



Australian Government

MEM23113 Evaluate hydrodynamic systems and system components

Release: 1

MEM23113 Evaluate hydrodynamic systems and system components

Modification History

Release 1. Supersedes and is equivalent to MEM23113A Evaluate hydrodynamic systems and system components.

Application

This unit of competency defines the skills and knowledge required to evaluate fluid systems and system components and includes hydrodynamic fundamentals, including properties of fluids and system component materials. It also includes evaluation of system component performance related to flow rates, pressures, forces and power of containment, transport and use of fluids, work health and safety (WHS) compliance requirements and risk management procedures.

The unit applies to evaluation of fluid systems and components used in hydrodynamic systems and is suitable for people working as technicians or system designers, draftspersons and maintainers, and for those pursuing careers and qualifications in engineering or related disciplines.

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

Pre-requisite Unit

MEM23004 Apply technical mathematics

MEM23006 Apply fluid and thermodynamics principles in engineering

Competency Field

Engineering science

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. Establish scope of hydrodynamic system	1.1 Determine fluid systems and system components to be evaluated 1.2 Identify stakeholders to be consulted on evaluation task 1.3 Confirm that appropriate support, including technical and professional assistance, is available 1.4 Determine WHS and regulatory requirements, risk management

Elements	Performance Criteria
<i>Elements describe the essential outcomes.</i>	<i>Performance criteria describe the performance needed to demonstrate achievement of the element.</i>
	and organisational procedures 1.5 Investigate sustainability implications of hydrodynamic applications
2. Apply principles and techniques required for evaluation of hydrodynamic system and components	2.1 Review features and functions of hydrodynamic system and components 2.2 Determine hydrodynamic principles and techniques required to evaluate system and select and optimise components 2.3 Determine appropriate analysis techniques, software and software validation techniques
3. Evaluate hydrodynamic system and components	3.1 Assess components and system compatibility with fluid properties 3.2 Assess suitability of pumps and pump performance in hydrodynamic system 3.3 Assess forces on bends and section changes in piping systems and confirm they are within specification 3.4 Assess hydrodynamic performance of components including fittings, valves and hoses 3.5 Assess open channel systems and optimise for required flow rates 3.6 Evaluate collar and cylindrical bearings subject to boundary, transitional and hydrodynamic lubrication
4. Report results	4.1 Record outcomes of evaluation 4.2 Provide documentation including calculations, component and system layouts, and functional diagrams

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.	
Hydrodynamic systems include:	• fluid vessels • pumping systems including industrial wash, fire prevention and irrigation • turbines for hydro-electric power generation • components including fluid containers, ducts, pipes, valves, pumps, turbines and fluid measuring devices • open channels for liquid transfer.
Sustainability includes:	• meeting all regulatory requirements • conforming to all industry covenants, protocols and best practice guides • minimising ecological and environmental footprint of process, plant and product • maximising economic benefit of process plant and product to the organisation and the community • minimising the negative WHS impact on employees, community and customer.
Appropriate licensed technical and professional assistance includes:	• technical support and advice relating to elements which have intrinsic dangers • professional support for technologies.
WHS, regulatory requirements and organisational procedures include:	• WHS acts, regulations and relevant standards • codes of practice from Australian and overseas engineering and technical associations and societies • risk assessments • registration requirements • safe work practices • state and territory regulatory requirements applying to electrical work.

Unit Mapping Information

Release 1. Supersedes and is equivalent to MEM23113A Evaluate hydrodynamic systems and system components.

Links

Companion Volume implementation guides are found in VETNet -

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

Assessment Requirements for MEM23113 Evaluate hydrodynamic systems and system components

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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:

- determining parameters and context of evaluation task
- determining work health and safety (WHS), regulatory requirements, risk management and organisational procedures
- identifying features, functions and components of hydrodynamic systems
- investigating and reviewing sustainability implications, features and functions of hydrodynamic systems and components on at least two occasions
- applying hydrodynamic principles and analysis techniques for hydrodynamic systems including software and software validation techniques
- evaluating components and system compatibility with fluid properties, pumps, turbines, piping forces, hydrodynamic performance of components, open channel systems, collar and cylindrical lubrication and determining safety, efficiency and fitness for purpose on at least two occasions
- reporting and documenting process and results of evaluation.

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:

- hydrodynamic systems
- WHS and regulatory requirements, codes of practice, standards, risk management and organisation requirements
- availability of professional and technical assistance for engineering specialisations
- current options and trends in performance analysis software including underpinning program techniques and software validation techniques
- properties of fluids including:
 - fluid types
 - relevant units of measurement
 - chemical properties
- sustainability issues including:

- hydrodynamic energy, generation and consumption
- environmental effects of manufacturing and use
- fluid statics
- fluid dynamics including:
 - flow
 - velocity
 - viscosity
 - pressure
 - fluid power
 - hydrodynamic forces
- hydrodynamic system components
- head loss in pipes and fittings
- pumping systems including components and methods for determining efficiency
- forces developed by flowing fluids
- open channel flow
- oiled bearings
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Assessment Conditions

- Assessors must:
 - have vocational competency in evaluating hydrodynamic systems and system components 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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