



Australian Government

Department of Education, Employment and Workplace Relations

MSATCM517A Determine corrosion prevention strategies for metal and alloys

Revision Number: 1

MSATCM517A Determine corrosion prevention strategies for metal and alloys

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor	This unit covers applying metallurgical principles to determine strategies for minimising or avoiding corrosion of metallic components and structures in manufacturing, engineering and structural situations
------------------------	---

Application of the Unit

Application of the unit	This unit requires application of metallurgical principles and techniques as individual or a member of a team working towards minimising corrosion of metal products, components or structures
--------------------------------	--

Licensing/Regulatory Information

Not applicable.

Pre-Requisites

Pre-requisite Units		

Employability Skills Information

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

Elements and Performance Criteria Pre-Content

Not applicable.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1. Research and determine corrosion prevention or minimisation need	1.1. Corrosion prevention or minimisation need is discussed with clients, other employees and other technical experts 1.2. Product performance, cost, location and environmental factors are identified 1.3. The metallurgical techniques and principles relating to corrosion are researched and reported on from appropriate sources of information and examination of corroded material 1.4. The metallurgical techniques and associated technologies required to prevent or minimise corrosion in the application are identified
2. Determine appropriate corrosion prevention or minimisation strategy and techniques for application	2.1. Appropriate corrosion prevention or minimisation strategies are selected for application. 2.2. Corrosion prevention or minimisation strategy is documented and approvals obtained from client, managers and other technical experts as appropriate. 2.3. Instructions for implementing corrosion prevention or minimisation strategy are prepared and communicated to appropriate personnel

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

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

Required skills:

- select appropriate metallurgical principles to reduce corrosion
- apply metallurgical principles to particular manufacturing, engineering and structural situations
- refer solutions to the original aim of the application.
- quote solutions in appropriate units, using appropriate significant figures.
- quote limitations of corrosion prevention or minimisation strategies.

Required knowledge:

Competency includes sufficient knowledge of:

- basic metallurgical principles (as given in the range statement)
- limitations of selected metallurgical principles

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 determine corrosion prevention strategies for metal and alloys. Critical aspects for assessment and evidence are required to demonstrate competency in this unit.

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

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

- correctly identify metallurgical processes involved in corrosion and corrosion prevention;
- select corrosion prevention strategies and techniques appropriate to metal or alloy application and client needs
- prepare instructions for corrosion prevention for client and other appropriate personnel.

Relationship to other units

This unit may be assessed concurrently with other relevant units.

Assessment method and context

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 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 assessment.

Resource implications

This section should be read in conjunction with the range of variables for this unit of competency. Resources required include suitable access to an operating plant or equipment 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.

Codes of practice/standards	Where reference is made to industry codes of practice, and/or Australian/international standards, it is expected the latest version will be used.
Metallurgical techniques and principles	Corrosion and Society <ul style="list-style-type: none"> • definition of corrosion • environments • corrosion damage • classification of corrosion • cost of erosion • social implications
Corrosion Principles	Electrochemical aspects <ul style="list-style-type: none"> • electrochemical reactions and chemical corrosion, galvanic cells, anode reactions, cathode reactions, concentration cells, polarisation, passivity, pourbaix diagrams (simplified Pourbaix diagrams for Al, Fe and Zn), the driving force of corrosion, the rate of corrosion Environmental effects <ul style="list-style-type: none"> • oxygen and oxidisers, velocity, temperature, corrosive concentration, corrosion environments (water, soil, atmosphere, dry gasses) Metallurgical aspects <ul style="list-style-type: none"> • metal structures (defects, grain boundaries, second phases, cold work, residual stress), galvanic series, immunity, passivity.
Corrosion at Elevated Temperatures	Mechanism of oxide film growth: <ul style="list-style-type: none"> • rate laws • oxide defect structures • Pilling-Bedworth rule • oxidation of alloys • catastrophic oxidations • de carburisation • high temperature resistant alloys

RANGE STATEMENT	
Forms of corrosion	<ul style="list-style-type: none"> • Uniform corrosion (general corrosion) • Galvanic corrosion • Crevice corrosion • Pitting corrosion • Fretting corrosion • Selective attack (leaching) • Intergranular corrosion • Stray current corrosion (electrolysis) • Erosion corrosion and cavitation damage • Stress corrosion cracking • Corrosion fatigue • Hydrogen damage • Microbial corrosion
Basic principles of Corrosion Control	<p>Material selection</p> <ul style="list-style-type: none"> • metals and alloys, metal purification, nonmetallics, stress relief <p>Alteration of environment</p> <ul style="list-style-type: none"> • changing media, temperature, velocity, oxygen concentration, etc. <p>Corrosion protection</p> <ul style="list-style-type: none"> • cathodic protection, anodic, protection and passivation, corrosion inhibitors, chemical conversion coatings, metal coatings, corrosion-preventing paints, coatings of plastic and rubber, temporary corrosion prevention. <p>Corrosion prevented by design</p> <ul style="list-style-type: none"> • wall thickness, design rules (streamlining, stagnation, crevices, metallic contact, etc.)
Corrosion Characteristics of common alloys	<ul style="list-style-type: none"> • Steel and cast iron • Stainless steel • Aluminium and its alloys • Copper and its alloys
Methodology of corrosion investigations	<ul style="list-style-type: none"> • Corrosions testing • Corrosion monitoring • Electrochemical investigations • Physical methods
Sources of information	<ul style="list-style-type: none"> • Reference texts • Manufacturers' catalogues and industrial magazines • Websites • Use of phone, email and fax information gathering

Unit Sector(s)

Unit Sector	Metallurgy
--------------------	------------

Competency field

Competency Field	
-------------------------	--

Co-requisite units

Co-requisite Units		