

Title	Identify and calculate trade calculations to solve problems for welding engineering trades		
Level	3	Credits	4

Purpose	<p>This unit standard is for use in the training and assessment for welding engineering trades.</p> <p>People credited with this unit standard are able to: identify and calculate the effects of forces on components and structures; calculate size, volume, and mass of three dimensional objects; calculate the quantities of welding consumables required as per job specification.</p>
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Classification	Mechanical Engineering > Welding
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Available grade	Achieved
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Guidance Information

- 1 Legislation and references
Legislation, regulations and/or industry standards relevant to this unit standard include but are not limited to the:
The International System of Units (SI), 8th edition, 2006, updated in 2014 (France: Bureau International des Poids et Mesures, 2006). Available at <http://www.bipm.org/en/publications/si-brochure/>.
- 2 Definitions
Quantities – properties ascribed to phenomena, bodies or substances that can be quantified; e.g., force, length, pressure.
Composites – materials commonly used in welding engineering including, ferrous such as low carbon steel, mild steel, nonferrous including, aluminium, copper alloys.
- 3 Assessment information
For assessments, formulae and conversion factors shall be supplied, and use of calculators is permitted. Assessments must reflect mechanical engineering applications.
- 4 Recommended skills and knowledge
It is recommended that people seeking credit for this unit standard first hold credit for:
 - 29397, *Demonstrate knowledge of basic trade calculations and units of measure for mechanical engineering trades*, and
 - 29398, *Apply knowledge of basic trade calculations for mechanical engineering trades*,
 or equivalent skills and knowledge.

Outcomes and performance criteria

Outcome 1

Identify and calculate the effects of forces on components and structures.

Performance criteria

- 1.1 Type and magnitude of forces acting on component members are identified from the applied loads.
- Range forces include tensile and compressive forces.
- 1.2 Nature and magnitude of forces are determined for simple mechanical systems.
- Range simple mechanical systems include – lever systems; counterweights, clamping arrangements.
- 1.3 Punching forces are calculated.
- 1.4 Strength of composites of the same cross sectional area is calculated and compared.
- Range types of strength – tensile and shear; evidence is required of calculations of the strength of one ferrous and one nonferrous metal.

Outcome 2

Calculate size, volume and mass of three dimensional objects.

Performance criteria

- 2.1 Dimensions of regular vessels are calculated to suit a designated volumetric capacity.
- Range regular vessels may include – rectangular, cylindrical, elliptical, spherical, conical; evidence is required of calculations for three different vessels.
- 2.2 Mass of regular vessels is determined for costing or lifting purposes.
- Range empty vessels, full vessels; evidence is required of calculations for three different vessels.

Outcome 3

Calculate the quantities of welding consumables required as per job specification.

Range calculations of consumables of any three welding jobs is required.

Performance criteria

3.1 Welding consumables are established and calculated for costing purposes.

Range consumables may include but not limited to – filler wire, consumable electrodes, tungsten electrodes, nozzle tip.

3.2 The volumes of consumable gases required for cutting and welding operations are established and calculated for costing purposes.

Planned review date	31 December 2027
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Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	26 January 2023	N/A

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

Comments on this unit standard

Please contact Hanga-Aro-Rau Manufacturing, Engineering and Logistics Workforce Development Council qualifications@hangaarorau.nz if you wish to suggest changes to the content of this unit standard.