



Australian Government

Assessment Requirements for MEM04021 Supervise individual non-ferrous melting and casting operation

Release: 2

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Modification History

Release 2. Quantum of hours of workplace practice removed. Supersedes and is equivalent to MEM04021 Supervise individual non-ferrous melting and casting operation (Release 1).

Release 1. Supersedes and is equivalent to MEM04021A Supervise individual non-ferrous melting and casting operation.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy the requirements of the elements and performance criteria on at least two (2) occasions and include:

- following work instructions, standard operating procedures (SOPs) and safe work practices
- identifying and interpreting specifications, safety procedures and codes of practice/standards for the required melting and casting operation
- checking for contaminants when verifying metal changes to melting and recommending changes and/or additions to the charge as required
- providing evidence from castings that were made using different alloys and moulds
- monitor melting and casting operations of non-ferrous metal
- operating a melting furnace safely and monitoring and supervising the operation of a furnace by other employees
- handling pouring equipment and monitoring safely and supervising the operation of pouring equipment by other employees.

Knowledge Evidence

Evidence required to demonstrate the required knowledge for this unit must be relevant to and satisfy the requirements of the elements and performance criteria and include knowledge of:

- safe work practices and procedures and use of personal protective equipment (PPE)
- charge calculations – importance of composition control, methods used to calculate for additions, types of alloy additions and their effects on casting behaviour and finished product
- non-ferrous alloys:
 - definition of non-ferrous metals
 - methods of controlling physical properties
 - advantages/disadvantages of density of each type of non-ferrous metal
 - methods of controlling tensile strength of non-ferrous metals
 - methods of controlling the hardness of non-ferrous metals

- influence of melting points on production processes
- shrinkage percentage of the types of non-ferrous metals
- how to control metal fluidity
- refractory selection requirements for non-ferrous alloys
- use of degassing to control gas defects
- actions required to control grain size
- grades of brass, bronze and gunmetal and their applications
- the grades of other copper, aluminium, lead, zinc, and magnesium based alloys and their applications
- how to select non-ferrous metal based on required properties
- how to conduct metal analysis of non-ferrous metals
- Australian standards (or other appropriate standard) for non-ferrous metals
- types of furnaces and their relative advantages and disadvantages including maintenance requirements
- selection of appropriate refractories for non-ferrous melting – silica, ganister, coatings and others common to non-ferrous melting
- selection of the form of linings for non-ferrous melting – monolithic, castable, rammable and bricks
- selection of the appropriate ladles/crucibles with regard to types, ladles, crucibles, safety and maintenance, including checking of mechanical condition of gearboxes and safety locks, and care of crucibles and porous plug
- supervision of other staff in melting and casting safety, including housekeeping, PPE, dry area and tools, pre-heating of ladles and safe working load of overhead cranes
- furnace operation, including procedures for ensuring a dry and safe charge, warm and dry equipment, pre-heating, scrap selection, scrap segregation, housekeeping, melting schedule, pouring schedule, charge calculations and calculations, including volume and mass calculations and maintenance of melting and pouring equipment
- use of lifting and handling equipment, including tongs, shanks, cranes, hoists, bogey ladles and maintenance
- types of control equipment – thermal analysis, pyrometers, gas analysis, chemical analysis, wet chemical analysis, spectrograph, fluidity test and shrinkage test
- quality control and procedures for accurate weighing, correct chemical analysis, temperature control, covers and fluxes, mould/metal reactions, conduct and interpretation of thermal analysis, degassing, deoxidising, ladle refining and customer requirements
- types of defects and prevention including – contamination, gas absorption, metal analysis, temperature control, oxidation and other defects common to non-ferrous metals
- tapping and pouring operations, including when to pour according to job and furnace specification, availability of emergency pour out pits and other safety equipment, availability of cranes or other transport, pour out rate, ensuring mechanical test bar is available and taken, if required, and ensuring pig pouring and tagging is performed correctly.

Assessment Conditions

- Assessors must:
 - have vocational competency in the supervision of individual non-ferrous melting and casting operation at least to the level being assessed with relevant industry knowledge and experience
 - satisfy the assessor requirements in the *Standards for Registered Training Organisations 2015* or its replacement and comply with the *National Vocational Education and Training Regulator Act 2011*, its replacement or equivalent legislation covering VET regulation in a non-referring state/territory as the case requires.
- Assessment must occur in a functioning workplace. Where assessment in the workplace would be unsafe, impractical or threatens the environment, assessment must occur in a sufficiently rigorous simulated environment that reflects the circumstances that would be experienced in a functioning workplace. Assessment must cover all aspects of workplace performance, including task skills, task management skills, contingency management skills and job role environment skills.
- Conditions for assessment must include access to all tools, equipment, materials and documentation required, including relevant workplace procedures, product and manufacturing specifications.
- 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.

Links

Companion Volume implementation guides are found in VETNet -

<https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b7050d37-5fd0-4740-8f7d-3b7a49c10bb2>