

SCOPE

- I 1.1 This practice covers the materials, design, fabrication, inspection and testing of plastic and plastic-lined piping. It covers thermoplastic piping, thermoplastic lined ferrous metal piping, and reinforced thermosetting resin pipe (RTRP).
- I 1.2 **An asterisk (*)** indicates that a decision by the Purchaser is required, or that additional information shall be furnished by the Purchaser.

SUMMARY OF ADDITIONAL REQUIREMENTS

- I 2.1 **Table 1** lists the code and standards which shall be used with this practice.

TABLE 1

CODE AND STANDARDS	
ASME Code	
B31.3	Process Piping
ASTM Standards	
D 2563	Classifying Visual Defects in Glass-Reinforced Plastic Laminate Parts
D 3035	Polyethylene (PE Plastic Pipe) [SDR-PR] Based on Controlled Outside Diameter
F 1545	Plastic-lined Ferrous Metal Pipe, Fittings and Flanges
AWWA Standard	
C 950	Fiberglass Pressure Pipe

DOCUMENTATION

- O,R *3.1 Temperature, pressure, and fluid service conditions will be supplied by the Purchaser.
- O,R 3.2 **Pipe Installer.** The pipe shall only be installed by qualified contractors approved by the pipe manufacturer.
- S,R *3.3 **Proposal Information.** The following data shall be submitted to the Purchaser for approval by the Owner's Engineer.
 - a. Product information including pipe specifications, MSDS sheets, installation instructions, and detailed joining procedures.
 - b. Verification that the pipe is suitable for the service.
 - c. Pipe inspection and testing procedures
 - d. Pipe transportation and storage information and details.

DESIGN

- I 4.1 Thermoplastic, Reinforced Thermosetting Plastic (RTRP) and plastic lined pipe shall conform to the referenced standards.
- S 4.2 **Plastic piping** shall **not** be used in above-ground flammable materials, combustible liquid or critical water services. Proposals to use plastic pipe in hazardous chemical service shall be submitted for approval by Owner's Engineer.
- I 4.3 **To determine the external design pressure for plastic pipe installed underground, underwater, or in other situations which cause external pressure, a safety factor of four** must be applied to the critical buckling pressure considering all imposed loads.
- O 4.4 **Plastic-lined piping** shall have **flanged joints**. Joint design shall be per the following:
 - a. **Nonflammable or non combustible service.** The liner shall be molded or shaped (lapped over the flange faces) to provide the gasket for the joint.
 - b. **Flammable materials, combustible liquid or hazardous liquid service.** The flanged joint shall be designed to prevent leakage under exposure to heat sufficient to destroy or melt the lining material. Vented piping shall not be used.
- O,R 4.5 **Maximum allowable deflection of thermoplastic and RTRP pipe**, at maximum operating pressure, shall be defined by pipe manufacturer, taking into account applicable live and dead loads.



O,R 4.6 Temperature limits for plastic and plastic-lined pipe shall be as follows:

MATERIAL		TEMPERATURE LIMITATION(1)			
		MINIMUM		MAXIMUM(2)	
		°F	°C	°F	°C
PP	(Polypropylene)	30	-1	210	99
PVDC	(Polyvinylidene Chloride)	40	5	160	71
PTFE	(Polytetrafluoroethylene)	-20	-29	500	260
FEP	(Perfluoro (Ethylene-Propylene) Copolymer)	-20	-29	300	149
ETFE	(Ethylene-tetrafluoroethylene)	-20	-29	300	149
PFA	(Perfluoroalkoxy)	-20	-29	500	260
PVDF	(Polyvinylidene Fluoride)	0	-18	275	135

Notes:

- (1) For exposure to corrosive environments, the recommendation of the pipe manufacturer shall be submitted for review by the Owner's Engineer.
- (2) Values represent maximum design temperature of contained fluid.

O,R 4.7 **Pipe lengths** shall not exceed 20 ft (6 m) for **plastic linings**, in order to limit differential thermal expansion between the pipe and the lining.

O,M 4.8 As-built drawings shall be furnished by the Purchaser.

INSTALLATION

- O 5.1 **Installation** shall follow manufacturer's specification including joint make-up.
- O * 5.2 **Plastic spacers** are permitted **between plastic-lined pipe and also, other types of flanged equipment** in non-flammable or non-combustible service. Spacers longer than 1/2 in. (13 mm) shall be armored. Spacer locations shall be indicated on "as-built" drawings.
- O 5.3 **PE piping shall be joined only by heat fusion welding.** Flanges shall be used, as required, to connect dissimilar systems.
- O 5.4 Mechanical joints which incorporate **O-ring seals** are acceptable for **RTRP piping**. **Bell and spigot joints using elastomeric seals** are acceptable for **underground RTRP pipe**.

INSPECTION AND TESTING

- O 6.1 **Thermoplastic and Thermoplastic-lined pipe and fittings.** Inspection shall be per ASTM 1545.
- 6.2 **RTRP pipe** shall be inspected and tested per AWWA C950.
- O 6.3 After installation, **plastic piping shall not be hydrostatically tested** until all fusion joints have cooled to ambient temperature and all solvent cemented joints or adhesive bonded joints have fully cured.

PREPARATION FOR SHIPMENT

- O 7.1 **Protection of openings.** After completion of inspection, all pipe and fittings shall be prepared for shipment as follows:
 - a. **Flanges** shall be protected over the entire gasket surface with wood and hardboard protectors bolted hand tight with at least four bolts.
 - b. **Socket welding-end connections** shall be fitted with wood or plastic plugs or caps.
- O 7.2 Thermoplastic pipe shall be shipped on racks or an equivalent that will give continuous support and prevent sagging or draping.

Revision Memo

1/79	Original Issue of Basic Practice	12/92	Revision 3
1/81	Revision 1		
1/85	Revision 2		
12/94	Revision 0 - Original Issue of International Practice		
3/98	Revision 1		
General editorial revision to rationalize this practice with the referenced standards and other IPs. Significant changes include: Revised Par. 2.1 to delete ASTM F 423, ASTM F 491, ASTM F 492, ASTM F 546, ASTM F 599 and replaced with ASTM F 1545 in Table 1 . Revised Par. 4.5 to add ETFE and PFA in Table.			

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