



Plastics Industry Pipe Association
of Australia Limited

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Industry Guidelines

BUTT FUSION JOINTING OF PE PIPES AND FITTINGS - RECOMMENDED PARAMETERS

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Disclaimer

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Notwithstanding, users of the guidelines are advised to seek their own independent advice and, where appropriate, to conduct their own testing and assessment of matters contained in the guidelines, and to not rely solely on the guidelines in relation to any matter that may risk loss or damage.

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BUTT FUSION JOINTING OF PE PIPES AND FITTINGS - RECOMMENDED PARAMETERS

The PIPA Technical Committee has prepared this publication as a guide to the butt fusion of polyethylene pipe using AS/NZS 4130 material as a basis.

INTERNATIONAL STANDARDS

PIPA recommends the butt fusion procedures and parameters as specified in ISO 21307, *Plastics pipes and Fittings – Butt Fusion Jointing Procedures for Polyethylene (PE) Pipes and Fittings Used in Construction of Gas and Water Distributions Systems*. Copies of ISO 21307 may be purchased from SAI Global www.saiglobal.com or other Standards suppliers.

ISO 21307 specifies three proven butt fusion jointing procedures for pipes and fittings, taking into consideration the materials and components used, the fusion jointing procedure and equipment and the quality assessment of the completed joint. It also covers the weld procedure for activities such as surface preparation, clamping, alignment and cooling procedures.

Where ISO 21307 references other International Standards, the equivalent Australian Standard is deemed to apply. Where there is no equivalent Australian Standard then the International Standard applies.

International Standard	Subject Matter	Australian Standard
ISO 8085-2	Fittings	AS/NZS4129 Section 6
ISO 4437	Gas Pipe	AS/NZS4130
ISO 4427	Water Pipe	AS/NZS4130
ISO 12176-1	Equipment	Not applicable ***
ISO/TS 10839	Installation	AS/NZS2033, AS/NZS 4645
ISO 13953	Tensile Test	N/A
ISO 1167-1	Hydrostatic Pressure Test	AS/NZS 4130 Clause 10.1
ISO 1167-3	Hydrostatic Pressure Test	AS/NZS 4130 Clause 10.1
ISO 1167-4	Hydrostatic Pressure Test	AS/NZS 4130 Clause 10.1
ASTM F2634	High speed tensile test	N/A

*** PIPA does not require the use of the International Standard ISO 12176-1 *Plastics pipes and fittings — Equipment for fusion-jointing polyethylene systems*. Some technicalities in the design requirements of the ISO standard have the potential to unjustly exclude welding machines that have clearly demonstrated consistent, successful performance in Australia for many years.

Background Information

Butt welding involves the heating of two pipe ends to fusion temperature and then subsequently joining the two ends by the application of force. However, a successful butt weld requires the correct combination and sequence of the welding parameters time, temperature and pressure.

Various proven butt fusion methods with minor differences have been in use in different countries for many years. ISO 21307 contains three distinct fusion methods described below for pipe and fittings.

It is essential that the parameters specified for a given method are followed. Do not mix and match parameters from each method.

- **Single pressure – low fusion jointing pressure**
This method has been used by most European countries and in Australia.
- **Dual pressure – low fusion jointing pressure**
This method is used by the water industry in the UK, and in Europe for pipe with a wall thickness greater than 22mm. These parameters are not commonly used in Australia.
- **Single pressure – high fusion jointing pressure**
This method has been used extensively in Northern America and more recently in Australia for the construction of gas gathering pipelines. The weld interface pressure is approximately three times the low pressure method and, as a consequence, more of the molten material is extruded from the weld zone, thereby enabling a reduced cooling time. The method is relatively new in Australia and therefore extra attention is required to ensure that:
 1. welding machines have sufficient structural strength and hydraulic capacity to achieve the high-pressure parameters in a safe manner. Confirmation should be sought from the machinery manufacturer.
 2. The welding operator is sufficiently experienced and proficient with the parameters.