



Plastics Industry Pipe Association
of Australia Limited

ACN 086 511 686

Industry Guidelines

POLYETHYLENE (PE) PIPES AND FITTINGS FOR COMPRESSED AIR

ISSUE 6.8

**Ref: POP002
19 APR 2009**

Pipelines Integrity For a Cleaner Environment



Disclaimer

In formulating this guideline PIPA has relied upon the advice of its members and, where appropriate, independent testing.

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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POLYETHYLENE (PE) PIPES AND FITTINGS FOR COMPRESSED AIR

This document contains guidelines for the use of PE pipes and fittings in compressed air applications and should be read in conjunction with POP001 and POP003. For the use of other plastic pipe systems in these applications, reference should be made to the manufacturer.

ATTRIBUTES

PE has a number of attributes which make it ideally suited to compressed air applications:

Fracture resistance

High resistance to fracture propagation limits the extent of fracture in the event of external damage. This feature means that PE, unlike some other thermoplastics, will present minimal hazard in the event of accidental damage and the pipe system would not normally require additional protection.

Ultraviolet Light Resistance

Black PE materials may be used if exposed to UV radiation, but consideration may need to be given to temperature effects.

For coloured products, PE is specified to contain an optimum level of UV stabiliser. However, coloured pigments are not as effective as carbon black, and the advice of PIPA or the manufacturer may be appropriate.

Corrosion resistance

Unlike metallic pipework, PE will not corrode.

Chemical resistance

PE has excellent chemical resistance and is suitable for use in contact with compressor oils, whereas some other thermoplastics have limited or poor resistance to compressor oils. Some synthetic oils, including aromatic, polyester, and di-ester types, may not be suitable. If in doubt, the advice of the manufacturer should be sought.

Impact resistance

PE has high impact strength compared with other thermoplastics, which maximises resistance to external damage.

Colour

May be coloured for easy identification.

Thermal insulator

Minimises variation in compressed air temperature and thus pressure variations.

Low noise/vibration transmission

Vibrations can cause problems in compressed air systems. PE pipes with their flexibility will not transmit vibrations to other structures.

Light weight

The light weight of PE pipe facilitates quick and easy installation. Combined with the benefits of prefabrication, this enables installation costs to be reduced.

This enables the PE compressed air system to be fixed into or onto cable trays, further reducing costs. The pipelines can be secured with pipe clips or cable ties depending on the pipe sizes. Since plastics do not conduct electricity, it is safe to install them in cable trays alongside electrical cables.

MANUFACTURING STANDARDS

PE – PIPES	AS/NZS 4130	Polyethylene (PE) pipes for pressure applications
PE – FITTINGS	AS/NZS 4129	Fittings for polyethylene (PE) pipes for pressure applications

PE pipe for compressed air has dimensions to Series 1 pipe requirements of AS/NZS4130.

PRECAUTIONS

Compressed air systems contain substantial stored energy, which, if released suddenly, could cause injury. It is recommended that pipe system design, installation and maintenance be conducted by those with appropriate knowledge and experience. Care is needed to avoid unplanned overheating of the system. Air compressors will produce air which may be considerably above ambient temperature. Connection between a piston compressor and receiver should not be in plastics due to the likelihood of unacceptably high temperatures.

Industry best practice of shielding equipment and pipework from direct heat sources, eg sunlight, should be adopted to prevent excessive heat buildup. It is also recommended that oil traps be fitted immediately downstream of the compressor.

JOINTING

It is especially important that installation be carried out by qualified and experienced operators under controlled conditions. All jointing should be conducted in accordance with the manufacturer's recommendations.

There are two jointing methods

(a) *Fusion Joints*

(b) *Mechanical Joints*

ALLOWABLE PIPE SYSTEM WORKING PRESSURES

The following tables list maximum operating pressures, in kPa. Under these conditions the system life is expected to be in excess of 50 years

For continuous operation at temperatures above 40°C, life expectancy may be reduced. However, for normal operation, ie variable operating temperatures, system life would not be reduced, including operation for limited periods at temperatures up to 60°C. Specific design data may be obtained from PIPA members.

System pressure capabilities have been derived using a safety factor of 2. The energy stored in compressed air and the potential for pressure spikes means that the pressure rating is less than that for water, for which the safety factor is 1.25.

PE 100 Pipe Systems

Classification of Pipe	Standard Dimension Ratio (SDR)	Operating Temp. 20°C	Operating Temp. 25°C	Operating Temp. 30°C	Operating Temp. 35°C	Operating Temp. 40°C
PN 10	17	630	620	590	560	530
PN 12.5	13.6	800	780	750	710	670
PN 16	11	1000	990	940	890	840
PN 20	9	1250	1240	1180	1120	1060
PN 25	7.4	1600	1540	1470	1390	1320

PE 80B Pipe Systems

Classification of Pipe	Standard Dimension Ratio (SDR)	Operating Temp. 20°C	Operating Temp. 25°C	Operating Temp. 30°C	Operating Temp. 35°C	Operating Temp. 40°C
PN 8	17	500	470	440	400	380
PN 10	13.6	630	600	560	510	480
PN 12.5	11	800	750	700	640	600
PN 16	9	1000	940	880	800	750
PN 20	7.4	1250	1180	1100	1000	940

PIPE MARKING

Marking of PE pipes manufactured specifically for compressed air, should show the following details.

1. Manufacturer's name or registered trademark, and pipe series 1 number.
2. Nominal diameter, nominal pressure classification and SDR
3. Operating pressure at 20⁰C.
4. PE material classification
5. The words, 'Compressed Air'
6. Date of manufacture in the form "010519".
7. Identification of the place of manufacture
8. The standard number, AS/NZS4130

Example of marking:

TRADEMARK S1 DN32 PN16 SDR11 1000KPa at 20⁰C PE100
COMPRESSED AIR 010519 F1 AS/NZS4130

FITTINGS AND VALVES

Reference should be made to PIPA members for recommended pressure limitations, for their range of products, but as a general guide:

- PE moulded fusion fittings are suitable for use at the operating pressures shown in the tables.
- PE mechanical fittings are suitable for use at operating pressures up to PN16 or PN20. Check the operating pressure with the fittings manufacturer.
- Fabricated fittings should not be used.

In order for PE mechanical fittings to comply with the requirements of AS/NZS 4129, it is normally considered necessary to provide reinforcement to female threads larger than 25mm. This reinforcement should also be corrosion resistant and is normally provided in the form of a stainless steel ring. Threaded outlets larger than 50mm should be avoided. The use of PTFE (Teflon) tape only is recommended for all fittings with plastics threads.

