

# Submittal Data Sheet



Job or Customer: .....

Engineer: .....

Contractor: .....

Submitted by: .....

Date

Approved by: .....

Date

Order No: .....

Date

Specification: .....

## < STANDARDS >



ASTM F1412  
ASTM D 4101  
ASTM D 635  
ASTM D 311



NSF 14



File No:  
1103, 3455



CSA B181.3

## ADDITIONAL CORROSIVE WASTE PRODUCTS

**FLOWAY™**

ACID RESISTANT FLOOR DRAINS

**NEUTRATANK®**

NEUTRALIZATION TANKS

**PLENUMLINE™**

FR-PVDF MECHANICAL JOINT ACID WASTE SYSTEM

**LABLINE®**

MECHANICAL JOINT ACID WASTE SYSTEM

**Encase™**

PP Double Containment System

IPEX's Enfield™ electrofusion-joint system is the preferred solution for virtually all non return air plenum chemical waste applications. Pipe and fittings are made from flame retardant Polypropylene (FRPP). A black non-flame retardant Polypropylene is also available upon request (NFRPP). Enfield™ FRPP and NFRPP Pipe and fittings comply with ASTM F1412 Standard specification for Polyolefin pipe and fittings for corrosive waste drainage systems. Material used in the manufacturing of Enfield™ pipe and fittings complies with the material requirements of ASTM D4101 Standard Specification for polypropylene for Injection and Extrusion materials. All pipe and fittings are listed to NSF 14 standard and IAPMO.

## pipe and fitting availability

1-1/2" – 12" Pipe (10' or 20', FRPP or NFRPP, Sch. 40 or Sch.80)	1-1/2" – 4" Glass Adapters, No Hub Adapters, Adapters FRPP
1-1/2" – 12" Couplings / CAPS, FRPP/ NFRPP	1-1/2" Duriron Adapter
1-1/2" – 6" Cleanout FRPP	1-1/2" Universal Traps FRPP
1-1/2" – 6" 90°. Sweep, 90°. Sweep SOC. x SPIGOT FRPP	1-1/2" 90 Deg. Sweep, Loose Nut x Socket FRP
1-1/2" – 8" Repair Couplings, FRPP/ NFRPP	1-1/2" Loose Nut x FPT/ Socket, Adapters FRPP
1-1/2" – 12" 1/4 Bend FRPP	1-1/2" – 6" "P" Trap FRPP
1-1/2" – 12" 1/8 Bend FRPP	1-1/2" – 12" Reducing Bushings FRPP
8" – 12" ANSI 150 Bolt pattern blind flanges FRPP	1-1/2" – 6" Reducing combination Wyes and 1/8 Bend FRPP
1-1/2" – 6" 1/8 Bend SOC. X SPIGOT FRPP	1-1/2" – 2" 1/4 Bend SOC. x SPIGOT FRPP
1-1/2" – 4" Male Adaptor FRPP	1-1/2" – 3" Female Adapter FRPP
1-1/2" – 12" Reducing / Sanitary Tees, Reducing / Double Sanitary Tees FRPP	1-1/2" – 12" ANSI 150 Bolt Pattern Flanges FRPP
1-1/2" – 2" True Wye FRPP	1-1/2" – 4" Reducing True Wye FRPP
1-1/2" – 12" Combination Wyes and 1/8 Bend FRPP	1-1/2" – 12" Reducing Double 45 Wyes FRPP
1-1/2" – 12" 45 Deg Wye and Reducing WYES FRPP	



**IPEX**  
by aliaxis

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## Installation Procedures

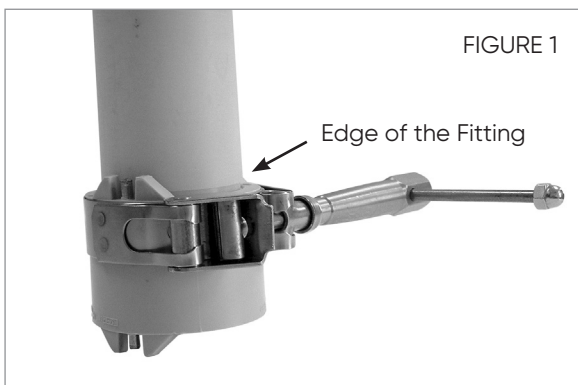
### Installation

For installation in cold weather, refer to the 'Cold Weather Fusion' procedure described later in this section.

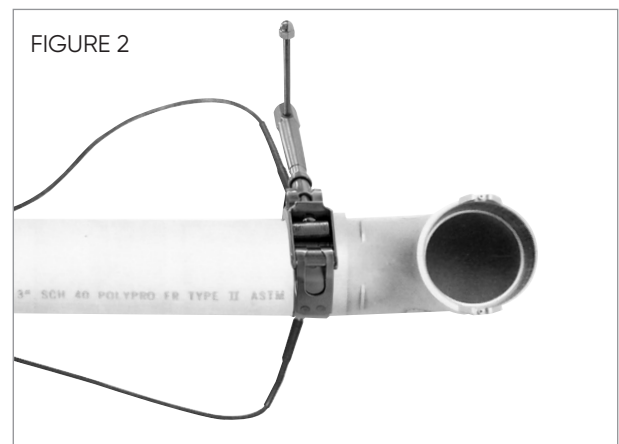
Before making the Enfield joint, it is important to check with an RMS meter, that the power source is providing between 96 and 162 volts @ 40 to 70 cycles with 11-amp capacity. The Enfusion hand held control unit provides for normal power variations, however generators should be checked to assure the correct output is always being provided.

Ensure Enfusion control unit, pipe and fittings are allowed to thermalise before beginning installation.

1. Completely unwind all cables from the Enfusion hand held machine's case before use.
2. Using a suitable mitre saw/chop saw or tube cutter designed for plastic, cut the pipe square making sure to remove all burrs and loose material. Do not chamfer.
3. Using 60-grit emery cloth, prepare the end of the pipe by removing dirt and oil (important to obtain a good bonding surface) and roughing up an area equal to 1.5 times the fitting's socket depth. Clean the roughed up area with ethyl or isopropyl alcohol to ensure complete removal of grease and residue. Once treated do not handle this area of the pipe or allow it to get dirty.
4. Insert the pipe all the way to the stop at the bottom of the socket of the fitting.
5. Decide whether single or multiple joints are being made. In case of multiple joints consult the "Multiple Joints Fusion" section that follows for cable connections and maximum allowable number of simultaneous joints.
6. Loosely fit IPEX-supplied clamp(s) only over the hub(s) of the socket(s) to be fused (Figure 1).
7. Tighten the clamp(s). A tight clamp is essential to the quality of the joint. It should not be possible to rotate the pipe inside the fitting socket when the clamp is fully tightened.
8. Turn the Enfusion hand held control unit on and observe the copyright message and the software version being displayed as the machine runs a self-diagnostic test.
9. Following the "CONNECT LEADS AND FITTINGS" instruction on the display, connect the output leads (Figure 2). If required, connect link cable for multiple fusions.



**NOTE:** The clamp should be positioned flush with the edge of the fitting. The clamp must be tightened sufficiently to prevent the pipe from rotating inside the fitting. Wheel handle clamps should not be used.



## Installation Procedures

IPEX has developed a revision to its fusion machine software. Your machine will display the software version upon start up, the most recent version being V1.19 (2014). This revision removes the need to select a size range, and automatically adjusts the fusion time based on ambient temperature. Allow time for the machine pipe and couplings to acclimatise.

### 10. With software UPDATE V1.19 (2014)

Once the leads are connected and you are ready to begin the fusion process. The machine will automatically check to ensure a connection is present and measure the ambient air temperature to set the fusion time.

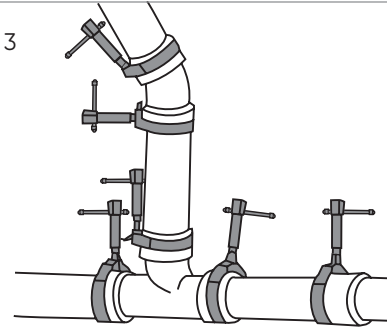
Without software UPDATE

Machines that have NOT been updated will require you to "SELECT SIZE". IPEX recommends the use of the 3" to 12" size range for all fittings regardless of size. (example: 1.5" fittings should use the 3" to 12" selection)

11. To begin the fusion cycle press START. Time will begin to count down to zero.
12. Upon completion of the fusion cycle an audible alarm will sound and the message "WELD COMPLETE DISCONNECT LEADS" will be displayed. A 30 second rest period must be observed to allow the joint(s) to cool before disconnecting the leads. The Enfusion machine will automatically reset, ready for the next operation.

13. Allow five additional minutes before removing the clamps so that the joint can sufficiently cool and properly cure.

FIGURE 3



NOTE: If leads are accidentally disconnected during the fusion process "Reconnect Lead & Press Start" will appear and a 120 second countdown will begin on the Enfusion hand held control unit. Reconnect leads and press START to continue the fusion cycle fusion.

If leads are reconnected during the countdown, the fusion machine will automatically assess how long the fusion cycle must be depending on how long the leads have been disconnected. If the leads are not reconnected during the countdown the machine will sound an audible alarm and restart the fusion cycle time. Prior to re-fusing, 1-1/2" – 3" fittings should cool for 5 minutes and 4" – 12" fittings should cool for 7 minutes. The Enfusion Control Unit should be reset by shutting it off and following instructions from step 8 onwards.



### V1.19 Enfusion Hand Held Control Unit

To obtain V1.19 on your hand held, please contact an IPEX representative.



### L2600 (Old Style Machine) Software UPDATE

This machine cannot be reprogrammed with the software update mentioned above. Due to the age of the machine and its components IPEX can no longer support updates to the machine's components or software.

Note: It is recommended that you replace these (L2600) machines with newer models. Until such time that a machine can be purchased, all joints regardless of size must be fused using the 4" size selection. Contact your local IPEX representative.

## Installation Procedures

### Cold Weather Fusion

Whenever possible pipe and fittings should be stored indoors. It is always preferable to perform pipe preparation and welding in a protected environment. However, should that not be possible, during cold weather (particularly at freezing or below) it is recommended that both pipe and fittings be stored in similar ambient temperature and conditions.

In cold weather applications, the lower operating temperature limit (0°F) of the Enfusion Hand-Held Control Unit must be strictly followed.

If ambient conditions during the installation fall below 0°F, postpone installation until ambient installation temperatures have increased to fall within the Operating Temperature Range of the Enfusion Hand-Held Control Unit.

Daily, weekly or seasonal temperature fluctuations may result in thermal expansion and/or contraction of the piping system. Refer to the System Design Considerations section of this manual for suitable techniques for accommodating thermal expansion and contraction and consult the Engineer of Record.

In addition, when the actual welding takes place in freezing or sub freezing environments, this cold weather pre fusion procedure must be followed.

**NOTE:** Enfusion Hand-Held Control Unit software update V1.19 will automatically adjust the fusion time as the ambient temperature changes. The following procedure is required for Enfusion Hand-Held Control Unit running software older than V1.19.

1. Follow steps 1 through 9 of Standard Enfield Electrofusion Installation.
2. When the "SELECT SIZE" prompt appears on the screen keep pushing the select button until all pipe sizes have been displayed.
3. Next will appear the first flash cycle: 1-1/2" to 2".
4. If the fitting(s) being welded is within this flash range, press START.
5. If the fitting(s) being welded is not included in this flash range, press the SELECT button one more time to display the second flash cycle: 3" through 12".
6. Press START.
7. Upon completion of the flash cycle, the display will show the "WELD COMPLETE DISCONNECT LEAD" message. Do not disconnect the leads.
8. Tighten clamps if necessary (see notes below).

9. Allow 1-1/2" to 3" joints to cool for 5 minutes, 4" to 8" joints to cool for 7 minutes and 10" to 12" joints to cool for 10 minutes before beginning the fusion cycle.
10. After cooling, continue with steps 10 through 14 of the Standard Enfield Electrofusion Installation procedure.

**NOTES:** Screen the joints being fused from the wind in very cold conditions to prevent heat loss.

Particular care must be taken to adequately tighten the clamps during extremely cold weather because of increased stiffness of the materials. One or two additional turns of the tightening screw might be required, above and beyond what is commonly sufficient in fair weather conditions. This is particularly true when welding large diameters.

For Enfusion Hand-Held Control units running software older than V1.19, the additional tightening of the clamps, designed to eliminate any gap between the pipe and the fitting, should be performed towards the end of the flash cycle.

However, care must be taken not to over-tighten to avoid distorting or crushing the fitting joint.

Marking of the pipe (indicating socket depth) is also recommended to assure that the pipe remains fully seated in the socket during the fusion cycle.

## Hydrostatic Testing Procedures



### WARNING

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

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



The purpose of a site pressure test is to establish that all joints have been correctly made.

Hydrostatically (water) test in accordance with local plumbing code or with authority having jurisdiction; but not exceeding a maximum of 10 ft of head pressure. After making the first 20 or 30 joints, it is highly recommended that a test be applied to ensure that the joint-making technique is satisfactory. If a leak is discovered, follow the appropriate procedure below.

Hydrostatic testing of the joints can be performed 10 minutes after the final joint has been completed. The low pressure testing procedure detailed below should be strictly followed.

1. Fully inspect the installed piping for evidence of mechanical abuse and suspect joints.
2. Split the system into convenient test sections, not exceeding 1,000 feet. The piping should be capped off with an expandable plug at the end of the pipe section to be tested.
3. Prior to starting the test in below grade applications, straight lengths of pipe should be backfilled between fittings that are tested.
4. Slowly fill the pipe section with water, taking care to evaluate all trapped air in the process. Use air release valves in any high spots in the system. Do not pressurize at this stage.
5. Leave the pipe for at least one hour to allow an equilibrium temperature to be achieved.
6. Visually check the system for leaks.
7. Pressurize the system to a suggested maximum of 10 feet of head by means of a standard 10' standing water test using a 10' vertical riser, or a low-pressure hand pump.
8. Leave the line at 10 feet of head for a period of 2 hours, during which time the water level should not change (standing water test), nor should the pressure gauge reading change (hand pump test).
9. If there is a significant drop in pressure, or extended times are required to achieve the desired pressure, either joint leakage has occurred or air is still entrapped in the line. In this event inspect for joint leaks. If none are found, check for entrapped air – these air pockets must be removed prior to continuing the test.
10. If joints are found to be leaking, the system must be fully drained and the joints repaired. Dry, or marginally fused Enfield joints can be re-fused by following steps 5 through 13 in the Standard Enfield Electrofusion Installation procedure. To remove moisture from the joint, use the drying cycle.
  - To dry the Enfield joint using the handheld Enfusion machine with software V1.19, users need to connect the leads and fittings. The machine will prompt the user to "PRESS START". The user needs to press the "SELECT" button and then "START" button immediately after. The drying cycle will appear with a 45 second count down.
  - Allow the joint to cool.
  - Now re-fuse using the correct Enfusion machine settings for the size of pipe being joined following steps 5-13 of the Standard Enfield Electrofusion Installation procedure.
  - Should any of the re-welded fitting(s) fail the second hydro-test, the leaking joint(s) can be back-welded with a hot-air gun and welding rod. Should the back-welded joint(s) fail a third hydro-test, they will need to be cut out of the system and substituted with new fittings.
  - If a joint has to be cut out and replaced, the procedure for pipe modification detailed in this manual should be strictly followed.
11. Repeat the 10 feet head test after repairing any leaking joints, following the procedure described above.

## Material Properties

Properties	Materials	
	Valve	Standards
Specific Gravity	0.94	D1505
Tensile Yield Strength @ 2"/Min.	3,400 – 4,000 psi	D638
Flexural Modulus	140,000 – 180,000 psi	D790
Hardness, Rockwell R	100	D1706
Izod Impact, Notched	> 1.0 ft. lbs/in.	D256
Coefficient of Linear Expansion	$6 \times 10^{-5}$ in/in/F	D696
Heat Deflection Temperature @ 66 psi load	180 – 220 °F	D648
Heat Deflection Temperature @ 264 psi load	130 – 180°F	D648
Water Absorption. 24 hrs.	0.02%	D570
Time of Burning (sec.)	< 5	D635
Extent of Burning (mm)	< 5	
Burning Class	V2	UL94
Maximum Smoke Density	62.0	D2843
Smoke Density Rating	40.1	
Oxygen Index %	28	D2863

## Enfield® Long Form

### General

Acid waste drain and vent system, as shown on drawings, shall be NSF listed and CSA certified Schedule 40, polypropylene as manufactured by IPEX. System to include pipe supplied in 10 ft. lengths (or 20 ft lengths if NFRPP is specified), fittings, traps and neutralization tanks from the same manufacturer. It shall also include recommended adapters to connect to other piping materials, where applicable.

### Material

Pipe shall be made from NSF listed Type 110 or 210, flame retardant polypropylene conforming to ASTM D4101, with a maximum average flame spread of zero seconds and a maximum extent of burning of 13 mm, in accordance with ASTM D635. Matched fittings shall be made from NSF listed flame retardant polypropylene with average maximum burn time of 80 seconds and maximum extent of burning of 20 mm in accordance with ASTM D635.

If NFRPP pipe is specified, it shall be made from NSF 14 listed and CSA certified Schedule 40 PP as manufactured by IPEX. Pipe shall comply with ASTM F1412 and material used shall comply with the material requirements of ASTM D4101.

### Fittings

Fittings shall be NSF listed and have an integral heavy gauge, nickel/chrome electrical resistance wire molded in place in the fitting body. Copper wire elements, loose wire or other loose joint components, are prohibited. Fittings shall be Enfield or approved equal.

### Joints

Connections between polypropylene pipe and fittings shall be made using the Enfield joint. All joints shall have a fusion cycle controlled by a microprocessor operated, waterproof, Enfuson control unit equipped with input and output voltage sensors, ambient temperature sensors to automatically adjust fusion time and audible alarms to indicate cycle interruptions and completion of the joining process. The unit shall be capable of fusing multiple joints and with a minimum capability of six 2" joints with the same fusion time as a single joint.

Connections between polypropylene and other piping materials shall be made using Enfield adapters according to manufacturer's (IPEX) recommendations. All electrofusion machines shall be third party certified by UL and CSA.

### Installation and Testing

Installation and testing shall be in accordance with the contract drawings, the manufacturer's recommendations and the local plumbing codes. Testing with compressed air is prohibited. The entire system shall be installed free of stress and in proper alignment. Horizontal supports shall provide a wide bearing area and be free of burrs or sharp edges. Support spacings shall be in accordance with the manufacturer's recommendations and local plumbing codes. Vertical piping shall have riser clamps at each floor. Pipe supports should be installed so that horizontal piping is in uniform alignment and with a uniform slope of at least 1/8" per foot, or in accordance with the local plumbing codes.

### Enfield Short Form

Acid waste drainage and vent system shall be NSF listed and CSA certified Schedule 40, flame retardant polypropylene joined by Enfield resistance wire, as manufactured by IPEX. All fittings shall have integral nickel/chrome resistance wire with no loose components. Jointing shall be controlled using a UL and CSA certified microprocessor operated Enfuson Control Unit incorporating self diagnostics and automatic audible alarms to indicate circuit defaults and joint completion, plus allow multiple jointing of fittings at the same fusion time as a single joint. Installation and testing shall be in accordance with the contract drawings, the manufacturer's recommendations and the local plumbing codes.



### About IPEX by Aliaxis

As leading suppliers of thermoplastic piping systems, IPEX by Aliaxis provides our customers with some of the largest and most comprehensive product lines. All IPEX by Aliaxis 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 by Aliaxis include:

- Electrical systems
- Telecommunications and utility piping systems
- PVC, CPVC, PP, ABS, PEX, FR-PVDF and PE pipe and fittings (1/4" to 48")
- 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

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