



Australian Government

PMAOPS311 Operate and troubleshoot reactors and reaction equipment

Release: 1

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Modification History

Release 1. Unit code and title changed. Application and Performance Criteria changed. Range of Conditions removed. Assessment Requirements changed. Supersedes and is equivalent to PMAOPS302 Operate reactors and reaction equipment.

Application

This unit describes the skills and knowledge required to operate a reactor unit that, as its prime function, causes and controls a chemical reaction. The reactor unit operation will integrate several plant items (single-unit operations). Operation of the reactor unit includes the operation of component plant items that are integral to the overall operation of the production unit.

This unit applies to autonomous operators who are required to demonstrate a significant understanding of the process and the equipment operation in a plant with local control, or in liaison with the control-room operator in a plant with a centralised control panel.

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

No licensing or certification requirements exist at the time of publication. Relevant legislation, industry standards and codes of practice within Australia must be applied.

Pre-requisite Unit

Nil

Competency Field

Operations

Elements and Performance Criteria

Elements	Performance Criteria
<i>Elements describe the essential outcomes.</i>	<i>Performance criteria describe the performance needed to demonstrate achievement of the element.</i>
1. Operate reactor unit according to procedures	1.1 Receive and give shift handover 1.2 Communicate with personnel to identify and coordinate work requirements 1.3 Identify, control and report process system hazards

Elements	Performance Criteria
<i>Elements describe the essential outcomes.</i>	<i>Performance criteria describe the performance needed to demonstrate achievement of the element.</i>
	1.4 Check for recent work undertaken on reactor and address outstanding and incomplete work 1.5 Check operational status of process system 1.6 Perform routine checks and complete logs and paperwork, taking appropriate action on unexpected readings 1.7 Adjust process system according to its type and function/s to maximise performance
2. Identify and respond to abnormal situations during operation	2.1 Monitor reactor unit frequently and critically throughout shift using own senses, and measured and indicated data 2.2 Monitor field data and instrumentation to ensure that product remains on specification 2.3 Identify impacts of changes upstream and downstream 2.4 Identify actual and developing situations that may require action 2.5 Take action to remedy abnormal situations according to operating procedures 2.6 Complete required documents outlining abnormal situation management and corrective action taken
3. Shut down and prepare reactor unit for maintenance	3.1 Prepare process system to be shut down according to operating procedures 3.2 Complete pre-shutdown checks according to operating procedures 3.3 Shut down process system according to operating procedures 3.4 Identify, control and report shutdown hazards 3.5 Monitor shutdown and identify abnormal situations which may require action 3.6 Take action to remedy abnormal situations according to operating procedures 3.7 Shut down and changeover duty and standby equipment according to operating procedures 3.8 Isolate process system from energy sources
4. Prepare and start up reactor unit	4.1 De-isolate and prepare process system to be returned to standby or service 4.2 Complete pre-start checks according to operating procedures 4.3 Start up process system according to operating procedures

Elements	Performance Criteria
<i>Elements describe the essential outcomes.</i>	<i>Performance criteria describe the performance needed to demonstrate achievement of the element.</i>
	4.4 Identify, control and report startup hazards 4.5 Monitor startup and identify abnormal situations which may require action 4.6 Take action to remedy abnormal situations according to operating procedures

Foundation Skills

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

- Learning skills to follow instructions, monitor process and select appropriate procedure.
- Reading skills to follow written procedures and documentation.
- Oral communication skills to liaise and coordinate with team members and the control-room operator.
- Writing skills to complete workplace documentation.
- Numeracy skills to monitor field data, instrumentation and process parameters.

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

Unit Mapping Information

Release 1. Supersedes and is equivalent to PMAOPS302 Operate reactors and reaction equipment.

Links

Companion Volume implementation guides are found in VETNet -

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

Assessment Requirements for PMAOPS311 Operate and troubleshoot reactors and reaction equipment

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Performance Evidence

There must be evidence the candidate has completed the tasks outlined in the elements and performance criteria of this unit:

- at least 2 times, each in a separate work context.

Knowledge Evidence

There must be evidence the candidate has knowledge of:

- all items on a schematic of the reactor unit, including:
 - type of reactor, the component plant items and their functions
 - troubleshooting of major components
 - principles of operation of plant and equipment
 - operating parameters and integrity limits including temperature, pressure, flow and pH
 - procedures for starting, stopping, operating, controlling and isolating the reactor
 - basis of the process used in the reactor to cause chemical reaction
 - methods of controlling the reaction rate and yield, and the advantages and disadvantages of each
 - impact of external factors (including variations in weather and feed)
 - interactions between plant items and processes
- physics and chemistry to the level of being able to provide an overview of the science of the reactor process
- the nature and condition of materials at each stage of the reaction, the changes which have occurred in that stage and why they have occurred
- the reaction in chemical terms and equations, including the effect of changing reaction variables (including temperature, pressure, catalyst, concentration and pH)
- product specifications and tolerances
- reactor and reaction equipment abnormal situations and required actions, including but not limited to:
 - variations in catalyst activity
 - control of exotherm/enderm
 - adjustments to meet product specifications
 - variations in feed rates and quality

- raw materials variations
- instrument failure and wrong reading
- equipment failure (electrical and mechanical)
- mechanical failure
- operational problems
- hierarchy of control
- reactor hazards:
 - possible causes
 - potential consequences
 - appropriate risk controls
 - reporting and escalation procedures.

Assessment Conditions

Skills must have been demonstrated in the workplace or in a simulated environment that reflects workplace conditions and contingencies. The following conditions must be met for this unit:

- use of suitable facilities, equipment and resources, including:
 - reactors and reaction equipment
 - operating procedures
- abnormal situations must be relevant to reactors and reaction equipment.

Assessors must satisfy the NVR/AQTF mandatory competency requirements for assessors.

Links

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