Title	**Join metals using the torch brazing and soldering processes**		
Level	**3**	**Credits**	**6**

Purpose	This unit standard covers torch brazing and soldering of several metals using a gas torch. People credited with this unit standard are able to: prepare to join metals using the torch brazing and soldering processes; join metals using the torch brazing and soldering processes; and inspect and repair brazed and soldered joints to industry standard.

Classification	Mechanical Engineering > Welding

Available grade	Achieved

Entry information	
Recommended skills and knowledge	Unit 21907, *Demonstrate and apply knowledge of safe welding principles and quality assurance under supervision*.

Explanatory notes

1 References
AWS B2.2, *Brazing procedure and performance qualification.* American Welding Society, 1991.
Health and Safety in Welding. Wellington: Department of Labour, 2006. Available from http://www.osh.govt.nz.

2 Definitions
Industry practice – refers to the safe and sound practices accepted by the fabrication industry.
Industry standard – refers to AWS B2.2 or equivalent.
Safe working practice – refers to formal worksite or company safety policies, or the practices established by *Health and Safety in Welding* or similar codes.
Metals – refer to carbon steel, stainless steel, copper, brass; and galvanised steel sheet.
Torch –refers to heating applied by a hand held gas torch.

Outcomes and evidence requirements

Outcome 1

Prepare to join metals using the torch brazing and soldering processes.

Evidence requirements

1.1 Work area is assessed for hazards associated with torch brazing and soldering and all necessary precautions taken in accordance with safe working practice.

Range compressed gas, fire, explosion, fumes, confined space, burns, visible light and infrared radiation, chemicals.

1.2 Brazing equipment is selected to meet brazing requirements in accordance with industry practice.

Range cylinders, regulators, flashback arrestors, hoses, torch, tip.

1.3 Brazing equipment is assembled and maintained ready for use in accordance with manufacturer's instructions.

Range maintenance – tip cleaning, checking for leaks, hose repair, reporting defective equipment.

1.4 Metals are prepared and assembled for brazing or soldering in accordance with industry practice.

1.5 Consumables are selected by composition or specification, or brand name in accordance with industry practice.

Range copper-phosphorous, silver brazing alloys, lead-tin solders, fluxes.

Outcome 2

Join metals using the torch brazing and soldering processes.

Range brazed joints in carbon steel, stainless steel, copper, brass; soldered joints in galvanised steel sheet.

Evidence requirements

2.1 Safety procedures are followed and personal protective equipment is worn in accordance with safe working practice.

2.2 Flame size and type are adjusted for soldering and brazing in accordance with industry practice.

2.3 Joints are made in accordance with industry standard.

2.4 Joints are cleaned in accordance with industry practice.

Outcome 3

Inspect and repair brazed and soldered joints to industry standard.

Evidence requirements

3.1 Joints are assessed for faults by visual examination, bend tests, and peel tests.

Range faults – melted base metal, lack of filler metal at joint edges, unfused filler metal, cracks, undercutting.

3.2 Faults are compared to the permissible levels allowed by industry standard.

3.3 Brazing and soldering faults are repaired to industry standard.

Range evidence is required of at least one repair to a brazed joint, and one repair to a soldered joint.

This unit standard is expiring. Assessment against the standard must take place by the last date for assessment set out below.

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	30 November 1994	31 December 2022
Revision	2	14 April 1997	31 December 2022
Revision	3	5 January 1999	31 December 2022
Review	4	4 April 2001	31 December 2022
Rollover and Revision	5	20 April 2006	31 December 2022
Review	6	22 May 2009	31 December 2022
Review	7	20 July 2017	31 December 2022

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 (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.