



**Australian Government**

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

# **MSATCM503A Recommend a refractory for an application**

**Revision Number: 1**

## MSATCM503A Recommend a refractory for an application

### Modification History

Not applicable.

### Unit Descriptor

|                        |                                                                                                                                                                                                               |
|------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Unit Descriptor</b> | This unit covers the knowledge and skills needed to recommend a refractory for an application based on a knowledge of the properties, application and modes of failure of the <i>principal refractories</i> . |
|------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

### Application of the Unit

|                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|--------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Application of the unit</b> | In a typical scenario, a metallurgical technician is involved with the development of a new product or process, or the improvement or redesign of an existing product/process. As part of this the requirements for an appropriate refractory material will need to be considered and a recommendation as to the type of refractory which will be appropriate for the situation will be made. This may also include evaluating suggestions made by refractory suppliers for their appropriateness to the situation. |
|--------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

### Licensing/Regulatory Information

Not applicable.

### Pre-Requisites

|                            |  |
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| <b>Pre-requisite Units</b> |  |
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## **Employability Skills Information**

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|-----------------------------|------------------------------------------|
| <b>Employability Skills</b> | This unit contains employability skills. |
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## **Elements and Performance Criteria Pre-Content**

Not applicable.

## Elements and Performance Criteria

| ELEMENT                                                                                   | PERFORMANCE CRITERIA                                                                                                                                                                                                                                                                                                                                                                                       |
|-------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. Identify the process requirements for a refractory                                     | 1.1. Identify the pH of the metallurgical slags<br>1.2. Determine the insulating requirements from the refractory<br>1.3. Determine other process requirements from the refractory<br>1.4. Identify likely process causes of refractory failure<br>1.5. Specify refractory needs in terms of physical and chemical properties required.<br>1.6.                                                            |
| 2. Recommend type of refractory material                                                  | 2.1. Select a refractory class suitable for the pH of the metallurgical slag<br>2.2. Shortlist refractory materials within that class suitable for the insulating and other process demands<br>2.3. Contrast the principal modes of failure for each short listed refractory with the likely process causes of refractory failure<br>2.4. Recommend suitable refractory material/s for the job.<br>2.5.    |
| 3. Consider economic and technical implications of different <i>modes of installation</i> | 3.1.. Compare possible alternative refractory materials<br>3.2. Compare possible alternative installation methods<br>3.3. Consider alternative materials with different installation methods and their overall technical/economic performance<br>3.4. Recommend a refractory material and a method of installation which delivers the best economic and technical performance for the application.<br>3.5. |

## Required Skills and Knowledge

### REQUIRED SKILLS AND KNOWLEDGE

This describes the essential skills and knowledge and their level, required for this unit.

#### Required skills:

- Apply principles to determine the pH of metallurgical slags
- Select appropriate refractories for an application
- Select appropriate method of refractory installation and repair
- Identify root causes of refractory failures

#### Required knowledge:

Competency includes sufficient knowledge of:

- metals and their properties and operating temperatures
- furnace operations
- refractory materials, purposes, common defects, installation and fixing techniques
- the limitations of refractories

## 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

A person who demonstrates competency in this unit must be able to recommend a refractory for application. Critical aspects for assessment and evidence are required to demonstrate competency in this unit.

The person will be able to select appropriate materials and installation methodologies for specified situations. Assessment may be by workplace project, case study or suitable alternative. The selection should be able to be justified on technical and economic grounds.

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

It is essential that competence is demonstrated in the ability to:

- identify refractory requirements for particular metals, alloys, slags and processes
- recommend refractories that are appropriate from both a technical and economic perspective
- determine the mode of refractory failure and recommend a more appropriate solution

#### Relationship to other units

This unit may be assessed concurrently with other relevant units.

#### Assessment method and context

Assessment will need to occur in an organisation using refractory materials.

Assessors must be satisfied that the person can consistently perform the unit as a whole, as defined by the elements, performance criteria, skills and knowledge. A holistic approach should be taken to the assessment.

Assessors should gather sufficient, fair, valid, reliable, authentic and current evidence from a range of sources. Sources of evidence may include direct observation, reports from supervisors, peers and colleagues, project work, samples, organisation records and questioning. Assessment should not require language, literacy or numeracy skills beyond

**EVIDENCE GUIDE****Resource implications**

those required for the unit.

The assessee will have access to all techniques, procedures, information, resources and aids which would normally be available in the workplace.

The method of assessment should be discussed and agreed with the assessee prior to the commencement of

If evidence is provided from a complete reline, or an initial refractory lining, then one recommendation may provide sufficient evidence. Where evidence is from the ongoing maintenance of an existing refractory, then it will be needed from a range of activities to provide sufficient evidence.

This section should be read in conjunction with the range of variables for this unit of competency. Resources required include suitable access to an organisation using refractories that allows for appropriate and realistic simulation. A bank of case studies/scenarios and questions will also be required to the extent that they form part of the assessment method. Questioning may take place either in the workplace, or in an adjacent, quiet facility such as an office or lunchroom. No other special resources are required.

## 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. 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.

#### Principal refractories

Principal refractories includes:

- silica
- alumino silicates
- dolomite
- magnesite-chrome,
- chrome-magnesite
- chrome
- insulation and insulating refractories
- special refractories (eg graphite, silicon carbide)
- monolithic refractories ie cement, plastics, ramming mixes and castables
- pH

pH of slags to be identified as acidic, basic or neutral in regards to their interaction with refractories.

#### Modes of installation

Modes of installation include:

- monolithic
- fired shape structures
- bricks
- other (eg sprayed)

## Unit Sector(s)

|                    |            |
|--------------------|------------|
| <b>Unit Sector</b> | Metallurgy |
|--------------------|------------|

## Competency field

|                  |  |
|------------------|--|
| Competency Field |  |
|------------------|--|

## Co-requisite units

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| Co-requisite Units |  |  |
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