



Australian Government

MEM30007 Select common engineering materials

Release: 1

MEM30007 Select common engineering materials

Modification History

Release 1. Supersedes and is equivalent to MEM30007A Select common engineering materials.

Application

This unit of competency defines the skills and knowledge required to identify and select common engineering materials including ferrous metals, cast irons, carbon and alloy steels, stainless steels, coated steels, nonferrous metals, aluminium and its alloys, copper and its alloys, nickel alloys, zinc, titanium, magnesium, refractory metals, polymers, thermosetting polymers, thermoplastic polymers, ceramics and glasses.

This unit applies to technician level activities in manufacturing and engineering environments. It covers identifying common materials used in engineering by their principal properties. All work is carried out under supervision.

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

Pre-requisite Unit

Nil

Competency Field

Engineering technician

Elements and Performance Criteria

Elements	Performance Criteria
<i>Elements describe the essential outcomes.</i>	<i>Performance criteria describe the performance needed to demonstrate achievement of the element.</i>
1. Identify common engineering materials by their principal properties	1.1 Follow standard operating procedures (SOPs) and comply with work health and safety (WHS) requirements at all times 1.2 Identify the principal properties of common engineering materials 1.3 Identify the effects of different types of bonding in materials 1.4 Identify the effects of mechanical and thermal processes on the principal properties of materials
2. Select materials for specific applications	2.1 Determine the engineering requirement for the specific application in consultation with others

Elements	Performance Criteria
<i>Elements describe the essential outcomes.</i>	<i>Performance criteria describe the performance needed to demonstrate achievement of the element.</i>
	2.2 Select materials based on the requirement and consideration of principal properties and further processing 2.3 Confirm the selection
3. Verify selected material as fit for purpose	3.1 Identify appropriate tests for the required properties 3.2 Arrange testing of materials with appropriate personnel based on job requirements 3.3 Obtain and analyse test results and confirm material choices or modify as appropriate

Foundation Skills

This section describes those language, literacy, numeracy and employment skills 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.

Classification of materials includes:	- metals and non-metals - ferrous and nonferrous metals - polymers - ceramics - composite materials.
Common engineering materials include:	- ferrous metals: - cast irons - carbon and alloy steels - stainless steels - coated steels - nonferrous metals: - aluminium and its alloys - copper and its alloys

	• nickel alloys • zinc • titanium • magnesium • refractory metals • polymers: • thermosetting • thermoplastic • elastomers • ceramics • glasses.
Appropriate tests include:	• those undertaken by a technician within the organisation • those required to be undertaken by external organisations • simple tests.
Physical properties include one or more of the following:	• electrical conductivity/resistivity • specific gravity/density • thermal conductivity/expansion • specific heat • melting • boiling points.
Mechanical properties include:	• strength: • yield • tensile • compressive • shear characteristics • torsion • hardness • impact resistance • fatigue resistance • elasticity • plasticity • ductility • malleability • creep resistance • visual appearance and colour • magnetic properties • corrosion resistance.
Material tests include:	• tensile • compressive • shear

	• torsion • hardness • impact • fatigue • creep • visual • corrosion testing.
Mechanical and thermal processes include:	• casting • forging, rolling and extrusion • cold forming • powder processes • heat treatment • joining - fasteners • soldering • brazing • welding • adhesives • finishing including coatings, metallic and non-metallic.
Chemical properties include:	• corrosion of metals including corrosion processes and mechanisms • degradation of polymers.
Bonding includes:	• ionic • covalent • metallic • molecular.
Appropriate personnel include one or more of the following:	• internal technicians • external organisations.

Unit Mapping Information

Release 1. Supersedes and is equivalent to MEM30007A Select common engineering materials.

Links

Companion Volume Implementation Guides are available on VETNet -

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

Assessment Requirements for MEM30007 Select common engineering materials

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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 include:

- identifying common engineering materials
- selecting materials for specific applications on at least two occasions
- verifying selected material as fit for purpose.

Note: Where a volume and/or frequency is not specified, demonstration must be provided at least once.

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:

- common engineering materials
- classification of materials
- structure of materials
- physical properties of materials
- magnetic properties
- optical properties
- mechanical properties
- chemical properties
- materials testing methods including destructive testing and applications
- engineering applications of ferrous metals
- engineering applications of nonferrous metals
- engineering applications of polymers
- effects of mechanical and thermal processes on the properties of materials
- hazards and control measure associated with selecting common engineering materials including housekeeping.
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Assessment Conditions

- Assessors must:

- have vocational competency in selecting common engineering materials 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.
- Where possible, assessment must occur in operational workplace situations. Where this is not possible or where personal safety or environmental damage are limiting factors, assessment must occur in a sufficiently rigorous simulated environment that reflects realistic operational workplace conditions that cover all aspects of workplace performance, including environment, 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.
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