

<b>Title</b>	<b>Weld steel structures in all positions using the manual metal arc welding process</b>		
<b>Level</b>	<b>4</b>	<b>Credits</b>	<b>10</b>

<b>Purpose</b>	<p>This unit standard covers welding of steel structures in all 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 to the accepted industry standard in all positions using the manual metal arc welding (MMAW) process; and inspect and repair MMAW steel 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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### 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 – Part 1: 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.  
*Steel* – weldable low-carbon unalloyed (carbon-manganese) steel.  
*Welding procedure* – written work instruction providing all the necessary technical details for a specific welding application.
- 3 Recommended for entry
 

Unit 2671, *Weld steel structures in the downhand positions using the manual metal arc welding process*, or demonstrate equivalent knowledge and skills.
- 4 Related unit standards
 

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

  - 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.

## 5 Timeframe

All activities are expected to be completed within commercially acceptable timeframes.

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## Outcomes and performance criteria

### Outcome 1

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

#### Performance criteria

- 1.1 MMAW power source characteristics and controls are selected for positional welding and welding procedure requirements.
- Range rating, duty cycle, open circuit voltage, current type (alternating or direct current), polarity, arc characteristic (dynamics) control, hot start control.
- 1.2 Equipment is assembled and maintained ready for use in accordance with manufacturer's instructions.
- Range welding cables, electrode holder, work clamp.
- 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 all positions using the MMAW process.

Range hydrogen controlled electrodes;  
material thickness – 8 to 16mm;  
butt welds – 2G, 3G, and 4G positions, full penetration;  
fillet welds – 3F and 4F positions.

**Performance criteria**

2.1 Workplace safety procedures are followed.

Range 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 instructions.

2.3 Measures to minimise welding distortion are applied in accordance with accepted industry practice.

Range examples are – weld sequence, restraint, backstepping.

2.4 Welds are deposited on steel to industry standard and in accordance with welding procedure.

2.5 Welds are cleaned in accordance with accepted industry practice.

**Outcome 3**

Inspect and repair MMAW steel 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 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.  
One of the following positions – 2G, 3G, 4G, 3F, 4F.

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<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

**Consent and Moderation Requirements (CMR) reference**

0013

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.