Title	**Butt weld polypropylene (PP) and polyethylene (PE) polymer pipes above and below ground level**		
Level	**4**	**Credits**	**10**

Purpose	This unit standard is intended for people working in the plastic fabrication industry as polymer welders. People credited with this unit standard are able to, for PP and PE polymer pipes above and below ground level: demonstrate knowledge of company procedures, documentation, hazards and equipment for butt welding; prepare to butt weld; butt weld; and inspect butt welds.

Classification	Plastics Processing Technology > Plastics Fabrication

Available grade	Achieved

Guidance Information

1 Health and Safety at Work Act 2015;
Health and Safety in Employment Regulations 1995;
International Organisation for Standardisation (ISO) 21307-17;
German Welding Society (DVS), Technical Codes on Plastics Joining Technologies, DVS standards 2207 -1, 2207-11;
Plastics Industry Pipe Association of Australia (PIPA) Technical Guidelines;
WorkSafe New Zealand. *Good practice guidelines – Excavation Safety*. Wellington, July 2016. Available at Excavation safety (worksafe.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, pending review of this unit standard.

2 Definitions
Standard Dimensional Ratio (SDR) refers to the pipe geometry; ratio of the nominal outside diameter to the nominal wall thickness.
Workplace procedures refer to organisation policies and procedures that are documented in memo, electronic, or manual format and available in the workplace, and are consistent with manufacturer's requirements. They may include but are not limited to – standard operating procedures, site specific procedures, site safety procedures, equipment operating procedures, quality assurance procedures, product quality specifications, references, approved codes of practice, housekeeping standards, environmental considerations, on-site briefings, supervisor's instructions, and procedures to comply with legislative and local body requirements relevant to the industry sector.

3 Assessment information

Evidence presented for assessment against this unit standard must be consistent with safe working practices and be in accordance with applicable manufacturer's specifications, workplace procedures and legislative requirements.

This unit standard is intended for, but is not limited to, workplace assessment. The range statements relate to industry specific equipment, procedures, and processes.

Outcomes and performance criteria

Outcome 1

Demonstrate knowledge of company procedures, documentation, hazards, and equipment for butt welding PP and PE polymer pipes above and below ground level.

Performance criteria

1.1 Potential environmental and safety hazards and controls are described.

Range hazards include but are not limited to – weather, electric shock, excavations, manual handling, personal injury, vehicles and public, minimum evidence of three hazards is required;
controls may include but not limited to – personal protective equipment, safe access and egress, weather protection, lifting and handling techniques, pipe storage and stacking, temporary traffic control, signage, barriers, overhead cables;
minimum evidence of one hazard control for each of the three hazards chosen from above is required.

1.2 Correct butt welding industry standard is applied to the correct material.

Range standard may include – DVS 2207-11, DVS 2207-1, ISO 21307-17;
material may include – PP, PE.

1.3 The main components of semi-automatic and fully automatic Computerised Numerical Control (CNC) butt welding equipment are described.

Range includes but is not limited to – heating element, facing tool, clamp, shoes, control box, residual current device, rollers, cutter, power source.

1.4 Potential faults associated with incorrect application and operation of equipment are described.

Range evidence is required for a minimum of five faults from – power supply, planer blades are sharp, electrical leads, hydraulic oil, hoses, connections, clamps open and close properly and smoothly throughout full travel, data logger, plate condition and temperature monitoring, temperature equipment calibration.

1.5 Work area for below ground level butt welding is prepared, safe working practices and collapse control for excavations and trenches are described.

Range collapse control includes – benching, battering, shoring, shielding.
safe working practices includes – always working in pairs, water, dewatering.

Outcome 2

Prepare to butt weld PP and PE polymer pipes above and below ground level.

Performance criteria

2.1 Work area is prepared for above ground butt welding.

Range work area preparations may include – sun or wind or rain shelters, level and solid ground conditions, pipe flow in, pipe flow out, machinery access;
evidence is required for a minimum of three work areas.

2.2 Materials are selected and evaluated.

Range material compatibility, same wall thickness, diameter, pressure ratings and standard dimension ratios, ovality.

2.3 Polymer pipe is prepared in accordance with welding procedure.

Range check for major damage (10% wall thickness), cleanliness, explain pipe reversion (toe in), pipe alignment, pipe cutting, pipe end preparation, pipe end covers, effects of sun heating the pipe.

2.4 Components are prepared and assembled in accordance with welding procedure.

Range pipe condition, edge preparation, cleaning, correct alignment and pre-set, wall thickness, ovality, pressure ratings, reversion (pipe toe in).

2.5 Welding equipment is selected to meet welding procedure requirements.

Range CNC, semi-automated.

2.6 Equipment is assembled, set up, and maintained ready for use.

Range tool condition, clean heating plate, clean cutting plate, checking of hydraulic oil for leaks, hydraulic rams, electrical cabling, tagged cabling.

2.7 Butt welding equipment is positioned to receive the polymer material correctly.

Range pipe loading, pipe alignment, pipe flow in, pipe flow out.

2.8 Parameters are calculated and applied.

Range includes but is not limited to – temperature, wall thickness, outside pipe diameter, heat soak time, pre-bead size, heat soak pressure, bead build up time, drag pressure, weld cooling.

Outcome 3

Butt weld PP and PE polymer pipes above and below ground level.

Range material wall thickness – 3mm to 100mm.

Performance criteria

3.1 Dummy welds are performed at the start of each day and for each change of pipe diameter and SDR.

Range checking of butt weld parameters, checking of correct operation of the machine, impurities are removed from the heating plate.

3.2 Dummy welds are aborted after ramp-up time.

3.3 Test weld pieces are completed and removed for testing.

3.4 Welds are completed to industry standard and in accordance with welding procedure.

3.5 Butt welds are marked and identification stamped. Manual weld data record sheets are completed.

3.6 Below ground butt welding machine is safely removed from the pipe.

Outcome 4

Inspect butt welds on PP and PE polymer pipes above and below ground level.

Performance criteria

4.1 Weld imperfections are identified by visual examination and any defective weld is removed.

Range defects may include – bead weld pitting, appearance and shape of the weld, bead width to welding standard, check intrusions through the weld.

4.2 A defective weld section is replaced according to industry standards.

Planned review date	31 December 2027

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	25 May 2023	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 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.