

**Suggested Temperature Limits
for the Operation and Installation
of Thermoplastic Piping in Non-
Pressure Applications**

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Foreword

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The purpose of this technical note is to provide suggested temperature limits for the operation and installation of thermoplastic piping in non-pressure applications.

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SUGGESTED TEMPERATURE LIMITS FOR THE OPERATION AND INSTALLATION OF THERMOPLASTIC PIPING IN NON-PRESSURE APPLICATIONS

Operating Notes:

The following related information and precautions should be considered before thermoplastic non-pressure piping systems are designed to transport fluids at the high temperature limits suggested in this document. It may be advisable in some cases to reduce these maximum temperature limits due to the chemical compatibility between the fluid and the piping material.

For purposes of this document, non-pressure piping systems should be considered those piping systems which do not operate fully charged for their continuous length and for which the static head never exceeds 15 psig.

Some plastic pipe systems may be affected by the continuous exposure to higher temperature fluids. Pipe and fitting manufacturers should be consulted for information about the effects of fluid temperatures on the piping system and its operation.

It should be noted that given the lower thermal conductivity of thermoplastics, the outer surface of the pipe might be at a lower temperature than the hotter fluid inside the pipe. The maximum temperatures suggested in the table are for the fluids being transported. The suggested temperature limits, which have been established under the assumption that the outer pipe surface is exposed to ambient temperatures, may need to be modified for cases where this assumption is essentially incorrect such as buried or insulated pipe. While the guidelines presented in the table are generally accepted for the products described, not all piping compounds are designed to sustain continuous exposure to high temperatures. The piping manufacturer should be consulted for specific information regarding thermal and oxidative stability of the piping product being provided.

The materials included in the tables are those covered by the current ASTM standards. Material or pipe manufacturers should be consulted for recommendations about other piping materials.

The temperature limits presented here are based on non-pressurized continuous exposure to high temperature aqueous environment. The piping manufacturer should be consulted regarding the applicability of these limits in the presence of specific chemicals or conditions.

Above ground installations, in which a polyolefin piping system conveys fluids at more traditional temperatures but is in direct exposure to sunlight for extended periods of time is of equal concern. In these situations, a conservative design and operating philosophy,

in which continual exposure to the high temperature extremes associated with heating by sunlight of the piping system, is recommended.

Installation Notes

When solvent cement joints are made at temperatures below 32°F, special precautions are needed to obtain adequate joint strength. Additional drying time may be required for solvent cement permeation and cure time of the joint. Refer to ASTM D2855 and/or consult piping manufacturers for details. Solvent cement manufacturers should be consulted regarding precautions that should be taken at the temperature extremes indicated.

Transporting fluids near the maximum temperature limit may require a continuously supported pipeline. For lower temperatures and intermittent flow it may be acceptable to support the pipe with hangers spaced at appropriately close intervals. The reader is referred to *PPI's Handbook of Polyethylene* for more information on this subject.

Joining of polyolefin pipe under the extreme temperatures presented in the tables may require special consideration and handling. Fusion joining of polyolefin pipe at these temperature extremes may require sheltering of the fusion apparatus and the fusion crew.

Handling of any construction materials at the temperature extremes presented in the tables should be done with extreme caution. Any pipe or fitting left in direct sunlight at very high ambient temperatures will increase in temperature significantly. Caution should be exercised in handling pipe and fittings in these situations so as to avoid any potential for personal injury.

The effects of low temperature are different. As temperatures drop, the modulus of elasticity for most polyolefins increases thus increasing the potential of low-temperature embrittlement. As such, polyolefin piping should be handled in accordance with specific manufacturer's recommendations at these low temperature extremes.

**SUGGESTED TEMPERATURE LIMITS
FOR OPERATION AND INSTALLATION OF THERMOPLASTIC PIPE
IN NON-PRESSURE APPLICATIONS**

Pipe Material	Minimum Temperature For Non-Pressure Continuous Flow (°F)	Maximum Temperature for Non-Pressure Continuous Flow (°F)
Acrylonitrile Butadiene Styrene (ABS)	0	180
Polyethylene (PE)		
PE1404	-40	100
PE2406	-40	180
PE3408	-40	180
Crosslinked Polyethylene (PEX)	-30	210
Polyvinyl Chloride (PVC)	0	150
Chlorinated Polyvinyl Chloride (CPVC)	0	210
Polybutylene (PB)	0	210

Pipe Material	Minimum Installation Temperature (°F)	Maximum Installation Temperature (°F)
Acrylonitrile Butadiene Styrene (ABS)	0	120
Polyethylene (PE)		
PE1404	-30	130
PE2406	-30	130
PE3408	-30	130
Crosslinked Polyethylene (PEX)	-30	140
Polyvinyl Chloride (PVC)	0	120
Chlorinated Polyvinyl Chloride (CPVC)	0	140
Polybutylene (PB)	0	120