



Australian Government

MEM23006 Apply fluid and thermodynamics principles in engineering

Release: 1

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Modification History

Release 1. Supersedes and is equivalent to MEM23006A Apply fluid and thermodynamics principles in engineering.

Application

This unit of competency defines the skills and knowledge required to apply fluid and thermodynamic principles to engineering applications. It includes fluid systems and components, forces on floating and submerged bodies, turbine and pumping systems, and jet forces on blades and plates.

This unit applies to fluid and thermodynamic devices and systems used in industry and is suitable for people working as technicians in engineering or related fields using hydrostatic, hydrodynamic, fluid power or heating, ventilation and air conditioning (HVAC) equipment and 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

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. Determine scope of fluid or thermodynamic application	1.1 Determine compliance requirements of work health and safety (WHS) and regulatory requirements, codes of practice, standards, risk assessment and registration 1.2 Review sustainability implications of fluid and thermodynamic tasks 1.3 Assess fluid, thermodynamic and vacuum principles, skills and techniques required by tasks 1.4 Review functions and features of fluid, thermodynamic and vacuum devices, machines and systems

Elements	Performance Criteria
<i>Elements describe the essential outcomes.</i>	<i>Performance criteria describe the performance needed to demonstrate achievement of the element.</i>
	1.5 Assess software techniques needed for analysis and graphics required by the task
2. Interpret fluid or thermodynamic system design for effective performance	2.1 Determine the energy cost for running boilers, heat engines, compressors or turbines over a billing period 2.2 Determine the efficiency of conversion of energy source to electrical, fluid, thermal or mechanical power 2.3 Determine the sustainability of the processes
3. Recommend fluid or thermodynamic system components	3.1 Select components for thermal and fluid systems ensuring compatible materials, pressure, temperature and flow capacity and appropriate performance 3.2 Determine pumping system power requirements to provide for raising fluid, adequate flow rate and specified system losses 3.3 Specify components and prove or test the performance requirements of specified system 3.4 Seek required technical and professional assistance or clarification of design information
4. Report results	4.1 Ensure clear and logical process of specification development and compatibility of units in calculations 4.2 Record results of investigation, evaluation and application

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.

System designs for	fluid
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industrial applications include one or more of the following:	- thermodynamic - vacuum.
Fluid and thermodynamic tasks include:	- energy costs, efficiency and sustainability assessment of running boilers, heat engines, compressors or turbines - fluid and thermal system component selection - pumping and turbine system power evaluation - evaluating vacuum system components and performance requirements.
Properties and units common to fluids and thermodynamics include:	- mass, weight and force - volume, density, specific volume and relative density - pressure (absolute and gauge), and atmospheric pressure variation - temperature (Celsius, Kelvin and others) - viscosity and surface tension - vapour pressure of a liquid (saturation vapour pressure) - temperature and pressure effects on properties - international system of units (SI) - fundamental dimensions and units - derived dimensions and units - enthalpy.
Static and hydrodynamic devices or systems include:	- floating and submerged bodies - turbine and pumping systems - stationary or moving plates or blades - vacuum systems.
Thermodynamic devices or systems include:	- heat transfer devices - compressors - boilers - turbines - heat exchangers - heat engines - refrigerators - heat pumps.
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 enterprise procedures include:	• WHS acts and regulations • relevant standards • codes of practice • risk assessments • registration requirements • safe work practices • state and territory regulatory requirements.
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Unit Mapping Information

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Links

Companion Volume implementation guides are found in VETNet -

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