



Australian Government

Department of Education, Employment and Workplace Relations

CPCPCM2004A Read plans and calculate plumbing quantities

Release: 1

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Modification History

Not Applicable

Unit Descriptor

Unit descriptor

This unit of competency specifies the outcomes required to use and interpret plans and specifications associated with construction work, and accurately complete measurements and calculations to establish quantities of materials for plumbing work.

The unit requires the interpretation of plans, drawings and specifications to interpret requirements, and making measurements and calculations to determine quantities of plumbing materials.

Application of the Unit

Application of the unit

This unit of competency supports skills to read and interpret plans for a variety of plumbing applications.

Site location for work application may be either domestic or commercial and may be a new work site or an existing structure being renovated, extended, restored or maintained. It may be a customer's premises or employer's workplace, either on or off-site.

Licensing/Regulatory Information

Not Applicable

Pre-Requisites

Prerequisite units

Nil

Prerequisite units Nil

Employability Skills Information

Employability skills 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

ELEMENT	PERFORMANCE CRITERIA
1. Prepare for work.	<p>1.1. Plans, drawings, specifications and standards are obtained and required calculations are identified.</p> <p>1.2. Safety (OHS) requirements associated with reading plans, calculating plumbing requirements and the workplace environment are adhered to throughout the work.</p> <p>1.3. Quality assurance requirements are identified and adhered to in accordance with workplace requirements.</p> <p>1.4. Work area and materials are prepared to support the efficient reading of plans and the calculation of plumbing requirements.</p>
2. Identify types of drawings and their functions.	<p>2.1. Main types of plans and drawings used in the plumbing industry are identified.</p> <p>2.2. Key functions of each type of drawing are identified.</p> <p>2.3. Key users of drawings are identified.</p>
3. Recognise commonly used scales, symbols and abbreviations.	<p>3.1. Commonly used scales, symbols and abbreviations are applied.</p> <p>3.2. Function of legend is understood and identified.</p>
4. Locate and identify key features on a services plan.	<p>4.1. Key features and dimensions of sectional details and elevations in a plan are identified and located.</p> <p>4.2. Location and types of services are identified.</p> <p>4.3. General and structural features and major horizontal and vertical measurements are located.</p>
5. Read and interpret job specifications.	<p>5.1. Purpose of job specification is identified.</p> <p>5.2. Details in job specification are obtained.</p> <p>5.3. Job specifications are read in conjunction with plans.</p>
6. Obtain measurements and perform calculations.	<p>6.1. Work measurements are obtained.</p> <p>6.2. Quality assurance requirements associated with calculations are applied.</p> <p>6.3. Measurements and dimensions are obtained from plans.</p> <p>6.4. Simple calculations are carried out.</p>
7. Calculate material quantities.	<p>7.1. Material quantities are calculated from job instructions.</p> <p>7.2. Information from plans, specifications and work area are obtained from job instructions.</p> <p>7.3. Measurements are correctly identified and recorded.</p>

ELEMENT	PERFORMANCE CRITERIA
8. Clean up.	<p>7.4. Quantities of <i>materials</i> suitable for work are calculated and recorded according to job instructions.</p> <p>8.1. Work area is cleared in accordance with workplace procedures.</p> <p>8.2. <i>Tools and equipment</i> are cleaned, checked, maintained and stored in accordance with manufacturer recommendations and workplace procedures.</p> <p>8.3. Information is accessed and documentation completed in accordance with workplace requirements.</p>

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Required skills for this unit are:

- communication skills to:
 - enable clear and direct communication, using questioning to identify and confirm requirements, share information, listen and understand
 - follow instructions
 - read and interpret:
 - documentation from a variety of sources
 - drawings and specifications
 - request relevant documentation and information
 - use language and concepts appropriate to cultural differences
 - use and interpret non-verbal communication, such as hand signals
 - written communication skills to:
 - complete other relevant workplace documentation
 - record calculations, measurements and material quantities
- numeracy skills to apply measurements and calculations
- organisational skills, including the ability to plan and set out work
- plan-reading skills, including:
 - boundaries
 - covenants

REQUIRED SKILLS AND KNOWLEDGE

- easements (stormwater, etc.)
- existing services
- orientation
- pedestrian and vehicular access
- preservation orders
- set backs
- site features
- site geography, including levels
- surrounding buildings and fences
- teamwork skills to work with others to action tasks and relate to people from a range of cultural and ethnic backgrounds and with varying physical and mental abilities.

Required knowledge

Required knowledge for this unit is:

- common industry calculations
- job safety analysis (JSA) and safe work method statements (SWMS)
- measurements, calculations and quantities
- range of drawings and specifications relevant to the plumbing industry
- relevant Acts, regulations and codes of practice
- symbols, dimensions, terminology and key features of plans
- tools, equipment and materials relative to plans, drawings and specifications
- work schedules, work plans, charts, work bulletins and memos
- workplace safety requirements.

Evidence Guide

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.

Overview of assessment

This unit of competency could be assessed in the workplace or a close simulation of the workplace environment providing that simulated or project-based assessment techniques fully replicate plumbing and services workplace conditions, materials, activities, responsibilities and procedures.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

A person who demonstrates competency in this unit must be able to provide evidence of:

- locating, interpreting and applying relevant information, standards and specifications for reading plans and calculating plumbing quantities
- applying safety requirements throughout the work sequence, including the use of personal protective clothing and equipment
- as a minimum the ability to, given the plans and specifications for a project, complete the following in respect of interpreting the plans and determining quantities:
 - identify type and purpose of the plan and drawing
 - identify its dimensions, symbols, abbreviations, key features, title and reference date (as current version)
 - identify required specifications and their impact and influence on the plumbing requirements of the project
 - draw a freehand sketch of the plumbing requirement of the project
- from measurement and calculation, indicating items of plumbing material required, ensuring:
 - correct selection and use of appropriate processes, tools and equipment
 - completion of all work to specification
 - compliance with regulations, standards and organisational quality procedures and

EVIDENCE GUIDE

Context of and specific resources for assessment	<p>processes</p> <ul style="list-style-type: none">• communication and working effectively and safely with others. <p>This competency is to be assessed using standard and authorised work practices, safety requirements and environmental constraints.</p> <p>Assessment of essential underpinning knowledge will usually be conducted in an off-site context.</p> <p>Assessment is to comply with relevant regulatory or Australian standards' requirements.</p> <p>Resource implications for assessment include:</p> <ul style="list-style-type: none">• an induction procedure and requirement• realistic tasks or simulated tasks covering the minimum task requirements• relevant specifications and work instructions• tools and equipment appropriate to applying safe work practices• support materials appropriate to activity• workplace instructions relating to safe working practices and addressing hazards and emergencies• material safety data sheets• research resources, including industry related systems information. <p>Reasonable adjustments for people with disabilities must be made to assessment processes where required. This could include access to modified equipment and other physical resources, and the provision of appropriate assessment support.</p>
Method of assessment	<p>Assessment methods must:</p> <ul style="list-style-type: none">• satisfy the endorsed Assessment Guidelines of the Construction, Plumbing and Services Training Package• include direct observation of tasks in real or simulated work conditions, with questioning to confirm the ability to consistently identify and correctly interpret the essential underpinning knowledge required for practical application• reinforce the integration of employability skills

EVIDENCE GUIDE

with workplace tasks and job roles

- confirm that competency is verified and able to be transferred to other circumstances and environments.

Validity and sufficiency of evidence requires that:

- competency will need to be demonstrated over a period of time reflecting the scope of the role and the practical requirements of the workplace
- where the assessment is part of a structured learning experience the evidence collected must relate to a number of performances assessed at different points in time and separated by further learning and practice, with a decision on competency only taken at the point when the assessor has complete confidence in the person's demonstrated ability and applied knowledge
- all assessment that is part of a structured learning experience must include a combination of direct, indirect and supplementary evidence.

Assessment processes and techniques should as far as is practical take into account the language, literacy and numeracy capacity of the candidate in relation to the competency being assessed.

Supplementary evidence of competency may be obtained from relevant authenticated documentation from third parties, such as existing supervisors, team leaders or specialist training staff.

Range Statement

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. **Italicised** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and

RANGE STATEMENT

regional contexts) may also be included.

Safety (OHS) is to be in accordance with commonwealth, state and territory legislation and regulations and may include:

- handling of materials
- hazard control
- hazardous materials and substances
- personal protective clothing and equipment prescribed under legislation, regulations and workplace policies and practices
- use of firefighting equipment
- use of first aid equipment
- use of tools and equipment
- workplace environment and safety.

Quality assurance requirements may include:

- Australian standards
- Environment Protection Authority (EPA)
- internal company quality assurance policy and risk management strategy
- International Standards Organisation
- site safety plan
- workplace operations and procedures.

Types of **drawings** may include:

- elevations and sections
- floor plans
- mechanical services and drainage plans
- sanitary plans
- sewerage plans
- site plans
- specifications.

Key features of detailed **plans and elevations** may include:

- boundaries
- building lines
- cross-sections of construction details
- easements
- layout of rooms
- location of works relative to other buildings
- orientation
- service locations
- shape of building and structure
- type of construction
- type of structure, including structural members
- vertical and horizontal measurements.

Measurements:

- are to be in metric scale
- cover all dimensions used in plumbing
- involve the use of:

RANGE STATEMENT

- calipers
 - dividers
 - rulers
 - squares
 - tape measures
 - may involve laser or similar technology.
- Calculations:**
- are to be performed manually and with the aid of a calculator
 - are to include:
 - area
 - circumference
 - diameter
 - force
 - length
 - mass
 - perimeter
 - pressure
 - ratios (e.g. ingredients, elements and triangulation)
 - scales
 - volume
 - require numeracy skills to apply the basic arithmetic calculations of addition, subtraction, multiplication and division in order to estimate simple projects and determine consumables required for a task.
- Information** may include:
- instructions issued by authorised organisational or external personnel
 - manufacturer specifications and instructions
 - organisation work specifications and requirements
 - recognised formulas or tables accepted by the regulatory authority
 - regulatory and legislative requirements, particularly those pertaining to:
 - building codes
 - OHS and environmental requirements
 - plumbing and gasfitting authority regulations
 - relevant Australian standards

RANGE STATEMENT

- safe work procedures relating to reading plans and calculating plumbing requirements
 - verbal, written and graphical instructions, including:
 - charts and hand drawings
 - diagrams or sketches
 - job drawings
 - material safety data sheets (MSDS)
 - memos
 - plans and specifications
 - signage
 - work bulletins
 - work schedules.
- Key features of *specifications* may include:
- material details
 - preferred suppliers
 - quality of finishes
 - quantities
 - skill requirements.
- Materials* for reading plans and calculating plumbing quantities include:
- drawings
 - plans
 - specifications.
- Tools and equipment* include:
- calculators
 - laser measuring devices
 - logarithmic tables
 - regulatory authority approved tables and formulas
 - rulers, dividers, tape measures or squares.

Unit Sector(s)

Unit sector Plumbing and services

Co-requisite units

Co-requisite units Nil

Co-requisite units Nil

Functional area

Functional area