

<b>Title</b>	<b>Design an open circuit, proportional hydraulic power system with closed loop control</b>		
<b>Level</b>	<b>5</b>	<b>Credits</b>	<b>10</b>

<b>Purpose</b>	People credited with this unit standard are able to establish system specifications for, and undertake design of an open circuit, proportional hydraulic power system with closed loop control.
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<b>Classification</b>	Mechanical Engineering > Fluid Power - Hydraulics
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<b>Available grade</b>	Achieved
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<b>Entry information</b>	
<b>Critical health and safety prerequisite</b>	Unit 20609, <i>Design an open circuit, proportional hydraulic power system with open loop control</i> , or demonstrate equivalent knowledge and skills.
<b>Recommended skills and knowledge</b>	Unit 5926, <i>Demonstrate knowledge of programmable logic controllers (PLC)</i> , or demonstrate equivalent knowledge and skills.

### Explanatory notes

- 1 Reference  
Health and Safety in Employment Act 1992.
- 2 Definition  
*Closed loop* – general control concept in which a command signal travels from the control device to the actuator or motor, followed by a feedback signal from the actuator or motor to inform the control device that action/motion has occurred. Subsequent adjustments are made to the command signals as necessary.  
*Industry practice* – safe and sound practices accepted by the mechanical engineering industry.  
*Worksite procedures* – operational procedures put in place by the candidate's employer. These include site safety procedures, equipment operating procedures, job procedures, quality assurance processes and procedures, and other procedures for the handling and disposal of materials and waste.
- 3 The following apply to this unit standard:
  - a All activities must demonstrate safe working practices.

- b All activities must be completed independently and reported within agreed timeframes.
- c The design and specification of the hydraulic fluid power system is the outcome of this unit standard. The actual construction of the system is not a requirement of assessment.

#### 4 Range

The hydraulic power system designed for this unit standard must be of an open circuit type with a closed loop control and include the use of the following range of components:

- Variable displacement pump(s), which may include but are not limited to vane and/or piston.
- Fluid conditioning equipment, which may include but is not limited to the following filter types - suction, pressure line, and/or return line.
- Pressure control valves, which may include but are not limited to relief, reducing, and/or sequence (pilot operated and/or direct acting).
- Proportional directional control valves.
- Flow control valves, which may include but are not limited to compensated, non-compensated, proportional.
- Non-return valves (NRV).
- Power conversion components, which may include but are not limited to hydraulic motors, hydraulic cylinders (single or double acting), and semi-rotary actuators.
- Auxiliary components, which may include but are not limited to accumulators and/or heat exchangers.
- Fluid conductors (pipes/hoses/couplings) and gauges.
- Electronic feedback device/componentry.

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## Outcomes and evidence requirements

### Outcome 1

Establish system specifications for an open circuit, proportional hydraulic power system with closed loop control.

### Evidence requirements

- 1.1 Design brief and operational requirements are confirmed with customer in accordance with worksite procedures.
- 1.2 Component functions are confirmed with customer.
  - Range relationship between electrical and mechanical sub-systems, variables affecting the performance of the proportional valve(s), the role of specialist hydraulic fluids.
- 1.3 Specifications are drawn up to meet worksite or customer requirements.
- 1.4 Design safety and regulatory requirements are identified and confirmed with customer.
- 1.5 Specifications meet customer's requirements.

1.6 Personnel associated with end use and complementary services are identified and consulted in accordance with worksite procedures.

Range: may include but is not limited to – component and consumable materials suppliers, hydraulic specialists, technical writers, staff training personnel.

**Outcome 2**

Undertake design of an open circuit, proportional hydraulic power system with closed loop control.

**Evidence requirements**

2.1 Calculations are made to meet operational requirements of system and determine sizing of components to meet design specification.

Range: may include but is not limited to – output torque, motor displacement, pressure, input power, flow, line size.

2.2 Terminology and symbols are selected to match specification in accordance with industry practice.

2.3 Design meets specification and operational capabilities.

2.4 Design and operational capabilities meet safety and regulatory requirements.

2.5 Documentation meets specifications and operational requirements in accordance with worksite procedures.

Range: bill of materials, operating and maintenance manual, service schedules, circuit diagram, as built drawings; may include but is not limited to - training manuals, labelling and safety information.

<b>Replacement information</b>	This unit standard, unit standard 20607 and unit standard 20609 replaced unit standard 2735.
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<b>Planned review date</b>	31 December 2016
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**Status information and last date for assessment for superseded versions**

Process	Version	Date	Last Date for Assessment
Registration	1	25 May 2004	31 December 2014
Review	2	17 November 2011	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 (CMR). 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.

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**Comments on this unit standard**

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