Title	**Extrusion weld rigid plastics materials**		
Level	**3**	**Credits**	**6**

Purpose	People credited with this unit standard are able to: demonstrate knowledge of extrusion welding of rigid plastics materials; plan and prepare to extrusion weld rigid plastics materials; and perform extrusion welding of rigid plastics materials.

Classification	Plastics Processing Technology > Plastics Fabrication

Available grade	Achieved

Guidance Information

1. Legislation, regulations and/or industry standards relevant to this unit standard include but are not limited to:
   Health and Safety at Work Act 2015;
   German Welding Society (DVS) DVS Media (dvs-media.eu);
   Plastics Industry Pipe Association of Australia (PIPA) Technical Guidelines, Plastics Industry Pipe Association of Australia – PIPA;
   and any subsequent amendments and replacements.

2. Definition
   Plastics materials are thermoplastics (including elastomers) and thermosetting materials.

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.

Outcomes and performance criteria

Outcome 1

Demonstrate knowledge of extrusion welding of rigid plastics materials.

Performance criteria

1.1 The components of common hand-held extrusion welders are identified, and their purpose is described.

Range components may include – parent material pre-heating equipment, extruder, extruder drive, temperature controller, welding shoe.

1.2 The features of different extrusion welders are described.

Range features include – pre-heat temperature range, pre-heat capacity, physical size, weight, temperature display, shoe types, separate blower.

1.3 The purposes of common extrusion welding accessory tools and materials are described.

Range extrusion welding accessory tools and materials include – scrapers, de-burring tools, wire brushes, pliers, knives, isopropanol cleaners.

1.4 Industry terminology is used when describing the extrusion welding process, materials and equipment.

1.5 The visual appearance of sound extrusion welds is identified.

Range visual appearance – smooth and continuous surface, even thickness, good edge bonding.

Outcome 2

Plan and prepare to extrusion weld rigid plastics materials.

Range evidence is required for one vertical and one horizontal extrusion welded joint, each using a different parent plastics material, a different type of welded joint, and a different welding procedure.

Performance criteria

2.1 Sources of hazard information associated with extrusion welding plastics materials are identified, hazards are described, and safety precautions are taken.

Range sources may include – safety data sheets, company data sheets, information from project engineer;
hazards include – burns, fumes, eye injuries, electrocution, poor body posture.

2.2 Identification techniques are carried out on the parent plastics material, and parent material and extrudate compatibility is verified.

Range parent plastics materials – polyvinyl chloride, polyethylene, polypropylene;
identification techniques include – cutting, specific gravity, manufacturers' identification marks, parent material weldability.

2.3 The type of welded joint to be used is selected according to the required joint geometry, and the welding procedure is determined and planned.

Range type of welded joint – vee-butt, overlap, fillet;
welding procedure may include – tacking, supporting, shielding.

2.4 Parent plastics material surface and joint preparation techniques are carried out.

Range surface and joint preparation includes – scraping, grinding, machining;
use of isopropanol cleaners;
pre-drying of all materials.

2.5 A suitable extrusion welder and extrusion welding shoe are selected according to the weld type, and the extrusion welding shoe is fitted to the welder.

2.6 The extrusion welder temperature, extruder output and pre-heat temperature are selected and set according to weld type and the parent plastics material characteristics in accordance with DVS 2207-4.

Outcome 3

Perform extrusion welding of rigid plastics materials.

Performance criteria

3.1 Extrusion welding of test pieces is performed.

Range evidence is required for welding one vertical and one horizontal welded joint, one circumference welded joint, each extrusion welded with 60^{o} vee-butt welds and a minimum length of 300mm, using different plastics materials and different gauges;
plastics materials – polyethylene, polypropylene;
gauge – between 10 mm and 20 mm.

3.2 Welding conditions of test piece welds are monitored and controlled during the welding process.

Range welding conditions include – pre-heat temperature, extruder output speed, extruder temperature;
welding conditions include – weld profile, weld speed.

3.3 Key features of the completed test pieces are verified.

Range key features include – weld aesthetics, weld voids, parent material distortion, good edge bonding.

3.4 Test piece welds meet weld short-term tensile welding factors.

Range weld short-term tensile welding factor from tensile tests for both plastics materials to be 0.7 or greater with no more than one result below this figure for each welded test piece;
tensile tests to be in accordance with DVS 2203-01 *Testing of welded joints of thermoplastics sheets and pipes – Test methods – Requirements* and DVS 2203-2 1985/07 *Testing of welded joints of Thermoplastics: Tensile test;*
spark joint testing;
tensile test specimens to be prepared with an appropriate and consistent surface finish and dimensional accuracy.

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	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

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.