

Title	Butt weld polyolefin pipes		
Level	3	Credits	6

Purpose	People credited with this unit standard are able to: demonstrate knowledge of butt welding of polyolefin pipes; prepare to butt weld polyolefin pipes in accordance with enterprise procedure; and butt weld polyolefin pipes in accordance with enterprise procedure.
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Classification	Plastics Processing Technology > Plastics Fabrication
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Available grade	Achieved
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Entry information	
Recommended skills and knowledge	Unit 20655, <i>Demonstrate knowledge of plastics materials joining techniques.</i>

Explanatory notes

- 1 *Enterprise* means an organisation where training or assessment is taking place, and/or where the trainee is employed.
- 2 All work practices must meet enterprise health and safety requirements.
- 3 *Enterprise procedure* is defined as actions which comply with the policies, systems, and directives in a particular enterprise. Enterprise procedures must comply with the requirements of the Health and Safety in Employment Act 1992, and subsequent amendments.
- 4 Definition
Polyolefin means polyethylene and polypropylene plastics materials.
- 5 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.

Outcomes and evidence requirements

Outcome 1

Demonstrate knowledge of butt welding of polyolefin pipes.

Evidence requirements

- 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.
- 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 – higher production output, stronger welds, more consistent welds.
- 1.4 Enterprise terminology is used when describing the butt welding process, pipes and equipment.
- 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.

Outcome 2

Prepare to butt weld polyolefin pipes in accordance with enterprise procedure.

Range prepare – 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.

Evidence requirements

- 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 – replacement of non-stick surface.

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 agents are prepared.

Outcome 3

Butt weld polyolefin pipes in accordance with enterprise procedure.

Range butt weld – 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.

Evidence requirements

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 agents.

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 Welds meet minimum tensile strength requirements.

Range weld tensile strength to be 85% or greater of the pipe parent material tensile strength, and failure mode must be ductile; tensile tests to be in accordance with International Organisation for Standardisation, ISO 13953:2001(E) *Polyethylene (PE) pipes and fittings – Determination of the tensile strength and failure mode of test pieces from a butt-fused joint*; tensile test specimens to be prepared with an appropriate and consistent surface finish and dimensional accuracy.

Planned review date	31 December 2013
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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	N/A
Rollover and Revision	2	18 March 2011	N/A

Accreditation and Moderation Action Plan (AMAP) reference	0134
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This AMAP can be accessed at <http://www.nzqa.govt.nz/framework/search/index.do>.

Please note

Providers must be granted consent to assess against standards (accredited) by NZQA, or an inter-institutional body with delegated authority for quality assurance, before they can report credits from assessment against unit standards or deliver courses of study leading to that assessment.

Industry Training Organisations must be granted consent to assess against standards by NZQA before they can register credits from assessment against unit standards.

Providers and Industry Training Organisations, which have been granted consent and which are assessing against unit standards must engage with the moderation system that applies to those standards.

Consent requirements and an outline of the moderation system that applies to this standard are outlined in the Accreditation and Moderation Action Plan (AMAP). The AMAP also includes useful information about special requirements for organisations wishing to develop education and training programmes, such as minimum qualifications for tutors and assessors, and special resource requirements.

Comments on this unit standard

Please contact the Competenz info@competenz.org.nz if you wish to suggest changes to the content of this unit standard.