drawings using manual drafting and CAD equipment and software

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to prepare electrotechnology/utilities drawings using manual drafting and computer-aided design (CAD) equipment and software.

It includes preparing, planning and completing electrotechnology/utilities drawings using manual drafting and CAD equipment and software. It also includes preparation and modification of preliminary electrotechnology/utilities drawings and diagrams using manual drafting methods, techniques, procedures, devices and CAD equipment and software from specifications, layouts, sketches or verbal instructions.

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

Pre-requisite Unit

UEECS0033 Use engineering applications software on personal computers

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEECD0031 Prepare engineering drawings using manual drafting and CAD for electrotechnology applications

and

UEECD0043 Solve problems in direct current circuits

or

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

Competency Field

Cross Discipline

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS

Elements describe the essential outcomes.

1 Plan electrotechnology/utilities drawing using manual drafting and CAD equipment and software

2 Prepare electrotechnology/utilities drawing using manual drafting and CAD equipment and software

PERFORMANCE CRITERIA

Performance criteria describe the performance needed to demonstrate achievement of the element.

- 1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures are identified and applied
- 1.2** Hazards are identified, risks are assessed and control measures are implemented
- 1.3** Extent of work is determined from job specifications and discussions with relevant person/s
- 1.4** Relevant person/s is consulted to coordinate work
- 1.5** CAD software, tools and equipment required for work are obtained in accordance with workplace procedures
- 2.1** WHS/OHS risk control measures and procedures for carrying out work are followed
- 2.2** Design, detailed drawings and layouts required are determined from job specifications
- 2.3** Technical data of system components is interpreted to determine parameters included in detailed drawings
- 2.4** Relevant CAD software tools are used to produce detailed drawings based on industry standard protocols
- 2.5** Detailed drawings are checked for accuracy and compliance with job specifications
- 2.6** Unplanned situations are responded to in accordance with workplace procedures and approval with authorised

		person/s
3 Complete electrotechnology/utilities drawing using manual drafting and CAD equipment and software	3.1	Completed drawings are submitted to relevant person/s and checked for accuracy and compliance with job specifications
	3.2	Modifications are followed and drawings re-submitted for final approval
	3.3	Completed drawings are filed in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Preparation of electrotechnology/utilities drawings using manual drafting and CAD equipment and software must include:

- architectural and site plan drawings
- auxiliary views and revolutions
- civil/geographic information systems (GIS) drawing basics
- electrotechnology drafting specifications, layouts, sketches or verbal instructions in conformance with Australian Standards and enterprise standards
- electrotechnology drawings line work, symbols, lettering and techniques
- layouts, assembly and installation drawings, and modifications (version control), and conversion between drawing types
- manual drafting methods, techniques, procedures and devices
- map drafting
- organisational procedures for collaborating with the client, key stakeholders and other staff in the selection of the preferred option

- organisational procedures for preparation and production of drawings, drawing sets, specifications, drafting documentation and operating and maintenance instructions/manuals for products and systems
- organisational procedures for processing, filing and saving all graphics, specifications, instructions and related documentation in correct format and location in accordance with work site procedures
- pole and structure elevations
- safety precautions when working with CAD equipment
- sketching methods, techniques, procedures and devices encompassing freehand sketching
- sketching techniques
- specifications obtained from design information, customer requirements, sketches, preliminary layouts and/or field investigations
- survey base plan drawings
- technical drawing equipment, including CAD applications, peripherals and devices including CAD software for electrotechnology applications and related commands
- type, form and size of materials from information, abbreviations and symbols supplied on electrotechnology drawings, briefs and/or specifications

Unit Mapping Information

This unit replaces and is equivalent to UEENEEE191A Prepare electrotechnology/utilities drawings using manual drafting and CAD equipment and software.

Links

Companion Volume implementation guides are found in VETNet - -

<https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6>

Assessment Requirements for UEECD0030 Prepare electrotechnology/utilities drawings using manual drafting and CAD equipment and software

Modification History

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Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying modifications to original drawings and resubmitting for approval
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including implementing risk control measures
- checking drawings for accuracy and compliance with job specifications
- completing electrotechnology/utilities drawings using manual drafting and computer-aided design (CAD) equipment and software
- determining job specifications from designs, drawings and layouts
- filing completed drawings
- obtaining specifications from design information, customer requirements, sketches, preliminary layouts and/or field investigations
- planning and preparing electrotechnology/utilities drawings using manual drafting and CAD equipment and software
- preparing and modifying preliminary electrotechnology/utilities drawings and diagrams using CAD equipment and software
- responding to unplanned situations
- submitting completed drawings
- using CAD equipment and related computer commands
- working with relevant person/s.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- architectural and site plan drawings for electrotechnology/utilities applications, including:
 - principles, purpose, terms and conventions usage in basic architectural drawings
 - typical scales

- base plan symbols and labels
- electrotechnology/utilities site plan symbols and labels
- signing and markings site plan symbols and labels
- architectural design and planning principles
- elevation drawings
- architectural symbols and abbreviations usage
- floor plans layout and production
- basic construction terminology and materials
- perspectives and pictorials
- typical wall and building sections with necessary details
- applicable building codes
- as-built floor plan measurement, sketching and drafting
- usage of schedules in freehand architectural style lettering
- styles of architecture
- fundamentals and design function in residential design
- site plans production
- foundation plan production
- AutoCAD basics for electrotechnology utilities applications, including:
 - operating system fundamentals encompassing principals, concepts and applications of CAD hardware; terms, conventions and codes related to CAD hardware; CAD hardware type and variation; system specifications interpretation and usage; input/output (I/O) devices identification; computer components installation and configuration arrangements and applications
 - CAD filing and naming conventions
 - opening program, closing and saving drawings
 - basic drafting commands encompassing line, circle, spline and rectangle
 - basic modification commands encompassing erasing, copy, mirror, block, trim and extend
 - layout and plotting
 - design centre encompassing electrical symbols and electronic symbols
 - AutoCAD and lists
 - components and symbols in CAD
 - mass storage and file compression
 - network operating systems, protocols, and cabling systems
 - researching hardware and software
 - installation and configuration of operating systems
 - plotting solutions
 - security issues
 - system maintenance
 - user interface
 - object creation and modification

- editing
- layers
- properties
- paper space and model space concepts
- dimensioning and dimensioning variables
- blocks
- attributes
- three-dimensional construction
- solid modelling and scripts
- library construction
- database manipulation
- data extraction
- circuit simulation
- wiring symbols - motor and generator; alternating current (a.c.) and direct current (d.c.) ; wiring junctions; grounds; distinguishing power and control conductors; normally open and normally closed contacts; series and shunt coils; circuit protection devices - overload relay w/thermal element; fuse and circuit breakers; push button - disconnect switches; momentary contact; maintained contact; meters; resistors; transformers - power, current, potential and auto-transformers
- auxiliary views and revolutions, including:
 - principles, concepts and purpose of auxiliary views and revolutions
 - terms, conventions and codes related to auxiliary views and revolutions
 - rules of revolutions
 - types and usage techniques of auxiliary views, auxiliary reference planes and revolutions
 - techniques and applications in finding the true size of an oblique surface
 - secondary auxiliary view drawing techniques and applications
 - applications of revolutions
 - usage of the axis of revolution to draw the true shape of an oblique view
- civil/geographic information systems (GIS) drawings fundamentals, including:
 - principles, terms and conventions usage in civil GIS drawings
 - land surveying techniques (e.g. property line, corners, symbols, coordinates, base line and typical sections)
 - GIS and global positioning systems (GPS) uses and applications
 - land survey plot production from a written description
 - manual and computer methods calculation of area
 - contour plans
 - profile drawings
- drawing, numbering, file names and digital file storage, including:
 - drawing series and version control
 - drawing sheet numbering
 - drawing file names

- drawing storage
- drawing file
- electrotechnology/utilities drafting fundamentals, including:
 - principles, concepts and purpose of electrotechnology/utilities drafting
 - terms, conventions and codes related to electrotechnology/utilities drafting
 - rules and symbols used in electrotechnology/utilities drafting
 - types and usage techniques of electrotechnology/utilities drawings
 - techniques and applications for creating graphic symbols charts
 - techniques and applications in composing block diagram drawings
- electrotechnology/utilities drawings and diagrams
- electrotechnology/utilities drawings line work, symbols, lettering and techniques production to Australian/New Zealand industry standards, including:
 - principles of correct drafting technique
 - principles, concepts and purpose of electrotechnology/utilities drawings
 - terms, symbols (including sectional symbols), conventions and codes related to electrotechnology/utilities drawings
 - rules for drafting electrotechnology/utilities drawings
 - types and usage techniques of electrotechnology/utilities drawings
 - relationship between components and symbols used in drafting applications
 - techniques and applications for production of electrotechnology/utilities drawings
- map drafting, including:
 - types and usage techniques of map drafting and illustrated maps
 - techniques and applications of plat surveys and set plans
 - techniques and applications of contour maps using profile coordinates
 - map reading techniques and applications
 - map drawing techniques and applications
- pole and structure elevations, including:
 - elevation sheet layout
 - elevation labelling
 - concrete bases
 - luminaire pole elevations
 - signal pole elevations
 - service pole elevations
 - sign pole elevations
 - sign bridge and cantilever elevations
 - breakaway sign structures
 - wood post/sign structures
- relevant manufacturer specifications
- relevant WHS/OHS legislated requirements
- relevant workplace documentation

- relevant workplace policies and procedures
- risk control measures
- sketching techniques for electrotechnology/utilities applications, including:
 - lines and letters
 - shapes
 - solids
 - axonometric views
 - building sketch
 - isometric views
 - object sketch
 - perspective: building interior perspective sketch
 - detail labelled sketch
- standard drawing sheets and drawing sheet layout, including:
 - standard drawing sheet borders
 - standard drawing sheet scale
 - standard drawing sheet editing - routine
 - standard drawing sheet editing - title block
 - standard drawing sheet editing - revision blocks
 - drawing sheet layout for small electrotechnology/utilities projects
 - drawing sheet layout for large electrotechnology/utilities projects
 - drawing sheet layout for signing and markings projects
 - key plan sheets
 - drawing layers
 - line types
- survey base plan drawings, including:
 - survey base plan scale
 - survey base plan
 - survey base plan contents
 - model space and paper space
 - external reference (xref) drawings
 - viewports.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so;

where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

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