



**Australian Government**

**Department of Education, Employment and Workplace Relations**

# **PMC552030C Operate a firing kiln**

**Revision Number: 1**

## PMC552030C Operate a firing kiln

### Modification History

Not applicable.

### Unit Descriptor

<b>Unit descriptor</b>	This unit of competency covers the operation of a firing kiln to fire clay and ceramic products. It involves preparing the kiln, loading the kiln, monitoring operations and solving operational problems.
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### Application of the Unit

<b>Application of the unit</b>	<p>This unit of competency applies to operators who are responsible for operating a firing kiln and resolving routine problems in a large plant. This unit was developed for larger production contexts but it may also be relevant to craft practitioners producing ceramic work. This unit does NOT apply to forming, drying prior to firing, finishing or operation of rotary kilns.</p> <p>This competency is typically performed by operators working either independently or as part of a team. At all times they would be liaising and cooperating with other members of the team.</p>
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### Licensing/Regulatory Information

Not applicable.

### Pre-Requisites

<b>Prerequisite units</b>		

<b>Prerequisite units</b>		

### Employability Skills Information

<b>Employability skills</b>	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 the firing equipment	1.1. Determine the firing requirements from the production program 1.2. Identify and set up the kiln cars or furniture 1.3. Ensure kiln refractories are within specification, including kiln cars, kiln lining and refractories at burners, as appropriate 1.4. Ensure the firing equipment is safe to use 1.5. Check for fuel feed obstructions and clear burner pathways
2. Load kiln	2.1. Ensure products are set or stacked to specification 2.2. Ensure correct stacking pattern is used 2.3. Ensure adequate space is allowed around each item 2.4. Use kiln space effectively
3. Monitor kiln operation	3.1. Monitor kiln firing to ensure temperature rise and fall rate is to specification 3.2. Monitor and record kiln car movement, or kiln contents 3.3. Monitor and adjust kiln heating equipment (elements or burners) and record temperature gradient details 3.4. Monitor the kiln atmosphere 3.5. Monitor for correct operation of kiln 3.6. Move kiln car or kiln contents to the appropriate storage area 3.7. Check and record condition of products leaving the kiln
4. Rectify routine problems	4.1. Identify the range of faults that can occur during the operation 4.2. Determine and rectify fault causes in accordance with procedures/work instructions 4.3. Identify and rectify equipment failure causes in accordance with procedures/work instructions 4.4. Ensure appropriate records and log books of equipment operations are maintained to meet procedures/work instructions 4.5. Identify non-routine problems and report to designated person
5. Control hazards	5.1. Identify hazards in kiln work area 5.2. Assess the risks arising from those hazards

ELEMENT	PERFORMANCE CRITERIA
	5.3. Implement measures to control those risks in line with procedures and duty of care

## Required Skills and Knowledge

### REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

#### Required skills

Required skills include:

- recognising conditions which will lead to out of specification operation
- implementing enterprise procedures within time constraints and in a manner relevant to the correct use of the equipment
- conveying information relevant to the operation clearly and effectively
- maintaining appropriate levels of quality assurance
- reading and numeracy to interpret workplace documents and technical information

#### Required knowledge

Required knowledge includes:

- stages and critical transitions during the firing process
- kiln temperature profile and deviations allowed
- importance of stacking patterns
- consequences of variations in the firing process
- underlying causes of faults such as precipitated by:
  - firing/temperature profile
  - drying
  - materials
  - stacking or distribution of product in kiln

## Evidence Guide

<b>EVIDENCE GUIDE</b>	
<p>The Evidence Guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.</p>	
<p><b>Overview of assessment</b></p>	<p>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.</p>
<p><b>Critical aspects for assessment and evidence required to demonstrate competency in this unit</b></p>	<p>Assessment for this unit of competency will be on an operating plant.</p> <p>It is essential that the equipment be understood and that the importance of critical material properties, settings and readings is known. Competence must be demonstrated in the ability to recognise and analyse potential situations requiring action and then in implementing appropriate corrective action.</p> <p>Consistent performance should be demonstrated. In particular look to see that:</p> <ul style="list-style-type: none"> <li>• kiln or kiln car is loaded to requirements</li> <li>• kiln firing is to requirements</li> <li>• temperature rise/fall rates are to specification.</li> </ul> <p>Competence must be demonstrated in the operation of all ancillary equipment to the level required for this unit of competency.</p>
<p><b>Context of and specific resources for assessment</b></p>	<p>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.</p> <p>Assessment will occur over a range of situations which will include disruptions to normal, smooth operation.</p> <p>Simulation or case studies/scenarios may be required to allow for timely assessment of parts of this unit of competency. Simulation should be based on the actual plant and will include 'walk-throughs' of the relevant competency components. A bank of scenarios/case studies/what ifs and questions will be required to probe the reasoning behind observable actions.</p>
<p><b>Method of assessment</b></p>	<p>In all plants it may be appropriate to assess this unit concurrently with relevant teamwork and communication</p>

<b>EVIDENCE GUIDE</b>	
	units. Individual enterprises may choose to add prerequisites and co-requisites relevant to their processes.
<b>Guidance information for assessment</b>	Assessment processes and techniques must be culturally appropriate and appropriate to the language and literacy capacity of the candidate and the work being performed.

## Range Statement

<b>RANGE STATEMENT</b>	
<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. 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) may also be included.</p>	
<b>Procedures</b>	All operations are performed in accordance with standard procedures and work instructions
<b>Clay and ceramic products</b>	<p>Clay and ceramic products may include:</p> <ul style="list-style-type: none"> <li>• bricks</li> <li>• tiles and pipes</li> <li>• ceramic products</li> <li>• crockery</li> <li>• sanitary ware</li> <li>• insulators or thermal ceramics</li> </ul>
<b>Equipment and unit operations</b>	<p>This unit includes all such items of equipment and unit operations which form part of the kiln system. These may include:</p> <ul style="list-style-type: none"> <li>• kilns: batch, tunnel, top-hat, shuttle and roller hearth</li> <li>• kilns: oil, gas, electric, coal and wood fired</li> <li>• optical and thermocouple pyrometers</li> <li>• kiln cars, racking or other kiln furniture</li> <li>• PLCs, control panels, control computers</li> </ul>
<b>Typical problems</b>	<p>Typical problems may include:</p> <ul style="list-style-type: none"> <li>• ensuring moisture content of product prior to firing is within specification</li> <li>• furnace temperature profile variations</li> <li>• distribution of product in kiln or on kiln car</li> <li>• correct transition through quartz inversion, as appropriate</li> <li>• distortion of refractories or mechanical failures</li> </ul>
<b>Occupational health and safety (OHS)</b>	The identification and control of hazards and the application of OHS are to be in accordance with current, applicable legislation and regulations, and company procedures



### Unit Sector(s)

<b>Unit sector</b>	Operational/technical
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### Competency field

<b>Competency field</b>	
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### Co-requisite units

<b>Co-requisite units</b>		