



Australian Government

Department of Education, Employment and Workplace Relations

PMAOPS304B Operate and monitor compressor systems and equipment

Revision Number: 1

PMAOPS304B Operate and monitor compressor systems and equipment

Modification History

Not applicable.

Unit Descriptor

Unit descriptor	This unit covers the operation and monitoring of a complex compressor system and associated equipment.
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Application of the Unit

Application of the unit	<p>In a typical scenario, an operations technician in a large plant looks after the operation of a complex compressor system. At the heart of the compressor system would be a reciprocating or rotary (screw or centrifugal) compressor capable of high pressure and high volume. These compressors would be distinguished by features such as:</p> <ul style="list-style-type: none"> • multistage compression • intercoolers • advanced lubrication and seal systems • surge control systems. <p>The operations technician would:</p> <ul style="list-style-type: none"> • identify and rectify operational problems • predict the potential impact of compressor output on the operation of the whole plant • facilitate output changes. <p>Generally the operations technician would be part of a team during start-up and shutdown operations. They would be expected to be capable of performing all parts of this unit. At all times they would be liaising and communicating with relevant team members.</p> <p>This unit does not:</p> <ul style="list-style-type: none"> • require the operation of a central control panel • apply to a packaged compressor, regardless of how large it may be, which is covered by <i>MSAPMOPS100A Use equipment</i>.
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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. Start up compressor systems/ equipment.	2.1. Perform pre-start-up checks 2.2. Check the status of the system/equipment prior to commencing start-up process 2.3. Check all required auxiliary systems, including oil and water, to confirm their operational condition 2.4. Start up individual items of equipment and the entire compressor system as required 2.5. Bring the system to required operating conditions.
3. Control and monitor the compressor system.	3.1. Initiate load-up through the selection of appropriate speed or cycle 3.2. Monitor and adjust downstream equipment as required 3.3. Monitor the operational condition and safety status of the unit/system and take appropriate action 3.4. Adjust operational speeds and operating cycles as required 3.5. Monitor or activate safety systems to ensure that any system shutdowns are controlled and conducted safely and effectively.
4. Shut down compressor systems/equipment.	4.1. Confirm shutdown cause with other personnel and plant operators before commencing to isolate or shut down the equipment/system 4.2. Implement control measures to minimise damage and hazards 4.3. Shut down system according to procedures 4.4. Inspect the system/equipment as required by procedures 4.5. Isolate and purge systems/equipment and prepare plant for maintenance as required.
5. Maintain plant effectiveness.	5.1. Frequently and critically monitor all plant throughout shift 5.2. Use measured/indicated data and smell, sight, sound and feel as appropriate to monitor plant 5.3. Identify critical equipment/processes and tune their performance 5.4. Identify issues likely to impact on plant performance and take appropriate action 5.5. Predict impact of a change in one unit/area on other

ELEMENT	PERFORMANCE CRITERIA
	plant units/areas and communicate this to relevant people 5.6. Test trips and alarms as required

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:

- efficient and effective operation of plant/equipment
- hazard analysis
- completing plant records
- communication
- problem solving

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

- process gas variations
- instrument failure/wrong reading
- electrical failure
- mechanical failure
- operational problem.

Required knowledge

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

- 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
- all items on a schematic of the plant item and the function of each
- correct methods of starting, stopping, operating and controlling process
- corrective action appropriate to the problem cause
- function and troubleshooting of major components and their problems
- types and causes of problems within operator's scope of skill level and responsibility.
- physics and chemistry relevant to the process unit and the materials processed
- process parameters and limits, eg temperature, pressure, flow, pH
- principles of operation of plant/equipment
- power and torque envelopes
- compression flows and characteristics

REQUIRED SKILLS AND KNOWLEDGE

- liquid and product separation principles
- product characteristics and tolerances
- flow charts
- flow, pressure, temperature, levels and rates.

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	<p>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.</p> <p>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.</p> <p>This unit of competency requires an application of the knowledge contained in the use of the compressor system and its 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.</p>
Critical aspects for assessment and evidence required to demonstrate competency in this unit	<p>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.</p> <p>Consistent performance should be demonstrated. In particular look to see that:</p> <ul style="list-style-type: none"> early warning signs of equipment/processes needing attention or with potential problems are recognised

EVIDENCE GUIDE	
	<ul style="list-style-type: none"> • 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. <p>These aspects may be best assessed using a range of 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 the plant, incidents on similar plants around the world, hazard analysis activities and similar sources.</p>
Context of and specific resources for assessment	Assessment will require access to an operating plant over an extended period of time, or a suitable method of gathering evidence of operating ability 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. Consider co-assessment with: <ul style="list-style-type: none"> • <i>PMAOPS221B Operate and monitor prime movers</i> • <i>PMAOPS223B Operate and monitor valve systems.</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	
<p>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.</p>	
Codes of practice/ standards	Where reference is made to industry codes of practice, and/or Australian/international standards, the latest version must be used.
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 • following through items initiated until final resolution has occurred • reporting problems outside area of responsibility to designated person.
Context	<p>This unit of competency includes all such items of equipment and unit operations which form part of the compressor system. For your plant this may include (select relevant items):</p> <ul style="list-style-type: none"> • single/multi-stage rotary compressors (axial flow, centrifugal, turbine, screw) • single/multi-stage reciprocating compressors • turbo expanders/compressors • advanced lube and seal oil systems • intercoolers/heat exchangers • scrubbers • instrument/control systems • programmable logic controllers (PLCs) • process controllers. <p>Typical problems for your plant may include:</p> <ul style="list-style-type: none"> • surging • control of temperature and pressure • variations in feed • vibration.
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

RANGE STATEMENT	
	<ul style="list-style-type: none"> • 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)	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.

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	<i>PMAOPS221B Operate and monitor prime movers</i>
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