

Title	Weld stainless steel plate in downhand positions using the gas metal arc and flux cored arc welding processes		
Level	3	Credits	6

Purpose	<p>This unit standard is for people welding stainless steel in downhand positions using the gas metal arc welding (GMAW) and flux cored arc welding (FCAW) processes.</p> <p>People credited with this unit standard are able to: prepare to weld stainless steel in downhand positions using the GMAW and FCAW processes; weld stainless steel in the downhand positions using the GMAW and FCAW processes; and inspect and repair GMAW and FCAW stainless steel plate welds.</p>
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Classification	Mechanical Engineering > Welding
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Available grade	Achieved
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Prerequisites	Unit 33135, <i>Demonstrate knowledge of safety and health while welding and thermal cutting</i> , or demonstrate equivalent knowledge and skills.
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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:
Health and Safety at Work Act 2015.
WorkSafe Good Practice Guide “Health and Safety in Welding”. Available at: <https://www.worksafe.govt.nz/assets/dmsassets/WKS-13-Welding-GPG.pdf>.
Weld Australia (formerly Welding Technology Institute of Australia (WTIA) Technical Note 7 – Health and Safety in Welding. Available at: [Product Details Weld Australia Member Portal](#).

Industry Standard - AS/NZS 1554.6: 2012, *Structural steel welding – Part 6: Welding stainless steels for structural purposes*, or equivalent. Available at:

www.standards.govt.nz.

Welder qualification Standard: AS/NZS ISO 9606.1: 2017, *Qualification testing of welders - Fusion welding - Part 1: Steels*, or equivalent. Available at:

www.standards.govt.nz.

Any new, amended or replacement Acts, regulations, standards, codes of practice, guidelines, or authority requirements or conditions affecting this unit standard will take precedence for assessment purposes.

2 Definitions

Accepted industry practice – approved codes of practice and standardised procedures accepted by the engineering industry as examples of best practice.

Downhand positions – flat, and horizontal-vertical welding positions.

FCAW – Flux Cored Arc Welding (gas shielded).

GMAW – Gas Metal Arc Welding, also referred to as *Metal Inert Gas (MIG) Welding*.

GMAW-P – Pulsed Power Gas Metal Arc Welding.

Industry standard – Class B of AS/NZS 1544.6, or equivalent.

Manufacturer's instructions – instructions provided by manufacturers of substances, equipment, and machinery. These instructions may include details on safe and correct handling, use and storage of substances and/or details on substance properties. Examples are labels on substance containers, product data sheets, and operator's manuals.

Stainless steel – typically, the austenitic stainless steel grades AISI 304L and 316L, but may also include other materials such as the duplex stainless steels.

Welding procedure – a work instruction providing all the necessary technical details for a specific welding application.

3 Assessment information

Evidence presented for assessment against this unit standard must be consistent with safe working practices and be in accordance with legislative requirements and workplace procedures and meet accepted industry practice. This includes the knowledge, use and maintenance of relevant tools and equipment.

Outcomes and performance criteria

Outcome 1

Prepare to weld stainless steel in downhand positions using the GMAW and FCAW processes.

Performance criteria

1.1 Equipment is selected to meet welding procedure requirements.

Range	power source rating and duty cycle, wire feed system and gun, shielding gas supply, welding cables, work clamp.
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- 1.2 Equipment is assembled, set up, and maintained ready for use in accordance with manufacturer's instructions.
- Range wire feed system; gun liner, nozzle and contact tip; shielding gas supply; welding cables; work clamp.
- 1.3 Stainless steel components are prepared and assembled in accordance with welding procedure.
- Range cleaning, providing root face where required, tack welding to correct alignment and pre-set.
- 1.4 Consumables are selected in accordance with welding procedure.
- Range electrodes are identified by specification and classification; shielding gases are identified by brand name and composition.

Outcome 2

Weld stainless steel in downhand positions using the GMAW and FCAW processes.

- Range six welds;
6-10mm plate thickness;
GMAW – tee weld, 2F position (ISO 6947 PB); butt weld, 1G position (ISO 6947 PA);
GMAW-P – butt weld, 1G position (ISO 6947 PA); tee weld, 2F position (ISO 6947 PB);
FCAW – tee weld, 2F position (ISO 6947 PB); butt weld, 1G position (ISO 6947 PA);
all tee joints to be angle sections to plate, to include welding into the corner.

Performance criteria

- 2.1 Workplace safety procedures are followed.
- Range examples are – use of personal protective equipment, checking of equipment for faults, use of fume extraction equipment, elimination of risk of fire or explosion, protection from arc radiation, protection from electrocution.
- 2.2 Electrodes are stored and handled in accordance with manufacturer's specifications.
- 2.3 Welds are deposited on stainless steel to industry standard and in accordance with welding procedure.
- 2.4 Component damage is minimised and distortion is controlled during welding and handling in accordance with accepted industry practice.
- 2.5 Welds are cleaned in accordance with accepted industry practice.

Outcome 3

Inspect and repair GMAW and FCAW stainless steel plate welds.

Performance criteria

3.1 Weld imperfections are identified by visual examination and workshop tests.

Range examples of workshop tests are – nick break, fillet break-over, bend, macro examination;
two workshop tests are required for welds from Outcome 2.

3.2 Weld imperfections are evaluated using acceptance levels in industry standard.

3.3 Weld defects are repaired in accordance with welding procedures and to industry standard.

Range evidence is required of at least one weld repair using GMAW and one using FCAW, involving the removal of the defect and rewelding.

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	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 2025
Review	8	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.