



Australian Government

Department of Education, Employment and Workplace Relations

PMAOPS323A Operate and monitor heating furnace

Revision Number: 1

PMAOPS323A Operate and monitor heating furnace

Modification History

Not applicable.

Unit Descriptor

Unit descriptor	This unit covers performing start-up, take-over/hand-over, monitoring, shut-down and storage of a heating furnace and associated equipment to legislative requirements, standards and codes of practice.
------------------------	--

Application of the Unit

Application of the unit	This unit applies to the start-up, take-over/hand-over and shut-down of a fired heating furnace. Furnaces covered by this unit would typically have the following features: • modulating combustion air supply • modulating single heat source • modulating firing rate, economisers and other associate equipment. The unit applies to furnaces used for heating heat transfer fluids which may include natural and synthetic oils or other media and other industrial uses as required in the workplace. The furnace may be singular or in a battery of furnaces. Work includes inspection procedures as specified in the manufacturer recommendations and workplace procedures, identification of maintenance requirements and hazard control measures. All work is carried out to applicable State/Territory and National OHS legislation, standards and codes of practice. Generally the technician would work alone or as part of a team for this unit.
--------------------------------	--

Licensing/Regulatory Information

Not applicable.

Pre-Requisites

Prerequisite units

Employability Skills Information

Employability skills	This unit contains employability skills.
-----------------------------	--

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.
---	--

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 furnace.	2.1. Perform pre-start-up checks 2.2. Start up individual items of equipment and the entire furnace system 2.3. Start up from standby and after maintenance 2.4. Increase temperature steadily with no surges or lulls 2.5. Stabilise furnace to produce required heat within required time.
3. Monitor and control the heating furnace.	3.1. Complete routine checks, logs and paperwork 3.2. Recognise the signs of potential and actual problems 3.3. Take appropriate action to minimise the impact of potential and actual problems 3.4. Monitor condition of heat transfer components (if any) and take appropriate action 3.5. Monitor fuel/air supplies and ratios and take appropriate action 3.6. Trim furnace as required.
4. Change heating rates.	4.1. Predict from rates and schedule when a transition will be required 4.2. Give advanced notice of transition to work team 4.3. Trim plant in a manner which prepares it for the change 4.4. Manage changes smoothly and in a timely manner
5. Maintain furnace 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 performance and take appropriate action 5.5. Predict impact of a change in one unit/area on other plant units/areas and communicate this to relevant people
6. Shut down furnace.	6.1. Determine type of shut down required 6.2. Give advance warning of shut down where possible

ELEMENT	PERFORMANCE CRITERIA
	6.3. Change over individual items of equipment 6.4. Shut down individual items of equipment and the entire furnace system 6.5. Shut down to a stand-by condition if required 6.6. Shut down in an emergency when required
7. Isolate and de-isolate furnace system and individual items.	7.1. Isolate plant 7.2. Make safe for required work 7.3. Check plant is ready to be returned to service 7.4. 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

Look for evidence that confirms skills in:

- following, standard operating procedures and statutory requirements
- performing preoperational checks of furnace
- performing maintenance checks
- orally reporting routine information
- identifying hazards, hazardous situations and control measures
- using personal protective clothing and equipment
- selecting the most appropriate prevention/control measure for a given situation
- starting up furnaces, including those fitted with associated equipment such as economisers
- monitoring furnaces, including checks of combustion management system and economiser operation
- checking operating status
- recording routine and familiar information in operating log and other standard workplace forms
- using testing equipment
- responding to typical emergency situations
- notifying downstream users
- performing operational and inspection shut-down, including procedures for associated equipment, such as economisers
- isolating furnace from any common connection between the furnace and other furnaces on line and all access points required for inspection

Required knowledge

Look for evidence that confirms knowledge of:

- pre-operational checks
- procedures for identifying and reporting maintenance requirements
- statutory requirements and workplace procedures for identifying and reporting hazards in the work area
- use and application of personal protective equipment
- safe work practices and procedures
- prevention and control measures
- the processes for starting a furnace, such as heat input, warm up of the reticulation system, systems operation, reticulation line pressure, heating fluid usage and supply, associated equipment such as economisers
- the process for confirming operational status of furnace

REQUIRED SKILLS AND KNOWLEDGE

- procedures for maintaining an operating log and communicating furnace status
- procedures for communicating furnace status and operation
- principles of furnace operation - single and battery
- furnace fittings
- preparing furnace for inspection
- heating fluid feed systems
- procedures for monitoring a furnace, such as heating fluid reticulation line pressure/temperature, usage, supply and quality of heating fluid, combustion/heat source system, fuel system, combustion air supply, operation of control/safety devices, combustion management system, associated equipment such as economisers
- function, purpose and location of associated equipment, such as economiser, air heater, feed heater, economiser relief valves, main stop valve
- procedures such as identification of emergency isolation of heat source, operation of furnace, selection and application of fire fighting equipment and notification of downstream users
- operational shut-down processes and procedures, such as cooling down, furnace pressure/vacuum and fuel/heat source isolation
- shut down processes and procedures for internal inspection, such as confirming furnace cooling down, vacuum/pressure, fuel/heat source isolation, removal of combustion equipment and water from furnace
- isolation procedures and safety issues
- procedures for cleaning furnace internally and externally
- various modes of furnace storage, which may include integral associated equipment such as economisers
- the reasons for selecting particular storage mode
- procedures for storing a furnace in shut-down mode

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 a range of problems, problem causes and environments.

Simulation may be required to allow for assessment of parts of this unit. Simulation should be based on the actual problems and should 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.

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

Competence must be demonstrated in the ability to define and analyse the problem as well as deal with the stakeholders. The stakeholders should be satisfied with the solution, as well as the solution being technically sound.

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

- different types of problems can be analysed and resolved
- different types of stakeholders can be satisfied
- the range of possible causes can be identified and analysed and the most likely cause determined
- appropriate action is taken.

These aspects may be best assessed using a range of scenarios/case studies/what-ifs. These assessment activities should include a range of problems, including new, unusual and improbable situations which may have been generated from the past history and similar sources.

Context of and specific resources for

Assessment will require a suitable method of

EVIDENCE GUIDE	
assessment	gathering evidence of problem solving 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.
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.
Furnace shut down	Furnace shutdown may be for: • operational shut down • inspection shut down • maintenance/cleaning shut down • other
Pre-operational checks	Heat exchange fluid feed supply, fuel supply/heat source, furnace valves - their operation and position, combustion air supply and combustion equipment
Furnace	Modulating combustion air supply, modulating single heat source, modulating firing rate, economisers, single and battery
Appropriate action	Appropriate action includes: • 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.
Procedures	Procedures may be written, verbal, computer-based or in some other form. They include: • all work instructions • standard operating procedures • formulas/recipes • batch sheets • temporary instructions • any similar instructions provided for the smooth running of the plant. For the purposes of this Training Package, 'procedures' also includes good operating practice as may be defined by industry codes of practice

RANGE STATEMENT	
	(eg Responsible Care) and government regulations.
Hazards	Chemical and thermal hazards, manual handling, machine guarding, illumination of work area, rubbish and combustible materials, heat transfer fluid and fuel leaks etc.
Associated equipment	Economiser, economiser relief valves, air heater, feed heater, main heating fluid stop valve, feed pumps, fans
Monitored	Heating fluid pressure and temperature, flame and combustion conditions, heating fluid feed and return systems, fuel system, combustion management system, heating fluid management system, heating fluid manifold fittings, soot blowers
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
--------------------	-----------------------

Competency field

Competency field	
-------------------------	--

Co-requisite units

Co-requisite units	
---------------------------	--