



**Australian Government**

# **PMAOPS302 Operate reactors and reaction equipment**

**Release: 1**

# PMAOPS302 Operate reactors and reaction equipment

## Modification History

Release 1. Supersedes and is equivalent to PMAOPS302B Operate reactors and reaction equipment

## Application

This unit of competency covers the skills and knowledge required to operate a production unit which, as its prime function, causes and controls a chemical reaction. The production unit operation will integrate several plant items (single unit operations). Operation of the production unit includes the operation of ancillary equipment that is integral to the operation of the production unit, such as:

- heating/cooling
- mixing
- separating
- catalyst regeneration
- weigh/charge/dispense
- pumps/valves.

The unit of competency applies to reactor or reaction equipment, such as:

- batch
- continuous
- catalytic
- fluidised bed
- pressurised/under vacuum
- gas/liquid/slurry/emulsion.

This unit of competency applies to operations technicians who are required to demonstrate a significant understanding of the process and the equipment operation in order to identify and rectify operational problems, run all aspects of the reactor operation, monitor and manage the supply of raw materials and output of product, and adjust product properties to meet specifications.

This unit of competency applies to an individual operating independently in a plant with local control or in liaison with the control room operator in a plant with a centralised control panel, such as distributed control system (DCS) type controls.

This unit of competency applies to an individual working alone or as part of a team or group and working in liaison with other shift team members and the control room operator, as appropriate.

This competency does not require the operation of a central control panel.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

## Pre-requisite Unit

Nil

## Competency Field

Operations

## Unit Sector

## Elements and Performance Criteria

Elements describe the essential outcomes.

Performance criteria describe the performance needed to demonstrate achievement of the element.

1	<b>Prepare for work</b>	<p>1.1 Receive and give shift handover</p> <p>1.2 Identify work requirements</p> <p>1.3 Identify and control hazards</p> <p>1.4 Coordinate with appropriate personnel</p> <p>1.5 Check for recent work undertaken on reactor unit</p> <p>1.6 Note any outstanding/incomplete work</p> <p>1.7 Check operational status of reactor unit</p>
2	<b>Operate reactor unit in accordance with procedures</b>	<p>2.1 Describe the type of reactor unit, the component plant items and their duties</p> <p>2.2 Complete routine checks, logs and paperwork taking action on unexpected readings</p> <p>2.3 Change rate, grade or specification smoothly</p> <p>2.4 Manage transitions smoothly and in a timely manner to minimise scrap/off grade as a result of a transition</p> <p>2.5 Adjust reactor unit and its component plant items as appropriate to their type and duty to maximise performance</p>

- 2.6 Charge/discharge reactor, if appropriate
  - 2.7 Monitor condition of catalyst, if appropriate, and take action to maintain production schedule and quality
  - 2.8 Monitor materials and stock levels of fees and take action to maintain production schedule and quality.
- 3 **Diagnose and take action on abnormal situations**
- 3.1 Monitor reactor unit and its component plant items frequently and critically throughout shift using measured/indicated data and senses
  - 3.2 Describe impacts of any changes upstream and downstream
  - 3.3 Recognise actual and developing situations which may require action
  - 3.4 Apply operational knowledge to resolve problems
  - 3.5 Take actions on abnormal situations which cannot be resolved during the shift to ensure safety and the resolution of the situation
  - 3.6 Follow through items initiated until final resolution has occurred
- 4 **Isolate and de-isolate reactor unit and its component plant items**
- 4.1 Complete any required pre-start checks
  - 4.2 Start up/shut down reactor unit according to the reactor type and duty in liaison with other personnel
  - 4.3 Start up/shut down/changeover component plant items within unit according to their type and duty in liaison with other personnel
  - 4.4 Build reaction rate steadily and stabilise reaction system to produce in specification product at specified rates within minimum time
  - 4.5 Isolate entire reactor unit and/or any component plant item
  - 4.6 Make safe for required work
  - 4.7 Check reactor unit/plant item is ready to be returned to

		service
	4.8	De-isolate and prepare reactor unit/plant item for return to service
5	<b>Clean reactors/vessels in accordance with procedures</b>	5.1 Identify cleaning requirements
		5.2 Clean to requirements

## Foundation Skills

This section describes those language, literacy, numeracy and employment skills that are essential to performance.

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

## Range of Conditions

This field allows for different work environments and conditions that may affect performance. Essential operating conditions that may be present (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) are included.

**Regulatory framework** The latest version of all legislation, regulations, industry codes of practice and Australian/international standards, or the version specified by the local regulatory authority, must be used, and include one or more of the following:

- legislative requirements, including work health and safety (WHS)
- industry codes of practice and guidelines
- environmental regulations and guidelines
- Australian and other standards
- licence and certification requirements

All operations to which this unit applies are subject to stringent health, safety and environment (HSE) requirements, which may be imposed through state/territory 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.

**Hazards** Hazards include one or more of the following:

- electricity

- gas
- gases and liquids under pressure
- structural hazards
- structural collapse
- equipment failures
- industrial (machinery, equipment and product)
- equipment or product mass
- noise, rotational equipment or vibration
- plant services (steam, condensate and cooling water)
- working at heights, in restricted or confined spaces, or in environments subjected to heat, noise, dusts or vapours
- flammability and explosivity
- hazardous products and materials
- unauthorised personnel
- sharp edges, protrusions or obstructions
- slippery surfaces, spills or leaks
- extreme weather
- other hazards that might arise
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**Situations requiring action**

Situations requiring action include one or more of the following:

- variations in catalyst activity
- control of exotherm/endothrm
- adjustments to meet product specifications
- variations in feed rates/quality
- raw materials variations
- instrument failure/wrong reading
- equipment failure (electrical/mechanical)
- mechanical failure
- operational problems

Actions on abnormal situations includes the following:

- determine problems needing action
- determine possible fault causes
- develop solutions to problems which do not have a known solution
- follow through items initiated until final resolution has occurred
- report problems outside area of responsibility to designated person

Operational knowledge includes one or more of the following:

- procedures
- training

- technical information such as journals, engineering specifications
- remembered experience
- relevant knowledge obtained from appropriate people

**Start up/shut down** Start up/shut down includes the following:

- start up and shut down to/from normal operating conditions
- start up and shut down to/from isolated, cold or empty
- start up and shut down to/from other conditions/situations experienced on the plant

**Procedures** All operations must be performed in accordance with relevant procedures.

Procedures are written, verbal, visual, computer-based or in some other form, include one or more of the following:

- emergency procedures
- work instructions
- standard operating procedures (SOPs)
- safe work method statements (SWMS)
- formulas/recipes
- batch sheets
- temporary instructions
- any similar instructions provided for the smooth running of the plant

**Operate** Operate is to monitor, adjust/make change to the production unit and/or its component items to meet specifications, by one or more of the following:

- manually in the plant
- using local controller in the plant

**Product** Product includes anything produced by a process step and so includes:

- intermediate products, such as the product from one process step, which then becomes the feed for another

## Unit Mapping Information

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## **Links**

Companion Volume implementation guides are found in VETNet -

<https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=9fc2cf53-e570-4e9f-ad6a-b228ffdb6875>