



Australian Government

Department of Education, Employment and Workplace Relations

PMAOPS205A Operate heat exchangers

Release: 1

PMAOPS205A Operate heat exchangers

Modification History

Not applicable.

Unit Descriptor

This competency covers the skills needed to operate heat exchangers, including heat exchangers that form part of a heating, cooling or refrigeration system.

This competency does NOT cover superheaters or waste heat boilers, which are treated as part of steam generating equipment.

In this competency, an operator would typically start up and shut down heat exchangers in accordance with procedures, and make adjustments to flow rate, temperature and pressure, depending on the type of heat exchanger. In particular, the operator needs to understand the factors affecting efficient operation of a heat exchanger in order to make appropriate adjustments or recognise when maintenance is required.

An important aspect of this competency is solving heat exchanger problems. The operator therefore needs to have a good understanding of heat exchanger operation and typical problems, along with the ability to implement remedial actions, which could include:

making adjustments

carrying out minor maintenance

identifying and reporting problems outside operator's scope of responsibility

identifying and controlling hazards related to heat exchangers and their integral equipment (including pressure vessels).

Generally the operator would be part of a team during start up and shut down procedures and would be expected to be capable of demonstrating competence in all parts of this unit. At all times they would be liaising and cooperating with other members of the team.

Prerequisites

This unit **hasno** prerequisites.

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Prerequisites

This unit **hasno** prerequisites.

Application of the Unit

Not applicable.

Licensing/Regulatory Information

Not applicable.

Pre-Requisites

Not applicable.

Employability Skills Information

Not applicable.

Elements and Performance Criteria Pre-Content

Not applicable.

Elements and Performance Criteria

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Element	Performance Criteria
1 Operate heat exchangers	1.1 Identify the type of heat exchanger. 1.2 Start up and shut down heat exchanger according to the heat exchanger type and duty. 1.3 Adjust flow rates, temperatures and pressure as appropriate to type of heat exchanger. 1.4 Start up from standby and after maintenance. 1.5 Complete routine checks, logs and paperwork, taking action on unexpected readings and trends.
2 Respond to heat exchanger problems	2.1 Monitor plant frequently and critically throughout shift using measured/indicated data and senses (sight, hearing, etc.) as appropriate. 2.2 Recognise operational problem. 2.3 Analyse cause of operational problems within

- scope of skill level.
- 2.4 Take timely and appropriate action to solve operational problems.
- 3 Carry out maintenance procedures
 - 3.1 Isolate heat exchanger and prepare for maintenance or vessel entry as require.
 - 3.2 Complete minor maintenance according to procedure.
 - 3.3 Receive plant back from maintenance.
 - 3.4 Prepare plant for the introduction of chemicals/hydrocarbons and operation.
 - 3.5 Return plant to operation.
 - 4 Control hazards
 - 4.1 Identify hazards in work area and with equipment.
 - 4.2 Assess risks arising from those hazard.
 - 4.3 Take appropriate action to control risks in accordance with procedures and duty of care.

Required Skills and Knowledge

Not applicable.

Evidence Guide

Assessment context and methods

Assessment for this unit of competency will be on an operating plant. 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 timely assessment of parts of this unit of competency (e.g. parts of elements 2 and 3). 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 and role plays.

This unit of competency requires a significant body of knowledge which will 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

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 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.

Resource implications

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.

Other assessment advice

In all plants it may be appropriate to assess this unit concurrently with relevant teamwork and communication units. For many plants, it might be appropriate for this unit to be assessed with:

PMAOPS201A - Operate fluid flow equipment

PMAOPS204A - Use utilities and services

PMACOM200A - Process and record information.

In a major hazard facility, it may be appropriate to assess this unit concurrently with:

PMAOHS200 - Participate in workplace safety procedures.

Essential knowledge

Competence includes a comprehensive understanding of heat exchanger principles and typical problems to a level needed to control the operation, and recognise and resolve operational problems. In particular it includes a knowledge of:

- all items on a schematic of the heat exchanger system and describe the function of each
- principles of operation of heat exchangers
- physics of operation
- correct methods of starting, operating and shutting down heat exchangers
- typical problems with heat exchangers and their remedy
- issues related to pressure vessels (regulations, requirements).

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typical problems with heat exchangers and their remedy

issues related to pressure vessels (regulations, requirements).

Range Statement

Context

This competency is typically performed by an operator. It includes all types of heat exchangers such as:

plate
U-tube
spiral
bayonet
air cooled fin
shell and tube (all variants of design)
scraped surface
vessel jackets/coils.

This competency does NOT cover superheaters or waste heat boilers, as these are treated as part of steam generating equipment.

Heat exchanger duties include:

heating
cooling
cryogenic
reboilers
condensers
gas dryers
gas coolers
refrigeration (evaporators/condensers).

Typical problems include:

avoiding damage to heat exchanger due to overheating and/or under/overpressurising
minimising factors that affect heat exchanger efficiency (scale build-up, fouling, internal leakage, air lock, turbulence, corrosion)
leakage or gasket problems
recognising when maintenance is required.

All operations are performed in accordance with **procedures**.

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.

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Unit Sector(s)

Not applicable.