



Australian Government

Department of Education, Employment and Workplace Relations

UEPMNT404A Maintain Complex Mechanical Pumps

Release: 1

UEPMNT404A Maintain Complex Mechanical Pumps

Modification History

Not Applicable

Unit Descriptor

Unit Descriptor 1)

This unit deals with the skills and knowledge required to undertake the installation and maintenance of multi-stage centrifugal pumps, axial flow compressors, fans and blowers.

Application of the Unit

Application of the Unit 3)

This unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

License to practise 3.1)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to Occupational Health and Safety and where applicable contracts of training such as apprenticeships and the like.

Licensing/Regulatory Information

Not Applicable

Pre-Requisites

Prerequisite Unit(s) 2)

Competencies 2.1)

Entry to this unit will require completion of a Certificate III from this training package or be a recognised tradesperson with a Certificate III Mechanical from the National Metals and Engineering training package or equivalent.

Competency in this unit may be assessed concurrently with or only after the following competency has been acquired:

UEPMNT304A Maintain mechanical pumps or similar unit from the national metals and engineering industry training package.

Employability Skills Information

Refer to the Evidence Guide

Elements and Performance Criteria Pre-Content

5) 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 Plan and prepare for the work | 1.1 Work requirements are identified from request/work orders or equivalent and clarified/confirmed with appropriate parties or by site inspection |
| | 1.2 Occupational Health and Safety standards, statutory requirements, relevant Australian standards, codes of practice, manufacturer |

ELEMENT	PERFORMANCE CRITERIA
	specifications , environmental requirements and enterprise procedures are identified, applied and monitored throughout the work procedure
	1.3 Resources required to satisfy the work plan are identified, obtained and inspected for compliance with the job specifications
	1.4 Relevant plans, drawings and texts are selected and interpreted in accordance with the work plan
	1.5 Correct size, type and quantity of materials/components are determined, obtained and inspected for compliance with the job specifications
	1.6 Work is planned in detail including sequencing and prioritising and considerations made, where appropriate, for the maintenance of plant security and capacity in accordance with system/site requirements
	1.7 Co-ordination requirements, including requests for isolations where appropriate, are resolved with others involved, affected or required by the work
	1.8 Potential hazards are identified and prevention and/or control measures are selected in accordance with the work plan and site procedures
	1.9 Work area is prepared in accordance with work requirements and site procedures
	1.10 Where appropriate, the teams and individuals roles and responsibilities within the team are identified and, where required, assist in the provision of on-the-job training
2 Remove pumps for maintenance	2.1 Required isolations are confirmed, where appropriate, in accordance with site requirements
	2.2 Pump is disconnected in accordance with the work plan
	2.3 Pump is removed in a manner which will assist

ELEMENT	PERFORMANCE CRITERIA
	in replacement in accordance with the work plan
	2.4 Pump is inspected for abnormalities in accordance with the work plan
3 Maintain pumps	3.1 Maintenance is performed in accordance with manufacturer specifications and site procedures
	3.2 Pump is dismantled for maintenance in accordance with manufacturer specifications and site procedures
	3.3 Sketches are made, data noted and components marked for identification and/or re-assembly in accordance with job requirements and site procedures
	3.4 New components are obtained and inspected for compliance with manufacturer specifications
	3.5 Dimensional inspection is performed with precision measuring devices to ensure compliance with specifications and results recorded in accordance with job requirements and site procedures
	3.6 Pump is reassembled applying appropriate principles and techniques in accordance with manufacturer specifications and site requirements
	3.7 Modifications/alterations are undertaken in accordance with site requirements
4 Replace/install pumps	4.1 Site is prepared for pump replacement in accordance with the work plan
	4.2 Pump is replaced in accordance with the work plan and manufacturer specifications
	4.3 Pump is levelled, aligned, coupled and connected in accordance with the work plan
	4.4 All fastening are torqued in accordance with manufacturer specifications and site requirements
	4.5 Machinery/plant and pump are test run,

ELEMENT**PERFORMANCE CRITERIA**

		monitored and adjusted as required in accordance with manufacturer specifications and site requirements
5	Complete the work	5.1 Work is completed and appropriate personnel notified in accordance with site/enterprise requirements 5.2 Work area is cleared of waste, cleaned, restored and secured in accordance with site/enterprise procedures 5.3 Plant, tools and equipment are maintained and stored in accordance with site/enterprise procedures 5.4 Work completion details are finalised in accordance with site/enterprise procedures

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

6) This describes the Essential Skills and Knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired in maintaining complex mechanical pumps.

The extent of the Essential Knowledge and Associated Skills required follows:

Evidence shall show that knowledge has been acquired for safe working practices of:

- Pumps and compressors
- Precision measuring equipment
- Seals and gaskets
- Bearings (anti-friction)
- White metal and tilting pad bearings
- Occupational Health and Safety standards
- Quality assurance/quality control
- Specialised tools and jigs
- Advanced balancing, levelling and alignment

REQUIRED SKILLS AND KNOWLEDGE

techniques

- Rigging and lifting equipment
- Materials and components of pumps
- Fluid dynamics
- Torque techniques
- Technical drawings and data
- Data recording techniques
- Hand and portable power tools
- Diagnostic and testing techniques
- Protective coatings
- Heating techniques
- Defined tolerances and fits
- Isolation procedures
- Insulation materials
- Complex/multistage pumps, compressors
- Communication principles

Specific skills needed to achieve the Performance Criteria:

- Identify and use precision measuring equipment
- Manufacture and install seals and gaskets
- Apply fluid dynamics principles
- Install bearings (anti-friction and plain)
- Use specialised tools and jigs
- Apply advanced level and alignment techniques
- Use technical drawings and data
- Identify and select materials and components
- Apply data analysis techniques
- Identify and apply correct torque techniques
- Use hand and portable hand tools
- Apply diagnostic and testing techniques
- Use heat application equipment
- Apply dismantling and reassembling techniques
- Work to defined tolerances
- Apply Occupational Health and Safety procedures
- Recognise worn/damaged components

REQUIRED SKILLS AND KNOWLEDGE

- Apply effective maintenance procedures
- Install white metal and tilting pad bearings
- Communicate effectively.

Evidence Guide

EVIDENCE GUIDE

8) This provides essential advice for assessment of the competency standard unit and must be read in conjunction with the Performance Criteria and the Range Statement of unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this competency standard unit and shall be used in conjunction with all components parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment

8.1)

Longitude 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's 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 in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord 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. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed 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 practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included in the

Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit**8.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the "Assessment Guidelines - UEP06". Evidence shall also comprise:

- A representative body of Performance Criteria 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 6) of this unit
- Demonstrate an appropriate level of skills enabling employment
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of contexts from the prescribed items below:
 - The knowledge and application of relevant sections of: Occupational Health and Safety legislation; Statutory legislation; Enterprise/site safety procedures; Enterprise/site emergency procedures
 - Preparation and planning of work
 - Removal techniques
 - Maintenance techniques and procedures
 - Installation techniques and procedures
 - Completion of work procedures
 - Dealing with an unplanned event by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment

8.3)

This unit should 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.

Competency Standards should be assessed in the workplace or simulated workplace and under the normal range of workplace conditions.

Assessment of this unit will be supported with documentary evidence, by means of endorsement stating type and application

of work.

In addition to the resources listed above in Context of assessment', evidence should show competency working, in limited spaces, with different types of plant and equipment as well as different structural/construction types and methods and in a variety of environments.

Method of assessment

8.4)

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 that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended 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

8.5)

There are no recommended concurrent assessments with this unit, however in some cases efficiencies may be gained in terms of learning and assessment effort being concurrently managed with allied competency standard units where listed.

UEPMNT304 Maintain mechanical pumps
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Key competencies

8.6)

Evidence that particular key competencies have been achieved within this unit is in the context of the following Performance Criteria of evidence. See Volume 2, Part 4 for an explanation of Key competencies and levels of this Training Package.

Key competencies	Example of Application	Performance Level
How are ideas and information communicated within this competency?	Refer to the following example of application: Explain ideas and actions, make suggestions for alternative actions and deal with contingencies and non-routine situations.	2

How can information be collected, analysed and organised?	Refer to the following example of application: Information with regard to operations, faults and maintenance may be observed and monitored for analysis and organised into records and reports.	2
How are activities planned and organised?	Refer to the following example of application: Planning the required activity, to include co-ordination and use of equipment, materials and tools to avoid backtracking and rework.	2

How is team work used within this competency?	Refer to the following example of application: Co-ordinate activities of the team and provide appropriate support to other team members in completion of work tasks to meet the team's goals.	2
How are mathematical ideas and techniques used?	Refer to the following example of application: Calculation of time to complete routine projects, operations, tasks, estimation of distances, levels, loads and material requirements.	2
How are problem solving skills applied?	Refer to the following example of application: Determine solutions which focus on long and short-term resolution of work task problems.	2
How is use of technology applied?	Refer to the following example of application: Access, communicate, measure and provide information to monitor operations and performance of plant and equipment.	2

Skills Enabling Employment**8.7)**

Evidence that competency in this unit incorporates skills enabling employment is in the context of the following performance. See Volume 2, Part 5 for definitions and an explanation of skills enabling employment.

Skills for Employment		Example of Application
1	Developing and using skills within a real workplace	Refer to the following example of application: Completion of tasks within an acceptable timeframe and performance with some supervision.
2	Learning to learn in the workplace	Refer to the following example of application: Comprehension and application of theoretical knowledge to well-developed skills.
3	Reflecting on the outcome and process of work task	Refer to the following example of application: Focused on improvement in own and other team member's performance in the workplace.
4	Interacting and understanding of the context of the work task	Refer to the following example of application: Working understanding of the processes and systems which apply to the workplace.
5	Planning and organising the meaningful work task	Refer to the following example of application: Achieving work tasks in a timely manner and ensuring that the work team achieves its stated work goals.
6	Performing the work task in non-routine or contingent situations	Refer to the following example of application: Seek advice and apply solutions to problems relevant to the workplace environment.

UEPMNT405A**Maintain fluid power systems****Range Statement****RANGE STATEMENT**

7) This relates to the competency standard 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.

Complex pumps may include multistage boiler feed pumps and circulation pumps, gas turbine compressors, multistage hydrogen compressors.

Pump drives may include electrical, internal combustion, hydraulic, pneumatic or steam.

Tools may include micrometers, verniers, dial test indicators, slip gauges, hand tools, hydraulic spanners, customised mandrels, digital height gauges, internal micrometers, depth gauges, air grinders, jigs and fixtures, customised spanners, thermal blankets, induction heaters, thermal crayons, digital thermometers, oxyacetylene gear and appropriate lifting devices.

Details of maintenance may be clarified by diagnosis and workplace inspection.

Maintenance can include repair, inspection, modification, lubrication, servicing, test running, identifying and replacing defective components.

Plant and equipment may include jigs for dismantling and oxyacetylene heating equipment.

Materials may include liquid nitrogen.

Work completion details may include plant and maintenance records, job cards, check sheets, on device labelling updates and reporting and/or documenting equipment defects.

Work site environment may be affected by nearby plant or processes e.g. chemical, heat, dust, noise and oil.

Isolations can refer to electrical/mechanical or other associated processes.

Generic terms are used throughout this Training Package for vocational standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms are given in Volume 2, Part 1.

Unit Sector(s)

Not Applicable

Literacy and numeracy skills

Literacy and numeracy skills 2.2)

Participants are best equipped to achieve 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.

Reading	4	Writing	4	Numeracy	4
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Competency Field

Competency Field 4)

Maintenance.