

Title	Weld steel structures in the downhand positions using the manual metal arc welding process		
Level	3	Credits	6

Purpose	<p>This unit standard is for people welding steel structures in the downhand positions using the manual metal arc welding (MMAW) process.</p> <p>People credited with this unit standard are able to: prepare to weld steel in the downhand positions using the MMAW process; weld steel in the downhand positions using the MMAW process; and inspect and repair structural steel MMAW 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 1554.1: 2011, *Structural steel welding – Part 1:Welding of steel structures*, or equivalent. Available at: www.standards.govt.nz.

Welder qualification Standards - AS/NZS 2980: 2018, Qualification of welders for fusion welding of steels - Additional requirements for Australia and New Zealand.

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.

Industry standard – refers to Category SP of AS/NZS 1554.1, AS/NZS 2980, 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.

MMAW – Manual Metal Arc Welding, also referred to as *Stick Electrode Welding*.

Steel – weldable low-carbon unalloyed (carbon-manganese) steel, also referred to as *mild steel*.

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 but is not limited to the knowledge, use and maintenance of relevant tools and equipment.

Outcomes and performance criteria

Outcome 1

Prepare to weld steel in the downhand positions using the MMAW process.

Performance criteria

1.1 Equipment is selected to meet welding procedure requirements, and assembled and set up ready for use in accordance with manufacturer's instructions.

Range power source – rating, duty cycle, open circuit voltage, alternating current or direct current);
welding cables; electrode holder; work clamp.

1.2 Routine maintenance is performed on the electrode holder, welding cables, and work clamp in accordance with manufacturer's instructions.

1.3 Steel is prepared and assembled in accordance with welding procedure.

Range cleaning, providing root face where required, tack welding to correct alignment, preset.

1.4 Electrodes are selected in accordance with welding procedure.

Outcome 2

Weld steel in the downhand positions using the MMAW process.

Range two welds;
hydrogen controlled electrodes; butt weld – 1G position (ISO 6947 PA), full penetration, 8-16 mm plate;
fillet weld – 2F position (ISO 6947 PB), 8-16 mm plate.

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 steel to industry standard and in accordance with welding procedure.

2.4 Damage to structural components 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 structural steel MMAW 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;
one workshop test is required for each weld from Outcome 2.

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

3.3 A weld defect is repaired in accordance with welding procedure and to industry standard.

Range removal of a defect in the root or intermediate pass of the butt weld, 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.