Title	**Demonstrate and apply knowledge of safe welding principles and quality assurance under supervision**		
Level	**2**	**Credits**	**4**

Purpose	This unit standard is for the training of mechanical engineering and related trades and covers welding principles and safe practice under supervision at an introductory level. It is concerned with welding to an entry-level standard and with establishing safe use of machines and proper operational practices, rather than meeting recognised welding codes or standards. People credited with this unit standard are able to: demonstrate knowledge of welding principles and quality assurance; and demonstrate safe welding practice under supervision to meet job specifications.

Classification	Mechanical Engineering > Welding

Available grade	Achieved

Entry information	
Critical health and safety prerequisites	Unit 21911, *Demonstrate knowledge of safety on engineering worksites*; Unit 21912, *Apply safe working practices on an engineering worksite;* and unit standard 29651, *Demonstrate knowledge of health and safety when welding and thermal cutting*; or demonstrate equivalent knowledge and skills.

Explanatory notes

1 References

Health and Safety at Work Act 2015 and supporting Regulations.

Accident Compensation Corporation and Department of Labour. *Metal Industry Guidelines for Safe Work*. (Wellington: ACC, 2007). Available from http://www.acc.co.nz/PRD_EXT_CSMP/idcplg?IdcService=GET_FILE&dID=3023&dDocName=PRD.

Welding Technology Institute of Australia. (2004). *Technical note number 7 – health and safety in welding*. Available from Heavy Engineering Research Association (HERA) 17 - 19 Gladding Place, Manukau City, Auckland 2104.

Worksafe NZ, *Health and Safety in Welding*. Available from Worksafe website at http://www.business.govt.nz/worksafe.

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.
GMAW – Gas Metal Arc Welding, also referred to as Metal Inert Gas (MIG) welding.
GTAW – Gas Tungsten Arc Welding, also referred to as Tungsten Inert Gas (TIG) welding.
MMAW – Manual Metal Arc Welding, also referred to as stick welding.
Under supervision refers to working under the direction of a suitably qualified tradesman or manager who oversees the learner and is responsible for ensuring that the quality of work meets the required standard.
Job specifications refers to instructions relevant to the safe completion of the specific task, such as technical specifications, assembly instructions, drawings, parts lists, standards, codes of practice, test and commissioning procedures, and verbal instructions.
Worksite refers to a real welding worksite, or a realistically simulated worksite in a training establishment.
Workplace procedures refers 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 Assessment information

Examples/evidence given must be within the context of mechanical engineering or fabrication and must meet applicable workplace procedures and accepted industry practice. Numerous reference texts and training manuals on welding are available and may be used; however, no one textbook or source of information is envisaged.

Job specifications for assessment purposes should take into account the introductory nature of this standard, and the materials and machinery used.

Outcomes and evidence requirements

Outcome 1

Demonstrate knowledge of welding principles.

Evidence requirements

1.1 The terms soldering, brazing, and welding are described and typical applications stated.

1.2 Welding terminology is explained with reference to typical applications.

Range butt weld, fillet weld, weld size (leg length and throat thickness), fusion, penetration, weld profile (concave, convex).

1.3 Material preparation for types of welds is described.

Range types of welds include but are not limited to – closed square butt, open square butt, single V, outside corner, tee joint, lap weld.

1.4 The principles of different types of welding and cutting processes are outlined with reference to typical applications.

Range processes – resistance welding, oxyacetylene, MMAW, GMAW, GTAW.

Outcome 2

Demonstrate knowledge of welding quality assurance.

Evidence requirements

2.1 The principles of, and reasons for, basic welding quality assurance and inspection are outlined.

Range principles – welding procedures, welder qualification, welding inspection.

2.2 Factors affecting weld quality are described.

Range factors include but are not limited to – welding procedure, material finish and quality, welder skill.

2.3 Defective welds are identified by visual inspection in accordance with workplace procedures or accepted industry practice.

Range defects include but are not limited to – concavity, undercut, undersized, porosity, non-metallic inclusions, cracks.

Outcome 3

Demonstrate safe welding practice under supervision to meet job specifications.

Range processes – MMAW, GMAW, GTAW;
material – mild steel sheet and/or plate;
minimum of two different material thicknesses from thickness range 1.5 – 10.0mm;
weld positions include but are not limited to – 1G, 2F.

Evidence requirements

3.1 Hazards for the welding task to be undertaken are identified and controls put in place to eliminate or minimise them.

Range examples of hazards – confined space, presence of flammable and/or explosive materials or containers, defective equipment, hot metal, hard and/or hot particles.

3.2 Personal protective equipment is worn in accordance with workplace procedures and/or accepted industry practice.

3.3 Welding plant and materials are checked and prepared for welding in accordance with workplace procedures and/or accepted industry practice.

Range examples of checks – connections of hose, regulator, torch, cables, gas cylinder; condition of cable insulation; welding torches and/or guns; parent material and filler metals.

3.4 Metals are prepared and joined in accordance with workplace procedures and/or accepted industry practice.

3.5 Weld is visually inspected for defects and weld quality confirmed with supervisor.

Replacement information	This unit standard replaced unit standard 2670.

Planned review date	31 December 2021

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	22 September 2005	31 December 2021
Rollover and Revision	2	17 September 2010	31 December 2021
Review	3	8 December 2016	N/A

Consent and Moderation Requirements (CMR) reference	0013

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 if you wish to suggest changes to the content of this unit standard.