enpure™
HIGH PURITY PP SYSTEM

Submittal Data Sheet

Job or Customer:	
Engineer:	
Contractor:	
Submitted by:	Date
Approved by:	Date
Order No:	Date
Specification:	
Installed Date:	

IPEX's Enpure™ socket fusion-joint system is the preferred solution for virtually all high purity applications. These pipes when used in a system with IPEX ENPURE Polypropylene fittings, valves and faucets are used to convey acids, alkalis, solvents, deionized water, distilled water, brine, caustic soda, and other liquids where high purity, chemical resistance and/or high temperature capability is required. Applications can range from low purity water, through to high purity water with a resistivity of 18 meg ohm. Pipe and fittings are made from a pure virgin polypropylene resin. The resin has no added plasticizers, pigments or reworked materials.

Schedule 40 and 80 Polypropylene Plain End Pipe complies with the material requirements of ASTM D 4101, Standard Specification for Polypropylene Injection and Extrusion Materials".

ENPURE Schedule 40 and 80 Polypropylene Plain End Pipe base resin meets the FDA requirements contained in the Code of Federal Regulations in 21 CFR 177.1520 (a)(3)(i) and (c)3.1a, 3.2a. According to our information, all other ingredients used in the resin meet the requirements of their respective FDA regulations and CFR 21 177.1520(b). Our resin meets the FDA criteria in 21 CFR 177.1520 for food contact applications, including cooking, listed under conditions of use A through H in 21 CFR 176.170(c), Table 2. Our resin can be used in contact with all food types as listed in 21 CFR 176.170(c), Table 1.

ENPURE Fittings and ENPURE Valve are joined by socket fusion in accordance with ASTM D2657 Standard Practice for Heat Fusion Joining of Polyolefin Pipe and Fittings.

< STANDARDS >

ASTM

ASTM D 4101
ASTM D 2657

pipe and fitting availability

1/2" – 4" Sch 40/80 Pipe (10'/20')	1/2" – 4" Stub Flanges and Steel Backing Ring
1/2" – 4" Couplings	1/2" – 4" Nipples SOC X FPT
1/2" – 4" 90/45 Elbows	1/2" – 11/4" Female Adapter SOC X FPT
1/2" – 4" Tees	1/2" – 4" Cobra Pipe Clips
1/2" – 3" Caps	3/4" – 4" Reducer Bushings
1/2" – 2" Tu Ball Valve-Vit	1/2" – 2" Diaphragm Valves - EPDM/PTFE
1/2" – 2" Single Check Valve	1/2" – 4" Heater Bushings

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Joining Methods – Socket Fusion

Socket fusion welding involves fusing the pipe to the socket of the fitting. The joint is made by simultaneously fusing the male and female surfaces by special manual or automatic heating devices. The welding tool in its simplest form consists of a heating surface on which a series of heater bushings are mounted; and a heater system, with an automatic temperature controller.No additional materials are required for this type of welding. Socket welding does not affect the chemical resistance of the polypropylene, nor does it influence the chemical resistance or pressure resistance of the assembled pipe, fittings and valves.

There are two different tools available for socket fusion: a hand-held tool and a bench fusion machine. When any of the following is required – larger sizes, high volume joints per day or absolute consistency of the welds – the use of a bench fusion machine (manual or hydraulic) is recommended. Below are detailed instructions for the use of our hand-held tool.

Note: For bench fusion machine procedures, please consult Enpure Technical Manual.

Socket Fusion with Hand Held Tools

The method described here applies only to thermal welds using manual-type welding equipment.

Step 1: Preparation

Select the heater bushing and the heating spigot of the required diameters, insert and secure the bushings to the heating paddle.

Step 2: Clean Surfaces

Carefully clean the Teflon© coated contact surfaces. Use only a clean dry cloth.

Step 3: Heating Tool

Set the temperature of the heating tool. To form the joint correctly, the temperature should be between 480°F (250°C) and 520°F (270°C). Plug the heater into a dedicated and grounded 110-volt outlet ensuring that the outlet is protected by circuit breakers or fuses.

CAUTION: Handle the heater bushings carefully. Damage to the Teflon coating on the heater bushings can result in irregular heating resulting in inferior joints.

NOTE: Using other electrical devices on the same power source causes amperage loss resulting in poor welds.

Step 4: Cut Pipe

Cut the pipe at right angles and chamfer the newly cut edge at an angle of 15° and a depth as per Table 1.

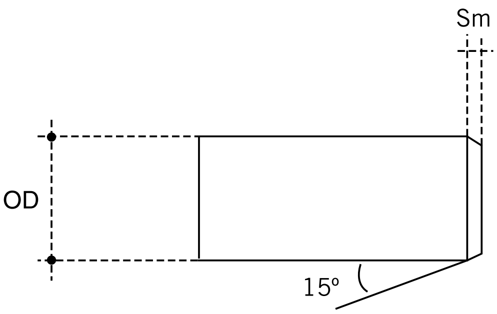


TABLE 1 – CHAMFER DEPTH

Pipe Size OD (in.)	Chamfer Depth Sm (in.)
1/2	
3/4	
1	5/32
1 1/4	
1 1/2	
2	
3	3/16
4	

Step 5: Check Fit

Check pipe and fittings for dry fit before fusing together.

Step 6: Make Insertion Reference

The length of pipe to be inserted varies by the pipe diameter. For the correct length of insertion, refer Table 2. Once selected, mark the pipe at the correct insertion length L.

Step 7: Make Longitudinal Reference

Mark a longitudinal reference line on the outside of the pipe and the fitting to show a guideline to prevent the two parts from rotating while the joint is being made.

Step 8: Clean Pipe and Fitting

Clean the fitting and pipe of any traces of oil or grease on the weld surfaces with an approved cleaning agent such as isopropyl alcohol.

Step 9: Check Bushings Temperature

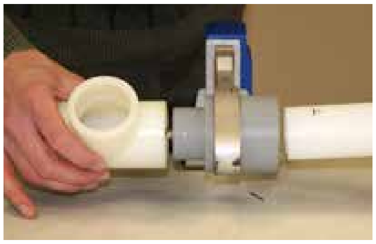
Check that the thermostat green light is on steady or, if external conditions require the use of a Tempilstik*, use the correct Tempilstik to check the bushings temperature.

CAUTION: DO NOT USE THE STICK ON THE PARTS OF THE BUSHINGS THAT WILL COME IN CONTACT WITH PIPE, FITTINGS OR VALVES.

NOTE: If creating a joint in cold weather, double-check the thermostat reading with the Tempilstik. Should the Tempilstik indicate an insufficient tool temperature, simply increase the thermostat setting by small increments until the Tempilstik deposit on the tool evaporates. After any changes to the temperature dial, the red light will come on. You must wait for the green indicator light before using the Tempilstik.

NOTE: Overheating or underheating of the pipe and fittings may result in a poor joint.

Step 10: Heat Components



Briefly and simultaneously engage both pipe and fitting with their respective bushing to determine interference. If substantially more resistance is offered by either the pipe or the fitting, begin your insertion with just that one item. Start the insertion of the second item once the first has reached the bushing half point. If the same resistance is observed, start both pipe and fitting insertion simultaneously.

Once the mark on the pipe reaches the edge of the female bushing, and the top of the fitting reaches the stop on the male bushing, apply just enough pressure to prevent "kickback" and hold together for the recommended times as shown in Table 3.

NOTE: Heating time starts from the moment of full insertion of both pipe and fitting.

NOTE: If the pipe and fitting do not fit tightly on the heater bushing, heating time should start when the components have swelled to just contact the surface of the heater bushings.

Step 11: Assembly

Once the recommended heating time has elapsed, quickly remove the elements from the heater bushings and fit the pipe into the socket for the entire insertion length as determined and marked previously. Do not turn the pipe in the socket.

Ensure the longitudinal reference marks are perfectly aligned.

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Installation Procedures

Step 12: Assembly

Hold the joint together for the welding time shown in Table 3. This will allow sufficient time for the components to fuse together.

Step 13: Joint Setting

Leave the joint to cool slowly at ambient temperature for the recommended cooling time minimums as shown in Table 3. Allow for proper cooling before pressurizing and testing the system.

NOTE: Never dip the joint into water or expose it to a forced airstream in order to cool it quickly as this will result in weak joints.

TABLE 2 – PIPE INSERTION LENGTH

Pipe Size (in.)	Insertion Length L (in.)
1/2	0.59
3/4	0.70
1	0.78
1-1/4	0.78
1-1/2	0.90
2	0.98
3	1.30
4	1.40

TABLE 3 – SOCKET FUSION TIMING

Pipe Size (in.)	Heating Time at 500°F (260°C) (sec)	Welding Time (sec)	Cooling Time (sec)	Cooling Time (min)
1/2	10	4	120	(2)
3/4	10	4	120	(2)
1	12	6	240	(4)
1-1/4	12	6	240	(4)
1-1/2	18	6	240	(4)
2	24	8	360	(6)
3	30	8	360	(6)
4	35	10	480	(8)

Hydrostatic Testing Products

WARNING

Use of compressed air or gas in PVC/CPVC/PP/PVDF pipe and fittings can result in explosive failures and cause severe injury or death.

- NEVER use compressed air or gas in Enfield or Labline pipes, fittings, or accessories.
- NEVER test Enfield or Labline systems with compressed air or gas, or air-over-water boosters.
- ONLY use Enfield or Labline systems for water and approved chemicals.

Site Pressure Testing

The purpose of an onsite pressure test is to establish that the installed section of line, and in particular all joints and fittings, will withstand the design working pressure, plus a safety margin, without loss of pressure or fluid.

IPEX recommends that a pressure test is conducted after completing the first 20 or 30 joints to ensure proper installation procedures are being followed.

Hydrostatic Test Procedure

1. Fully inspect the installed piping for evidence of mechanical abuse and/or suspect joints.
2. Split the system into convenient test sections not exceeding 1,000 ft.
3. Slowly fill the pipe section with clean water, taking care to evacuate all entrapped air in the process. Do not pressurize at this stage. Water temperature should not exceed 80°F.
4. Leave the section for at least 1 hour to allow equilibrium temperature to be achieved.
5. Check the system for leaks. If clear, check for and remove any remaining air and increase pressure up to 50 psi. Do not pressurize further at this stage.
6. Leave the section pressurized at 50 psi for 10 minutes. If the pressure decays, inspect for leaks. If the pressure remains constant, slowly increase the hydrostatic pressure to 1 1/2 times the nominal working pressure or as specified by the authority having jurisdiction.
7. Leave the section pressurized for a period not exceeding 1 hour. During this time, the pressure should not change.

If there is a significant drop in static pressure or extended times are required to achieve pressure, either joint leakage has occurred or air remains in the line. Inspect for leakage and if none is apparent, reduce the pressure and check for trapped air. This must be removed before further testing.

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Physical Properties

Properties	Materials	
	Natural PP	Standards
Specific Gravity	0.9	ASTM D792
Tensile Strength at Yield (psi)	3,700 - 4,100	ASTM D638
Modulus of Elasticity Tensile (psi) at 73°F	165,000 - 185,000	ASTEM D638
Izod Impact, (ft.lbs./in.) at 73°F, notched	No Break	ASTM D256
Coefficient of Linear Expansion, (in./in./°F x 10^{-5})	6.1	ASTM D696
Linear Expansion Factor, (in./100 ft./10°F)	0.732	
Heat Distortion Temperature, (°F) at 66 psi	185°F	ASTM D648
Thermal Conductivity, (BTU/in./hr./sq.ft./°F)	1.2	ASTM C177
Water Absorption, (%) 24 hrs. at 73°F	0.02	ASTM D570

About the IPEX Group of Companies

As leading suppliers of thermoplastic piping systems, the IPEX Group of Companies provides our customers with some of the world's largest and most comprehensive product lines. All IPEX products are backed by more than 50 years of experience. With state-of-the-art manufacturing facilities and distribution centers across North America, we have established a reputation for product innovation, quality, end-user focus and performance.

Markets served by IPEX group products are:

- Electrical systems
- Telecommunications and utility piping systems
- Industrial process piping systems
- Municipal pressure and gravity piping systems
- Plumbing and mechanical piping systems
- PE Electrofusion systems for gas and water
- Industrial, plumbing and electrical cements
- Irrigation systems
- PVC, CPVC, PP, PVCO, ABS, PEX, FR-PVDF, NFRPP, FRPP, HDPE, PVDF and PE pipe and fittings (1/2" to 48")

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