

<b>Title</b>	<b>Demonstrate and apply knowledge of fluid mechanics</b>		
<b>Level</b>	<b>6</b>	<b>Credits</b>	<b>15</b>

<b>Purpose</b>	People credited with this unit standard are able to: explain the principles of hydrostatics; analyse fluid systems and components in terms of fluid mechanics principles; select and size pipes and components to match operational requirements; and identify causes of problems associated with fluid mechanics and specify remedial action.
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<b>Classification</b>	Mechanical Engineering > Applied Principles of Mechanical Engineering
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<b>Available grade</b>	Achieved
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<b>Entry information</b>	
<b>Recommended skills and knowledge</b>	Previously acquired competence in the transposition of formulae, the manipulation of equations, and the use of trigonometric functions; understanding of fundamental concepts of physics (mass, length, and time) and their derived units, including pressure, force, gravitational effect, velocity, acceleration, and energy.

**Explanatory notes**

- 1 References  
Health and Safety at Work Act 2015 and supporting Regulations.
- 2 Definitions  
*Accepted industry practice* refers to approved codes of practice and standardised procedures accepted by the wider mechanical engineering industry sectors as examples of best practice.  
*Workplace procedures* refer to procedures used by the organisation carrying out the work and applicable to the tasks being carried out. They may include but are not limited to – standard operating procedures, safety procedures, equipment operating procedures, codes of practice, quality management practices and standards, procedures to comply with legislative and local body requirements.

- 3 Range
- a Liquid systems may include but are not limited to liquids such as – water, oil, acids, ink, paint.
  - b Gas systems may include but are not limited to gases such as – air, oxygen, nitrogen, nitrous oxide, carbon dioxide, argon, medical gases.
- 4 Assessment information
- a Examples given must be within the context of mechanical engineering or manufacturing.
  - b Numerous reference texts and training manuals on fluid mechanics are available and may be used; however, no one textbook or source of information is envisaged. All activities must comply with applicable workplace procedures and must be consistent with accepted industry practice.

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## Outcomes and evidence requirements

### Outcome 1

Explain the principles of hydrostatics.

#### Evidence requirements

- 1.1 Fluid properties are explained in terms of density, specific weight, pressure due to depth, and thrust on vertical and inclined immersed faces.
- 1.2 Principles of floatation are explained in terms of buoyancy.

### Outcome 2

Analyse fluid systems and components in terms of fluid mechanics.

Range evidence is required for one liquid system and one gas system.

#### Evidence requirements

- 2.1 The principles of mass flow, conservation of mass, and conservation of energy are explained in terms of the relationships of pressure, volume, and temperature.
- 2.2 The properties of fluid systems are calculated, and formulae are selected using appropriate laws and are applied to meet the requirements of specific mechanical engineering situations.

Range properties – pressure, volume, and temperature; appropriate laws may include but are not limited to – fan laws, pump laws, gas laws.

2.3 The selection of instruments for measuring fluid flow matches the instruments' performance characteristics and the operational requirements of specific mechanical engineering situations.

Range instruments may include but are not limited to – pitot tubes, anemometers, orifice plates, variable area flow meters, Venturi meters.

2.4 Fluid behaviour in mechanical engineering systems is assessed in terms of static and dynamic pressures, friction loss, laminar and turbulent flow, density, and viscosity.

### Outcome 3

Select and size pipes and components to match operational requirements.

Range components include but are not limited to – pumps, compressors, fans; evidence is required for one liquid system and one gas system.

### Evidence requirements

3.1 Fluid systems are defined in schematic form to match operational requirements.

3.2 Performance criteria specified establish fitness for intended purpose.

Range criteria – size, material, capacities, flow, pressure.

3.3 Systems are specified using terminology that meets the requirements of users and suppliers.

3.4 Simple circuits are sketched using recognised industrial symbols.

Range sources of symbols may include but are not limited to – British Standards (BS), Comité Européen des Transmissions Oléohydrauliques et Pneumatiques (CETOP), International Standards Organisation (ISO).

### Outcome 4

Identify causes of problems associated with fluid mechanics and specify remedial action.

### Evidence requirements

4.1 Collation and analysis of data establish the nature of the problem as being associated with fluid mechanics.

Range data includes but is not limited to – measurements, laboratory reports.

- 4.2 Probable root causes of flow problems are identified in terms of fluid characteristics.
- Range pressure, volume, temperature, vaporisation temperature, saturation temperature, density, viscosity, velocity.
- 4.3 Remedial actions specified are appropriate for restoring operational integrity and/or re-establishing design integrity.

<b>Planned review date</b>	31 December 2021
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#### Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	24 February 1998	31 December 2016
Review	2	27 October 2005	31 December 2016
Rollover and Revision	3	19 March 2010	31 December 2021
Review	4	20 October 2016	N/A

<b>Consent and Moderation Requirements (CMR) reference</b>	0013
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This CMR can be accessed at <http://www.nzqa.govt.nz/framework/search/index.do>.

#### Please note

Providers must be granted consent to assess against standards (accredited) by NZQA, before they can report credits from assessment against unit standards or deliver courses of study leading to that assessment.

Industry Training Organisations must be granted consent to assess against standards by NZQA before they can register credits from assessment against unit standards.

Providers and Industry Training Organisations, which have been granted consent and which are assessing against unit standards must engage with the moderation system that applies to those standards.

Requirements for consent to assess and an outline of the moderation system that applies to this standard are outlined in the Consent and Moderation Requirements (CMRs). The CMR also includes useful information about special requirements for organisations wishing to develop education and training programmes, such as minimum qualifications for tutors and assessors, and special resource requirements.

#### Comments on this unit standard

Please contact Competenz [qualifications@competenz.org.nz](mailto:qualifications@competenz.org.nz) if you wish to suggest changes to the content of this unit standard.