

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

<b>Purpose</b>	<p>This unit standard is for people welding steel structures in the downhand positions to AS/NZS 2980, or equivalent, using the manual metal arc welding (MMAW) process.</p> <p>People credited with this unit standard are able to prepare to weld; and weld steel in the downhand positions using the MMAW process to structural industry standard; and inspect and repair structural steel MMAW welds.</p>
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<b>Classification</b>	Mechanical Engineering > Welding
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<b>Available grade</b>	Achieved
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<b>Prerequisites</b>	Unit 29651, <i>Demonstrate knowledge of health and safety when welding and thermal cutting</i> , or demonstrate equivalent knowledge and skills.
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## Guidance information

### 1 References

Health and Safety at Work Act 2015.

*Health and Safety in Welding*. Wellington: Department of Labour, 2006. Available from <http://www.worksafe.govt.nz>.

AS/NZS 1554.1:2014, *Structural steel welding – Welding of steel structures*.

AS/NZS 2980:2007, *Qualification of welders for fusion welding of steels*.

### 2 Definitions

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

*Industry standard* – AS/NZS 2980:2007 or equivalent.

*MMAW* – Manual Metal Arc Welding.

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

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

### 3 Related unit standards

This unit standard is one of a manual metal arc welding set that is intended to be assessed in the following order:

- Unit 21907, *Demonstrate and apply knowledge of safe welding principles and quality assurance under supervision* (Level 2); a base level standard suitable for off job or on job delivery.
- Unit 22906, *Demonstrate and apply knowledge of welding low carbon steel* (Level 3); an introductory standard for use across all mechanical engineering trades.
- Unit 2682, *Weld steel in the downhand positions to a general purpose industry standard using the manual metal arc welding process* (Level 3); a progressive general purpose unit standard suitable for all mechanical engineering trades.
- Unit 2671, *Weld steel structures in the downhand positions using the manual metal arc welding process* (Level 3); a structural welding standard for steel fabricators who weld downhand to a certified structural standard.
- Unit 2685, *Weld steel structures in all positions using the manual metal arc welding process* (Level 4); a structural welding standard for steel fabricators who weld in all positions to a certified structural standard.

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## Outcomes and performance criteria

### Outcome 1

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

### Performance criteria

- 1.1 Equipment is selected to meet welding procedure requirements, and assembled 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 to structural industry standard.

Range hydrogen controlled electrodes;  
butt weld – 1G position, full penetration, 8-16 mm plate;  
fillet weld – 2F position, 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.

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 compared to the permissible levels allowed by the industry standard.

3.3 A weld defect is repaired to industry standard.

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

<b>Planned review date</b>	31 December 2022
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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	N/A

<b>Consent and Moderation Requirements (CMR) reference</b>	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 Competenz [qualifications@competenz.org.nz](mailto:qualifications@competenz.org.nz) if you wish to suggest changes to the content of this unit standard.