



Australian Government

Department of Education, Employment and Workplace Relations

PMAOPS223B Operate and monitor valve systems

Release: 1

PMAOPS223B Operate and monitor valve systems

Modification History

Not applicable.

Unit Descriptor

Unit descriptor	In a typical scenario an operator adjusts and monitors valves and ancillary equipment as part of controlling a process, eg hydrocarbons transport pipeline, gas distribution network.
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Application of the Unit

Application of the unit	<p>This unit may be required when <i>PMAOPS222B Operate and monitor pumping systems and equipment</i> is appropriate. It may only be counted towards a qualification where competence in <i>PMAOPS201B Operate fluid flow equipment</i> is unable to be obtained due to the nature of the job, but the operation of valves is relevant.</p> <p>The operations technician would:</p> <ul style="list-style-type: none">• identify and report operational problems• be aware of and contribute to a safe working environment• contribute to the safe and productive operation of the valve• operate, monitor and maintain equipment using relevant procedures <p>Generally the operator would be part of a team and would be expected to be competent in all parts of this unit. At all times they would be liaising and cooperating with other members of the team/shift.</p>
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Licensing/Regulatory Information

Not applicable.

Pre-Requisites

Prerequisite units		
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Employability Skills Information

Employability skills	This unit contains employability skills.
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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.
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Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1. Prepare for work.	1.1. Identify work requirements 1.2. Identify and control hazards 1.3. Coordinate with appropriate personnel
2. Prepare valves for operation.	2.1. Check operation of valves and valve systems by applying knowledge of valve operation and fundamental operating principles 2.2. Check the valves required for operation against the site specific operating pressures, temperatures, volume, velocities and materials requirements where applicable 2.3. Prepare or sequence valves required for operation, ensuring that they are either closed or opened as required, to regulate the flow of liquids and systems flow rates in a safe and efficient manner 2.4. Check the valve operational integrity to minimise the risk of valve leakages and failures.
3. Operate valve systems.	3.1. Monitor valve operation to ensure it is functioning correctly and excludes such incidents as vibration, chatter, cycling, and sticking 3.2. Take appropriate action 3.3. Regulate or alter valve sequences to control the flow rates of fluid during the process to meet changing production conditions and demands.
4. Conduct operational maintenance	4.1. Clean and lubricate valve stems, threads and other operational parts to ensure the correct operational condition of the valve is maintained 4.2. Evenly tighten valve bolting assemblies to prevent product leakage 4.3. Identify valve and regulator faults and take appropriate action 4.4. Isolate jammed or sticking valves from operation, and take appropriate action.
5. Isolate and de-isolate valves.	5.1. Isolate plant 5.2. Make safe for required work 5.3. Check plant is ready to be returned to service 5.4. Prepare plant for return to service.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

This describes the essential skills and knowledge and their level, required for this unit.

Required skills

Competence includes the ability to isolate the causes of problems to an item of equipment within the valve system and distinguish between causes of problems/alarm/fault indications such as:

- instrument failure/malfunction
- electrical failure/malfunction
- mechanical failure/malfunction
- equipment design deficiencies, eg wrong valve type for service
- product parameters, eg temperature, viscosity, purity
- fouling or contamination
- erosion and corrosion.

Required knowledge

The knowledge referred to in the Evidence Guide for this unit includes:

- identify all items on a schematic of the valve system and describe the function of each
- physics related to the process
- valve equipment operating parameters
- process and product variables and reactions
- operating pressures
- operating temperatures
- flow volume calculations
- flow velocity calculations
- fluid corrosive properties
- fluid erosive properties.
- principles of operation of valves
- physics and chemistry relevant to the valves and the materials processed
- process parameters and limits, eg temperature, pressure, flow, pH
- duty of care obligations
- hierarchy of control
- communication protocols, eg radio, phone, computer, paper, permissions/authorities
- routine problems, faults and their resolution
- relevant alarms and actions
- plant process idiosyncrasies
- correct methods of, operating and controlling valves
- corrective action appropriate to the problem cause
- function and troubleshooting of major components and their problems

REQUIRED SKILLS AND KNOWLEDGE

- types and causes of problems within operator's scope of skill level and responsibility.

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, the Range Statement and the Assessment Guidelines for the Training Package.

Overview of assessment

Assessment of this unit should include demonstrated competence on actual plant and equipment in a work environment. The unit will be assessed in as holistic a manner as is practical and may be integrated with the assessment of other relevant units of competency. Assessment will occur over a range of situations, which will include disruptions to normal, smooth operation.

Simulation may be required to allow for assessment of parts of this unit. Simulation should be based on the actual plant and will include walk-throughs of the relevant competency components. Simulations may also include the use of case studies/scenarios, role plays and 3D virtual reality interactive systems. In the case of evacuation training or of training for competencies practised in life threatening situations, simulation may be used for the bulk of the training.

This unit of competency requires an application of the knowledge contained in the use of valve systems and their integral equipment, to the level needed to maintain control and recognise and resolve problems. This can be assessed through questioning and the use of what-if scenarios both on the plant (during demonstration of normal operations and walk-throughs of abnormal operations) and off the plant.

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

Competence must be demonstrated in the ability to recognise and analyse potential situations requiring action and then in implementing appropriate corrective action. The emphasis should be on the ability to stay out of trouble rather than on recovery from a disaster.

Consistent performance should be demonstrated. In particular look to see that:

- early warning signs of equipment/processes needing attention or with potential problems are recognised
- the range of possible causes can be identified and analysed and the most likely cause determined
- appropriate action is taken to ensure a timely return to full performance
- obvious problems in related plant areas are recognised and an appropriate contribution made to their solution.

These aspects may be best assessed using a range of

EVIDENCE GUIDE	
	scenarios/case studies/what-ifs as the stimulus with a walk-through forming part of the response. These assessment activities should include a range of problems, including new, unusual and improbable situations, which may have been generated from the past incident history of valves, incidents with similar valves around the world, hazard analysis activities and similar sources.
Context of and specific resources for assessment	As a general rule assessment will require access to an operating plant over an extended period of time, or a suitable method of gathering evidence of operating competence over a range of situations. A bank of scenarios/case studies/what-ifs will be required as will a bank of questions which will be used to probe the reasoning behind the observable actions.
Method of assessment	In all plants it may be appropriate to assess this unit concurrently with relevant teamwork and communication units. It will frequently also be appropriate to assess this unit concurrently with: <ul style="list-style-type: none">• <i>PMAOPS221B Operate and monitor pumping systems and equipment</i>
Guidance information for assessment	Assessment processes and techniques must be culturally appropriate and appropriate to the oracy, language and literacy capacity of the assessee and the work being performed.

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. Bold italicised wording, if used in the Performance Criteria, is detailed below. Add any 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 regional contexts.

Codes of practice/ standards	Where reference is made to industry codes of practice, and/or Australian/international standards, the latest version must be used.
Context	<p>This unit of competency includes all such items of equipment and unit operations which form part of the valve system. For your plant this may include (select relevant items):</p> <ul style="list-style-type: none"> • globe, butterfly, ball and gate valves • control valves • isolation valves • non-return or check valves • pressure relief valves • shutdown systems • hydraulic power units. <p>Valve actuation may be:</p> <ul style="list-style-type: none"> • pneumatic • hydraulic • electrical • manual.
Typical problems	<p>Typical problems for your plant may include:</p> <ul style="list-style-type: none"> • vibration/resonance • blockages/hydrates • valve seat wear • valve seal leakage • valve stem leakage • mechanical failure, eg plug/gate • valve sticking.
Appropriate action	<p>Appropriate action includes:</p> <ul style="list-style-type: none"> • determining problems needing action • determining possible fault causes • rectifying problem using appropriate solution within area of responsibility

RANGE STATEMENT	
	<ul style="list-style-type: none"> • following through items initiated until final resolution has occurred • reporting problems outside area of responsibility to designated person.
Procedures	<p>Procedures may be written, verbal, computer-based or in some other form. They include:</p> <ul style="list-style-type: none"> • all work instructions • standard operating procedures • formulas/recipes • batch sheets • temporary instructions • any similar instructions provided for the smooth running of the plant. <p>For the purposes of this Training Package, 'procedures' also includes good operating practice as may be defined by industry codes of practice (eg Responsible Care) and government regulations.</p>
Health, safety and environment (HSE)	<p>All operations to which this unit applies are subject to stringent health, safety and environment requirements, which may be imposed through State or Federal legislation, and these must not be compromised at any time. Where there is an apparent conflict between Performance Criteria and HSE requirements, the HSE requirements take precedence.</p>

Unit Sector(s)

Unit sector	Operational/technical
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Competency field

Competency field	
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Co-requisite units

Co-requisite units		
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