



Australian Government

Department of Education, Employment and Workplace Relations

MSATCM303A Monitor non-ferrous melting and casting processes

Revision Number: 1

MSATCM303A Monitor non-ferrous melting and casting processes

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor	This unit covers the knowledge and skills needed to undertake the melting and casting of non-ferrous alloys
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Application of the Unit

Application of the unit	In a typical scenario, a technician will be required to monitor a non - ferrous melting and casting operation, ensuring that correct quantities are used and correct procedures followed.
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Licensing/Regulatory Information

Not applicable.

Pre-Requisites

Pre-requisite Units	

Employability Skills Information

Employability Skills	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 specifications for required casting	1.1. Identify required material specification 1.2. Identify mould requirements 1.3. Identify any special requirements for this job
2. Verify metal charges to melting	2.1. Calculate required charge of each component 2.2. Select required components to give the required metal specification 2.3. Recommend changes/additions to the charge 2.4. Monitor the preparation of the charge including checking for contaminants
3. Monitor furnace operation	3.1. Check that the furnace is in good operational condition 3.2. Organise for maintenance/repairs as required 3.3. Monitor a melt to ensure the product meets specification
4. Monitor pouring of molten metal	4.1. Check pouring is to procedures 4.2. Take required samples for analysis
5. Control hazards	5.1. Identify hazards in the metal melting/pouring process 5.2. Assess the risks arising from those hazards 5.3. Implement procedures to control those hazards in line with procedures and duty of care

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

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

Required skills:

- take calculations needed for determining charges
- visually check furnaces for operational condition and safety risks
- take samples
- follow safety and quality procedures

Required knowledge:

- Charge Calculations
 - importance of composition control.
 - methods of calculation used to correct for
 - additions.
 - types of alloy additions.
- Non-ferrous alloys
 - definition
 - physical properties
 - density
 - tensile
 - hardness
 - melting points
 - shrinkage percentage
 - fluidity
 - brass
 - bronze
 - gunmetal
 - copper based alloys
 - aluminium based alloys
 - lead
 - selection
 - requirements
 - × customer
 - × manufacturer's
 - metal analysis
 - Australian standards
- Types of furnaces
 - crucible

REQUIRED SKILLS AND KNOWLEDGE

- oil
- gas
- induction
- channel
- coreless
- resistance
- reverberatory
- maintenance
- Refractories
 - silica
 - ganister
 - coatings
 - others common to non-ferrous
- Linings
 - monolithic
 - castable
 - rammable
 - bricks
- Ladles/crucibles
 - types
 - ladles
 - crucibles
 - safety
 - maintenance
 - care of crucibles
 - porous plug
- Safety
 - house keeping
 - personal
 - clothing
 - gear
 - dry area
 - pre-heat ladles
 - overhead cranes
- Furnace operation
 - personal attire
 - dry charge
 - dry equipment

REQUIRED SKILLS AND KNOWLEDGE

- pre-heating
- scrap selection
- house keeping
- melting program
- alloying program
- charge calculations
- percentages
- ratio and proportion
- calculations
- volume
- mass
- operation
- maintenance
- Lifting and handling equipment
 - tongs
 - shanks
 - cranes
 - hoists
 - bogey ladles
 - maintenance
- Types of control equipment
 - thermal analysis
 - pyrometers
 - gas analysis
 - chemical analysis
 - wet
 - dry
 - spectrograph
 - fluidity
 - shrinkage test
- Quality control
 - accurate weighing
 - correct analysis
 - temperature control
 - covers and fluxes
 - mould/metal reactions
 - thermal analysis
 - degassing

REQUIRED SKILLS AND KNOWLEDGE

- deoxidising
- ladle refining
- Defects
 - contamination
 - gas absorption
 - metal analysis
 - temperature control
 - oxidation
 - other defects common to non-ferrous metals
 - methods of avoiding/overcoming defects
- Alloy production
 - charge
 - analysis
 - calculation
 - preparation
 - melt control
- Tapping/pouring
 - pouring method sequenced
 - temperature check
 - capacity requirements
 - ladle/crucibles
 - checks
 - preparation
 - pre-heating
 - transfer
 - × safety clips
 - filling
 - metal maintenance
 - covers/fluxes
 - temperature
 - metal pouring
 - mould condition
 - test bar
 - × reasons
 - × method
 - pig pouring and tagging
 - ladle/crucible return
 - emptying

REQUIRED SKILLS AND KNOWLEDGE

- cleaning
- maintaining
- lubrication
- -repairs to refractory
- cleaning of refractory

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 monitor basic non-ferrous melting and casting processes. 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:

- Monitor melting and casting operations
 - Evidence should be provided from a number of castings using different alloys and or different moulds.
 - Safely operate melting furnace
 - Safely handle pouring equipment

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

EVIDENCE GUIDE**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 organisation where non-ferrous casting is done. 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.

Mould

Moulds are sand, die and investment moulds.

RANGE STATEMENT	
Contaminants	Contaminants include non specified metal, rubber, grease, water, paint and non metallics, closed containers or pipes and pressure containers such as aerosols.
Material specification	Material specification includes non-ferrous metals and non -ferrous alloys as well as contaminants

Unit Sector(s)

Unit Sector	Metallurgy
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Competency field

Competency Field	
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Co-requisite units

Co-requisite Units		