



Australian Government

PMC557095 Specify and monitor the installation of monolithic/castable refractories

Release: 1

PMC557095 Specify and monitor the installation of monolithic/castable refractories

Modification History

Release 1. Supersedes and is equivalent to PMC557095A Specify and monitor the installation of monolithic/castable refractories

Application

This unit of competency covers the skills and knowledge required to specify and monitor the installation of monolithic or castable refractories. It applies to castable, mouldable and gunned (shotcrete, gunite) refractories.

This unit of competency applies to operators who are required to confirm that the design aligns to refractory requirements; design and document the installation method, materials, equipment and other specifications; and monitor the installation to ensure it meets specifications.

This unit of competency applies to senior technicians or those in similar roles who are required to analyse and synthesise advanced theoretical and technical knowledge and apply independent judgement to high-level technical issues and complex problems. The individual may work in liaison with other refractory specialists or they may be the sole refractory specialist for this job or in their organisation.

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

Pre-requisite Unit

Nil

Competency Field

Technical

Unit Sector

Not applicable

Elements and Performance Criteria

Elements describe the essential outcomes.

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

1 **Confirm design specification**

1.1 Check design specification against agreed set of requirements for the refractory

- 1.2 Identify discrepancies or conflicts in requirements
 - 1.3 Confirm installation requirements and specifications
- 2 **Design installation process**
 - 2.1 Determine method of installing refractory
 - 2.2 Determine refractory materials to be installed
 - 2.3 Determine mix requirements for materials
 - 2.4 Determine installation equipment requirements
 - 2.5 Determine anchor requirements
 - 2.6 Determine post placement requirements
 - 2.7 Design formwork if required
 - 2.8 Design scaffolding or other internal access needs if required
 - 2.9 Design external access/egress means if required
 - 2.10 Identify installation health, safety and environmental (HSE) hazards
 - 2.11 Determine appropriate hazard controls
 - 2.12 Check for discrepancies or conflicts in the designs and take appropriate action
- 3 **Prepare for installation**
 - 3.1 Specify installation procedure
 - 3.2 Liaise with relevant stakeholders
 - 3.3 Modify specification if needed
 - 3.4 Ensure correct ordering of requirements
 - 3.5 Identify time critical items for the installation
 - 3.6 Identify other items critical to the success of the project
 - 3.7 Identify or develop measures to monitor all critical items
 - 3.8 Prepare installation specification

4	Monitor installation	4.1	Ensure requirements meet specification/contract
		4.2	Ensure hazard controls are in place and effective
		4.3	Monitor work to installation specification
		4.4	Take appropriate action on non-conformances as required
		4.5	Report during project as required
		4.6	Complete end of project documentation on completion

Foundation Skills

This section describes those required skills (language, literacy and numeracy) 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.

Applicable legislation, regulations, standards and codes of practice include:

- HSE legislation, regulations and codes of practice relevant to the workplace, equipment and production processes and hazardous materials
- Australian/international standards relevant to the materials being used and products being made
- any relevant licence and certification requirements.

All operations to which this unit applies are subject to stringent 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 such requirements the legislative requirements take precedence.

HSE hazards	Identification of HSE hazards requires consideration of: • exposure to heat • exposure to dust • exposure to refractory materials • confined space entry • working with equipment • working at heights • ultra-violet (UV) and other welding hazards • disposal of waste, scrap and excess materials • manual handling hazards.
Mix requirements	Mix requirements include: • materials to be mixed • mixing ratios • location of mixing (e.g. in charge vessel, at nozzle or other location).
Method of installing refractory	Method of installing refractory includes one or more of: • casting • moulding of plastic refractory • gunning (shotcrete, gunite and gunned plastic refractory).

Unit Mapping Information

Release 1. Supersedes and is equivalent to PMC557095A Specify and monitor the installation of monolithic/castable refractories

Links

Companion Volume implementation guides are found in VETNet -

<https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=45a7f1d5-61a5-447a-9688-7abbd7e1a5c7>

Assessment Requirements for PMC557095 Specify and monitor the installation of monolithic/castable refractories

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Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy the requirements of the elements and performance criteria and demonstrate the ability to:

- analyse and interpret technical reports, technical specifications and data
- confirm design specifications meet refractory requirements
- determine refractory installation process to meet refractory design specifications
- plan the installation project
- develop installation specification, including:
 - technical specification
 - hazard controls and residual hazards
 - installation schedule
 - measures for monitoring critical items
- monitor the installation conformance to specifications and take action on non-conformances
- complete project documentation and reports
- communicate technical information verbally and in writing/drawings
- communicate and negotiate agreements with internal and external stakeholders, including one or more of:
 - customer representatives
 - technical experts
 - regulators
 - management
 - refractory designer
 - refractory installer
- materials and equipment suppliers
- contractors
- apply complex and/or theoretical mathematical calculations, statistics
- solve complex problems within or arising from the refractory design and/or installation.

Knowledge Evidence

Must provide evidence that demonstrates knowledge relevant to their job sufficient to fulfil their job role, including knowledge of:

- properties of all common refractory materials, including:
 - cementitious refractories
 - plastic clay refractories
 - other refractories
 - fibre or fibre reinforced refractories (e.g. ceramic fibre and steel fibre)
- application and principles of installation methods, including:
 - casting
 - moulding of plastic refractory
 - gunning (shotcrete, gunite and gunned plastic refractory)
- application and limitations of anchors and anchoring systems, including:
 - metal crook
 - metal Y
 - cast iron
 - ceramic
 - precast cones
 - hexmetal
- application and limitations of installation equipment, including:
 - rams
 - vibrators
 - compactors
 - gunning systems
- application and limitations of post placement requirements for different refractory systems, including:
 - drying
 - curing
 - control of moisture and or temperature
 - striking of formwork
 - removal of scaffolding or other access/egress provisions
- formwork design and construction
- scaffolding design and construction
- calculations relevant to specifications
- project planning and management
- regulatory framework
- hierarchy of control
- hazards that may arise in the job/work environment and:
 - their possible causes
 - potential consequences
 - appropriate risk controls.

Assessment Conditions

- The unit should be assessed holistically and the judgement of competence shall be based on a holistic assessment of the evidence.
- The collection of performance evidence is best done from a report and/or folio of evidence drawn from:
 - a single project which provides sufficient evidence of the requirements of all the elements and performance criteria
 - multiple smaller projects which together provide sufficient evidence of the requirements of all the elements and performance criteria.
- A third-party report, or similar, may be needed to testify to the work done by the individual, particularly when the project has been done as part of a project team.
- Assessment should use a real project in an operational workplace. Where this is not possible or where personal safety or environmental damage are limiting factors assessment must occur using a sufficiently rigorous simulated environment that reflects realistic operational workplace conditions. This must cover all aspects of workplace performance, including environment, task skills, task management skills, contingency management skills and job role environment skills.
- Assessment in a simulated environment should use evidence collected from demonstration of skills and one or more of:
 - walk-throughs
 - pilot plant operation
 - industry-based case studies/scenarios
 - ‘what ifs’.
- Knowledge evidence may be collected concurrently with performance evidence or through an independent process, such as workbooks, written assessments or interviews.
- Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.
- Conditions for assessment must include access to all tools, equipment, materials and documentation required, including relevant workplace procedures, product and manufacturing specifications associated with this unit.
- The regulatory framework will be reflected in workplace policies and procedures and is not required to be independently assessed.
- Foundation skills are integral to competent performance of the unit and should not be assessed separately.
- Assessors must satisfy the assessor competency requirements that are in place at the time of the assessment as set by the VET regulator.
- In addition the assessor or anyone acting in subject matter expert role in assessment shall demonstrate both technical competency and currency. If the assessor cannot demonstrate technical competency and currency they shall assess with a subject matter expert who does meet these requirements.
- Technical competence can be demonstrated through one or more of:
 - relevant VET or other qualification/Statement of Attainment
 - appropriate workplace experience undertaking the type of work being assessed under routine and non-routine conditions

- appropriate workplace experience supervising/evaluating the type of work being assessed under routine and non-routine conditions
- Currency can be demonstrated through one or more of:
 - being currently employed undertaking the type of work being assessed
 - being employed by the organisation undertaking the type of work being assessed and having maintained currency in accordance with that organisation's policies and procedures
 - having consulted/had contact with an organisation undertaking the type of work being assessed within the last twelve months, the consultation/contact being related to assessment
 - conducting on the job training/assessments of the type of work being assessed
 - being an active member of a relevant professional body and participating in activities relevant to the assessment of this type of work.

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