

Title	Butt weld polyolefin pipes		
Level	3	Credits	10

Purpose	People credited with this unit standard are able to: demonstrate knowledge of butt welding of polyolefin pipes; prepare to butt weld polyolefin pipes; and butt weld polyolefin pipes.
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Classification	Plastics Processing Technology > Plastics Fabrication
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Available grade	Achieved
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Guidance Information

1. Legislation, regulations and/or industry standards relevant to this unit standard include but are not limited to the current version of:
Health and Safety at Work Act 2015;
Health and Safety in Employment Regulations 1995;
and any subsequent amendments and replacements.
2. Definitions
Accepted industry practice – approved codes of practice and standardised procedures accepted by the engineering industry as examples of best practice.
Polyolefin means polyethylene and polypropylene plastics materials. For the purpose of assessment, butt welding equipment shall be manually operated and include hydraulically powered pressure cylinders, a pipe end facing attachment and a pipe end heating plate attachment.
Workplace procedures – procedures used by the organisation carrying out the work and applicable to the tasks being carried out. Examples are – standard operating procedures, site safety procedures, equipment operating procedures, codes of practice, quality management practices and standards, procedures to comply with legislative and local body requirements.
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.
4. Related unit standards
It is recommended that people intending to gain credit for this unit standard first hold credit for Unit Standard 20655 *Demonstrate knowledge of plastics materials joining techniques*.

Outcomes and performance criteria

Outcome 1

Demonstrate knowledge of butt welding of polyolefin pipes.

Performance criteria

- 1.1 The butt welding process cycle is described.
- Range process cycle – position and clamp pipe ends, face and clean pipe ends, pre-heat pipe ends, fuse pipe ends under pressure, cool welded pipe, release welded pipe, pipe welds are de-beaded.
- 1.2 The components of a manually operated butt welding machine are identified, and their purpose and main features are described.
- Range components – machine frame, pipe and fittings clamping and alignment equipment, hydraulic power system including pressure gauge, end facing attachment, heating plate and controls, timing equipment.
- 1.3 Semi-automatic and fully automatic butt welding machines are identified, their principle features are described, and the advantages of these machines are explained.
- Range features may include – automatic end facing, automatic weld cycle, automatic pipe feeding and clamping, precision controls, automatic data logging;
advantages may include but are not limited to – higher production output, stronger welds, more consistent welds.
- 1.4 The butt welding process, pipes and equipment are described using enterprise terminology.
- 1.5 The critical compatibility requirements of pipes to be welded together are identified and described.
- Range compatibility requirements – polyolefin type and flow properties, pipe external diameter, pipe wall thickness, pipe roundness, pipe manufacturer.
- 1.6 Sources of information to verify pipe compatibility and to determine welding parameters are identified.
- Range sources include – pipe manufacturers, butt welding machine manufacturers.

- 1.7 Optimal butt welding environment requirements are identified, and their relevance to weld quality is described.
- Range environment requirements include – cleanliness, ambient temperature, dryness, physical stability, minimal pipe drag.
- 1.8 The requirement for individual weld traceability is explained, and common methods for recording and identifying welds are described.
- 1.9 Welded pipe testing methods are described, and their purpose and limitations are explained.
- Range welded pipe testing methods – hydrostatic pressure tests, tensile tests, flexural beam tests, long-term creep tests.
- 1.10 Common welding faults are identified.
- Range common welding faults – pipe misalignment, cold weld, hot weld, contaminated weld, too much fusion pressure, too little fusion pressure, timing.

Outcome 2

Prepare to butt weld polyolefin pipes.

Range evidence is required for two different butt welds – one weld using polyethylene pipe and one weld using polypropylene pipe; one weld using pipe equal to or less than 125 mm outside diameter and one weld using pipe greater than 125 mm outside diameter.

Performance criteria

- 2.1 Sources of hazard information associated with butt welding of polyolefin pipes are identified, indoor and outdoor butt welding hazards are described, and safety precautions are taken.
- Range sources may include – materials safety data sheets, company data sheets, supervisor;
hazards include – burns, fumes, eye and hand injuries, electrocution, uneven footing, unstable equipment.
- 2.2 Job instructions are identified and pipes for welding are verified.
- 2.3 Butt welding machine is located and positioned to suit the welding task, and is connected to a reliable power supply.
- 2.4 Pipe clamp change-parts are selected to suit the pipe size to be welded, and fitted to the butt welding machine.

- 2.5 Butt welding machine set-up information is interpreted, and the required welding parameters are established.
- Range welding parameters include – heating plate temperature, initial preheat pressure and time, heat soak pressure and time, pipe fusion pressure and time, cooling pressure and time.
- 2.6 Butt welding machine heating plate is cleaned and inspected for defects, and corrections are made.
- Range corrections may include but not limited to – replacement of non-stick surface;
cleaning agent – isopropyl alcohol.
- 2.7 Heating plate temperature is set according to set-up information, and power is switched on.
- 2.8 Butt welding machine end facing attachment cutter is inspected for defects, and sharpened or replaced.
- 2.9 Pipe end cleaning agent isopropyl alcohol is prepared.

Outcome 3

Butt weld polyolefin pipes.

Range evidence is required for two different butt welds – one weld using polyethylene pipe and one weld using polypropylene pipe; one weld using pipe equal to or less than 125 mm outside diameter and one weld using pipe greater than 125 mm outside diameter.

Performance criteria

- 3.1 Pipe ends are cut, cleaned, fitted, and clamped into the butt welding machine.
- 3.2 Pipe ends are faced with the butt welding machine pipe end facing attachment.
- 3.3 Faced pipe ends are inspected and cleaned, and corrections and adjustments are made where required.
- Range inspection includes – smooth and notch free end faces, acceptable end gap between pipes, alignment of pipe ends;
cleaning may include – removal of all cutting waste and contamination, use of cleaning agent isopropyl alcohol.
- 3.4 Butt welding is performed in accordance with specified welding parameters.
- Range welding may include – embossing a unique identification number on each weld.

3.5 Critical characteristics are monitored and controlled during the welding process.

Range critical characteristics include – weld bead size and shape, weld bead surface finish, heating plate temperature, heating plate removal time, pressure and timing of all phases.

3.6 Weld quality is visually verified, and welding conditions are recorded.

3.7 Test specimens are prepared for testing by third party.

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	26 April 2005	31 December 2025
Rollover and Revision	2	18 March 2011	31 December 2025
Review	3	26 October 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.