



**Australian Government**

**UEENEEI101A Use instrumentation  
drawings, specification, standards and  
equipment manuals**

**Release: 2**

# **UEENEEI101A Use instrumentation drawings, specification, standards and equipment manuals**

## **Modification History**

Not applicable.

## **Unit Descriptor**

**Unit Descriptor**                    **1) Scope:**

### **1.1) Descriptor**

This unit covers using drawings, specifications, standards and equipment manual applicable to installing, maintaining and fault finding process controls. It encompasses the principles of process control embodied in drawings, standards, specifications and equipment manuals, matching equipment with that specified for a given function and location and determining the connections required between pneumatic, hydraulic and electrical equipment from instrumentation drawings and specifications

## **Application of the Unit**

**Application of the Unit**    **2)**

This unit is intended for competency development in entry-level employment based programs incorporated in approved contracts of training.

## **Licensing/Regulatory Information**

**License to practice**            **3)**

The skills and knowledge described in this unit require a license to practice in the workplace where plant and equipment operate at voltage above 50 V a.c. or 120 V d.c. However other conditions may apply in some jurisdictions subject to regulations related to electrical

## License to practice

3)

work. Practice in the 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 and lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space and lifting and risk safety measures.

## Pre-Requisites

Prerequisite Unit(s)

4)

Competencies

4.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE1 01A Apply Occupational Health Safety regulations, codes and practices in the workplace`

UEENEEE1 07A Use drawings, diagrams, schedules, standards, codes and specifications

Literacy and numeracy skills

4.2)

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 Volume 2, Part 3 'Literacy and

Numeracy<sup>7</sup>

Reading 3      Writing 3      Numeracy 3

## Employability Skills Information

### Employability Skills 5)

This unit contains 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 Skill requirements.

## Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit      Performance Criteria describe the required performance needed to demonstrate achievement of the element.  
Assessment of performance is to be consistent with the Evidence Guide.

## Elements and Performance Criteria

### ELEMENT

### PERFORMANCE CRITERIA

- |  |  |
|--|--|
| 1 Prepare to use instrumentation drawings, specification, standards and equipment manuals. | 1.1 Established OHS risk control measures and procedures are followed.   |
|  | 1.2 The need for instrumentation drawings, specification, standards or equipment manuals is determined from the nature of the work to be undertaken.                           |
|  | 1.3 Established routines and procedures are followed to obtain instrumentation drawings, specification, standards or equipment manuals required for the work to be undertaken. |

<b>ELEMENT</b>	<b>PERFORMANCE CRITERIA</b>
2 Use instrumentation drawings, specification, standards and equipment manuals	2.1 Instrumentation drawings, specification, standards and/or equipment manuals are selected, appropriate to the work being undertaken.
	2.2 Instrumentation drawings, specification, standards and equipment manuals are interpreted using knowledge of process controls and instrumentation drawing layouts, conventions and symbols.
	2.3 Dimensions are extracted from drawings and diagrams for application to work undertaken.
	2.4 Location of equipment is determined from instrumentation drawings and specification.
	2.5 Connections between pneumatic, hydraulic and electrical equipment are determined from instrumentation drawings and specifications
	2.6 Equipment manuals are reviewed to ascertain their format and where information relevant to the work to be undertaken is located.
	2.7 Information given in equipment manuals is interpreted in relation to the work to be undertaken.
3 Convey instrumentation information and ideas using drawings and diagrams.	3.1 Drawing conventions are used in neat freehand drawings to convey instrumentation information and ideas to others involved in the work to be undertaken.
	3.2 Instrumentation drawing conventions are used to neatly correct freehand original job drawing to show final 'as-installed' arrangement.
	3.3 Corrected drawings are forwarded to appropriate person(s) in accordance with established procedures.

## Required Skills and Knowledge

### REQUIRED SKILLS AND KNOWLEDGE

8) 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 using instrumentation drawings, specification, standards and equipment manuals.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

#### **KS01-EI101A Concepts and Practices of Industrial Instrumentation**

Evidence shall show an understanding of the concepts of industrial instrumentation and the basic practices to an extent indicated by the following aspects:

T1 Industrial Instrumentation encompassing:

- Introduction to the purposes of measurement in industrial processes
- Instrument control loops
- Types of measurement in these processes
- Local and remote measurement
- Measurement signal methods
- Signal transmissions electrical standards
- Signal transmissions pneumatic standards
- Flow, temperature, pressure and other appropriate measurements.
- Identification and purpose of instruments measuring processes directly and those measuring indirectly.
- Instrumentation and control components: sensors, transducers, converters and transmitters.

T2 Instrument Standards encompassing:

- Instrumentation standards
- Relationship between standards
- Using standards
- Fluids in Process Piping Colour Coding.
- Instruments symbols

T3 Instrumentation Terminology and SI units encompassing:

- SI base units
- SI derived units
- Scientific notation and engineering notation
- SI prefixes.
- Instrumentation metric units
- Non-standard SI Units - kg/cm<sup>2</sup>, etc.
- Conversion of units
- Instrumentation terminology:

## REQUIRED SKILLS AND KNOWLEDGE

- Span
- Range
- Accuracy
- Precision
- Errors
- Zero
- Repeatability
- Sensitivity
- Hysteresis

T4 Calibration of link and lever instruments encompassing:

- Principles of levers and links and calibration of indicator recorder instrument
- Calibration terms
- Calibrate a link and lever instrument
- Interpret calibration data so as to identify the types of error displayed by an instrument and whether the instrument is within its specified accuracy.
- Interpretation of graphs and tables associated with instrumentation

T5 Instrumentation safe working practices encompassing:

- Identification of instrumentation and control hazards
- Risk control measures for instrumentation work.
- Risk assessment

T6 Instrumentation drawings, diagrams and manuals encompassing:

- Electrotechnology drawing symbols for instrumentation and control (electrical/electronic circuits; Instrument circuits/diagrams; PLC diagrams; pneumatic; hydraulic)
- standards used in Instrumentation drawings (ISA; ASME; AS; SAMA).
- Drawings used in Instrumentation - schematic; single line; wiring; PLC diagrams; process flow diagrams - brief instrument information; process loop diagrams - details, terminals, types of instruments.
- Manufacturers Data Sheets, Manuals, Specifications and Test Procedures - instrumentation Manuals, Catalogues and Drawings.
  - Interpretation of the specifications contained within instrumentation Manuals, Catalogues and Drawings.
  - Interpretation of the test procedures contained within instrumentation Manuals, Catalogues and Drawings.
  - Comparison of data presented in different forms for the same equipment.
  - Identification of data relevant to instrumentation from a range of publicity material.
  - Extraction of information such as calibration, testing or installation procedures from manuals, specification sheets and drawings.

## REQUIRED SKILLS AND KNOWLEDGE

- Quantity take-offs and Parts Lists
  - Part Numbers for components, assemblies and equipment.
  - Parts List for a specified project or installation from Manuals, Catalogues, Specifications and Drawings.
  - List of equipment, required to undertake a specified project or installation, from Manuals, Catalogues, Specifications and Drawings.
  - Identification and extraction of a Part Number for an actual sample component or part from a Manual, Catalogue, Specification and/or Drawing
- Sketching of instrumentation and control drawings:
  - Sketching a schematic circuit diagram from a given circuit board layout diagram, wiring or installation drawing and installation or modification of a specified project using information contained within Manuals,
  - Sketching a part or equipment layout needed to perform a specified task, such as installation or modification, from given Manuals, Catalogues, Specifications and Drawings

## Evidence Guide

### EVIDENCE GUIDE

9) The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

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 9.1)

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. 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 judgment.

Activities associated with normal everyday work influence how/how much 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.

**Critical aspects of evidence required to demonstrate competency in this unit 9.2)**

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 must be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE11'. Evidence shall also comprise:

- A representative body of work performance 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, policies and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
  - Use instrumentation drawings, specification, standards and equipment manuals as described in 8) and including:

- A Identifying instrumentation drawings, specification, standards and equipment manuals relevant to the work to be undertaken.
- B Interpreting instrumentation drawings, specification, standards and equipment manuals using knowledge of process controls and instrumentation drawing layouts, conventions and symbols.
- C Determining location of equipment from instrumentation drawings and specification
- D Determining connections between pneumatic, hydraulic and electrical equipment correctly
- E Using correct conventions in freehand drawings.
- F Giving correct information in freehand drawings.
- G Dealing with unplanned event

**Context of and specific resources for assessment 9.3)**

This unit must 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 by this unit.

These should be part of the formal learning/assessment

environment.

Note: Where simulation is considered a suitable strategy for assessment, the conditions 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 instrumentation drawings, specification, standards and equipment manuals

**Method of assessment**

**9.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note: Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily 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.

**Concurrent assessment and relationship with other units**

**9.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEE10 7A Use drawings, diagrams, schedules, standards, codes and specifications

## Range Statement

### RANGE STATEMENT

**10)** 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 must be demonstrated in relation to instrumentation assembly, installation, fault finding, maintenance or development work functions using instrumentation drawings, specification, standards and equipment manuals for least two different process control systems

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 Volume 2, Part 2.1.

## Unit Sector(s)

Not applicable.

## Competency Field

<b>Competency Field</b>	<b>11)</b>
	Instrumentation and Control