



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

introduction

< STANDARDS >



ASTM D 4101

IPEX's **Encase®** electrofusion-joint system is the preferred solution for virtually all underground and critical area chemical waste applications. Pipe and fittings are made from non/ flame retardant Polypropylene. **Encase®** Material used in the manufacturing of **Encase®** pipe and fittings complies with the material requirements of *ASTM D4101 Standard Specification for polypropylene for Injection and Extrusion materials.*

pipe and fitting availability

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

ENFIELD®

ELECTROFUSION ACID WASTE SYSTEM

1 1/2"- 8" Primary, 4"-12" Secondary Pipe (20' FRPP Sch. 40 & 20' NFRPP Sch. 80)

1 1/2"- 8" DOUBLE WYE SOC x SPIGOT FRPP

1 1/2"- 8" PRIMARY COUPLINGS

1 1/2"- 6" CLEANOUT ASSEMBLY FRPP

1 1/2"- 6" CLEANOUT, FRPP

1 1/2"- 8" REDUCER COUPLINGS

4" - 12" SECONDARY COUPLINGS

1 1/2" - 6" FLOOR DRAINS, SPIGOT

4" - 12" SECONDARY REPAIR COUPLINGS

1 1/2" - 6" ACCESS TEE, SOC x SPIGOT x SOC

1 1/2"- 8" 1/4 BEND SOC. X SPIGOT FRPP

1 1/2" - 8" P" TRAP FRPP

1 1/2"- 8" 1/8 BEND SOC. X SPIGOT FRPP

1 1/2"- 8" END SEALS, SOC x SPIGOT

1 1/2"- 12" ANSI 150 BOLT PATTERN BLIND FLANGES FRPP

1 1/2"- 8" COMBINATION WYE and 1/8 BEND FRPP

Note: Primary pipe sizes – 1 1/2" up to 8"
Secondary pipe sizes – 4" up to 12"



Points to Remember

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 104 and 126 volts @ 45 to 65 cycles with 16-amp capacity. The Enfusion machine provides for normal power variations, however generators should be checked to assure the correct output is being provided.

Procedure:

1. Using a tube cutter with a wheel designed for plastic (saw and miter box can also be used as an alternative), cut the **pipe square** making sure to remove all burrs and loose material. **Do not chamfer.**
2. Using 60-grit emery cloth, prepare the end of the pipe by removing dirt and oil (important to obtain a good bonding) 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.**
3. Completely unwind all cables from the Enfusion machine's frame before use.
4. Insert the pipe all the way to the stop at the bottom of the socket. If the pipe does not bottom against the pipe stop it may create excessive purge or leak paths.
5. Decide whether single or multiple joints are being made. In case of multiple joints consult the "Multiple Joints Fusion" table 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.
7. Tighten the clamp(s) until it is not possible to rotate the pipe inside the fitting. A tight clamp is essential to the quality of the fusion cycle. quality of the joint. It should not be possible.
8. Turn the Enfusion machine on and observe the copyright message being displayed as the machine runs a self- diagnostic test.
9. Following the "CONNECT OUTPUT LEAD" instruction on the display, connect the output leads (Figure 2). If required, connect link cable for multiple fusions.

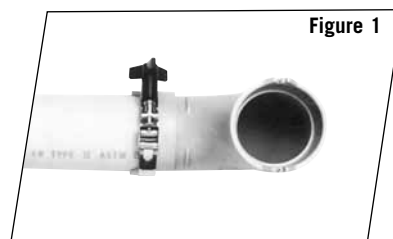


Figure 1

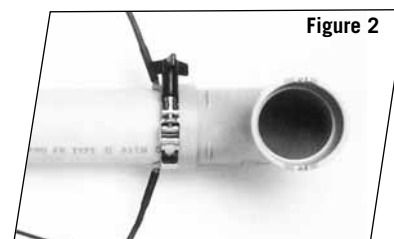


Figure 2

Note: Clamp position must be flush with the outer edge of the socket

Installation Procedures

10. Following the "SELECT PIPE SIZE" instructions on the display, select the size of the joint being fused by using the "SELECT" button (Figure 3).



Figure 3



Figure 4

This will automatically set the fusion time (Figure 4).

11. Once the correct size is displayed, press the START button. Temperature and welding time will be displayed. Time will count down to zero.
12. Upon completion of the fusion cycle an audible alarm will sound and the message "DISCONNECT INPUT LEAD" will be displayed.
13. 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.
14. Allow five additional minutes before removing the clamps so that the joint can sufficiently cool and properly cure (Figure 5).

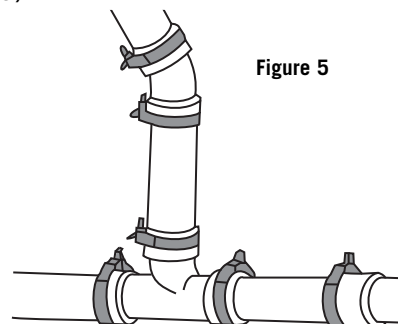


Figure 5

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

1. Follow steps 1 through 9 of Standard Enfield Electrofusion Installation.
2. When the "SELECT PIPE 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 "DISCONNECT INPUT LEAD" message. **Do not disconnect the leads.**
8. Tighten clamps if necessary (see notes below).
9. Allow the joints to cool for 5 minutes before beginning the fusion cycle.
10. After 5 minutes, 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.

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 overtighten 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.

Multiple Joint Fusion

The chart indicates the number of joints that can be fused at one time. Remember, multiple fusions can only be done with the same size fittings. Do not attempt multiple fusions of different size fittings.

	Maximum Allowable Joints Per Size							
Pipe Size (inches)	1 1/2	2	3	4	6	8	10	12
Max # of Joints	10	8	4	3	2	1	1	1

Attach the connector leads and link cable leads to fitting terminals as shown in Figure 6. The link cables should be connected in series. Follow the fusion procedure, as outlined in steps 1-14, to complete the multiple fusion.

Note: Each joint being fused must have an IPEX clamp flush with the outer edge of the socket.

In-Field Joining

The Encase system is manufactured in modular form from factory-assembled components. Minimal site fabrication is required and therefore site installation time is cut to a minimum. The only joining necessary is to fuse the primary and secondary pipe with Encase couplings. Both primary and secondary joints can be assembled in the trench, or aboveground local to the trench, depending on the site conditions. The general principles for fusing the primary and secondary Encase couplings to the Encase pipe is essentially the same as that described above – with some slight modifications in procedure. These are detailed in the following section.

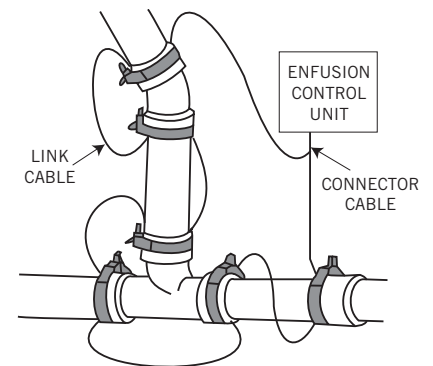
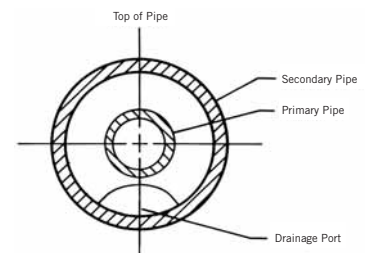


FIGURE 6

Primary Pipe Joining

Prior to commencing joining, ensure the trench has been correctly prepared to accept the Encase system. Suggested trench and bedding preparation details are shown in Section Eight of this manual under “Buried Pipe”.

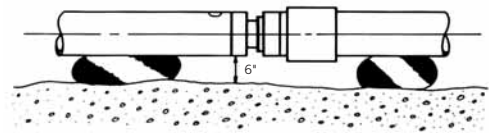
1. After preparing the trench, the Encase components should be placed in position with the pipe ends aligned for joining. Each pipe is labeled to facilitate correct alignment. Make sure there is at least 6” of clearance all around the pipe local to the joints to allow easy access.
2. It is essential that the anchor plate at each end of the pipe is positioned so that the drainage and leak detection cable port is at the bottom of the pipe.



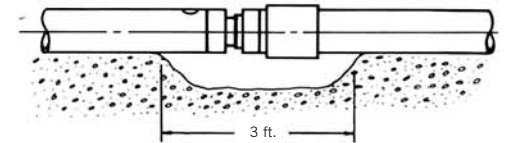
- All fittings have four access ports to allow the fittings to be installed at the desired angle. Both pipe and fittings are supplied with twine to simplify installation of leak detection cable after primary joining. Make sure the twine is placed out of the way prior to commencing work.



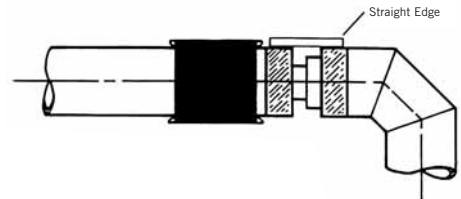
- Lay the pipe on sandbags in the trench to facilitate setting the necessary fall on the pipe run to allow free drainage as dictated by the local codes. This also allows easy access for pipe joining.



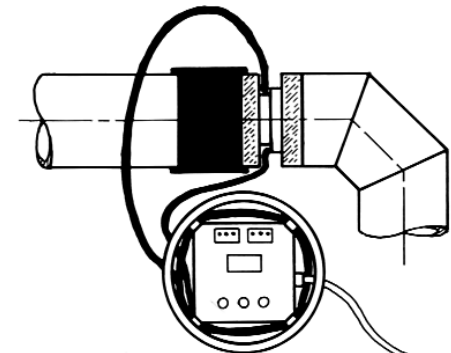
- Alternatively, the trench bed may be completely covered with sand or pea gravel. In this case, the bedding material must be removed from underneath the secondary pipe to a depth of 6" and along a length of three feet either side of the joint centerline, to allow insertion and fusion of the secondary coupling.



- Clean off the outside surfaces of both the primary and secondary pipe sections, making sure that all moisture, mud and grit is removed and that the primary coupling is also clean.
- Slide the secondary coupling over the one section of the pipe to be joined so that it is out of the way and does not interfere with the primary joining process.
- Make sure the primary joint is properly aligned before fusion. We suggest a straight edge be placed across the gap (as shown) to ensure the joint is square before joining.

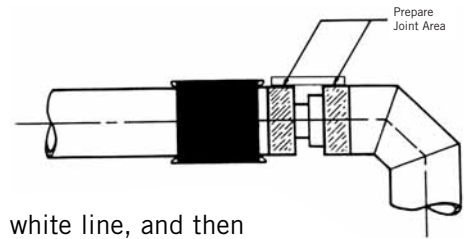


- Prepare and fuse the primary pipe in the manner outlined in the figure below.



Secondary Pipe Joining

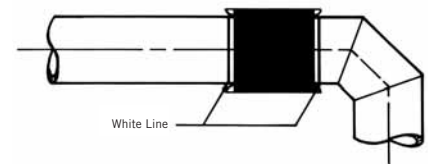
- The ends of all fittings and pipe sections are marked with a white line to show where the secondary coupling should be positioned for joining. Make sure that all dirt, oil, water and grease is removed from the area between the pipe/fitting end and the white line, and then lightly abrade the pipe surfaces with a 60-grip emery cloth.



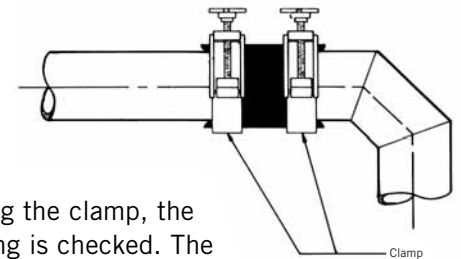
CAUTION: It is essential that the white lines are visible on either side of the coupling prior to commencing the joining operation.

Failure to position the secondary coupling centrally between the white lines may result in the fusion wires being in contact with the secondary pipe. If this happens, the wire will overheat and a poor joint will result.

- Slide the secondary coupling back over the joining area and onto the mating pipe/fitting. The coupling MUST be centrally located between the white lines of the mating components before fusing.

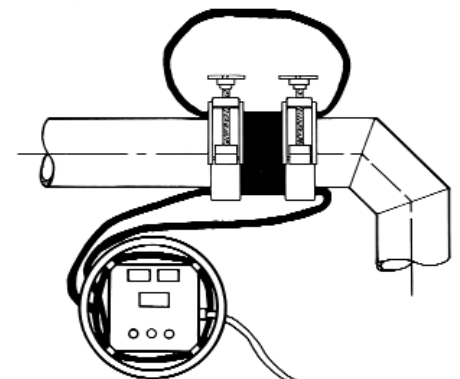


- Place one secondary clamp on the outside edge of each end of the coupling and tighten. It is usually necessary to tighten by hand followed by three or four turns of a hand wrench to fully lock the secondary coupling into position. It is essential that, after tightening the clamp, the fit of the secondary coupling onto the pipe/fitting is checked. The coupling MUST NOT move. If it does, the clamp should be tightened further until the coupling is FIRMLY LOCKED onto the pipe/fitting.



Note: Extremes in ambient temperature may result in secondary clamps bottoming out before full pressure on the coupling can be achieved. Should this occur, the clamp must be replaced. When the coupling is correctly locked in place, the clamps should still have a gap between the clamp jaws. This must be verified prior to joint fusion.

- Connect the blue Enfusion lead to the secondary coupling, select the correct fitting size and complete the Enfusion cycle as described previously in the 'Joining Procedure'.
- Leave the joint undisturbed for 10 minutes, after which time the secondary clamps can be removed and the system pressure tested according to the procedures detailed under 'Testing' at the end of this section.



The purpose of a site pressure test is to establish that all joints have been correctly made. Encase allows for the individual testing of the primary and secondary piping.

Primary Pipe

Hydrostatic testing of the primary joint can be performed ten minutes after the final primary joint has been completed. The 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 marginal, Encase joints can be simply re-fused by following the procedure detailed in this manual. Prior to re-fusing the joint, make sure the hub clamps are in position, then use the flash cycle to drive off any moisture left in the joint. Re-fuse using the correct time for the size of pipe being joined. It should not be necessary to cut out the joint, unless the joint has previously been overheated, contaminated or very badly made in the first instance. Where joints have to be cut out and replaced, the procedures for pipe modification detailed in this manual should be strictly followed.

Hydrostatic Testing Procedures

11. Repeat the 10 feet head test after repairing any leaking joints, following the procedure described above.

Secondary Pipe – Hydrostatic Testing

1. After successfully completing the primary pipe 10 foot head test, the secondary pipe can be joined and tested. Do not drain the primary pipe. Simply leave the primary pipe at a 10 foot-head hydrostatic pressure to avoid any possibility of the primary pipe collapsing due to the external load from the secondary pipe test.
2. Fill the secondary pipe with cold water and repeat steps 5 to 11 in ‘Primary Pipe’ procedure..
3. After successfully completing the secondary pipe test, leave the primary pipe full of water and under pressure. Drain the secondary pipe and purge through with low pressure, dry (-100F dewpoint), air or nitrogen to purge out all moisture from the system.

Secondary Pipe – Air Testing



WARNING

Take special care to avoid causing impact to the piping when testing the interstitial space of rigid thermoplastic systems using compressed gases. Impact to the system during air testing can cause failure which may result in injury or death.

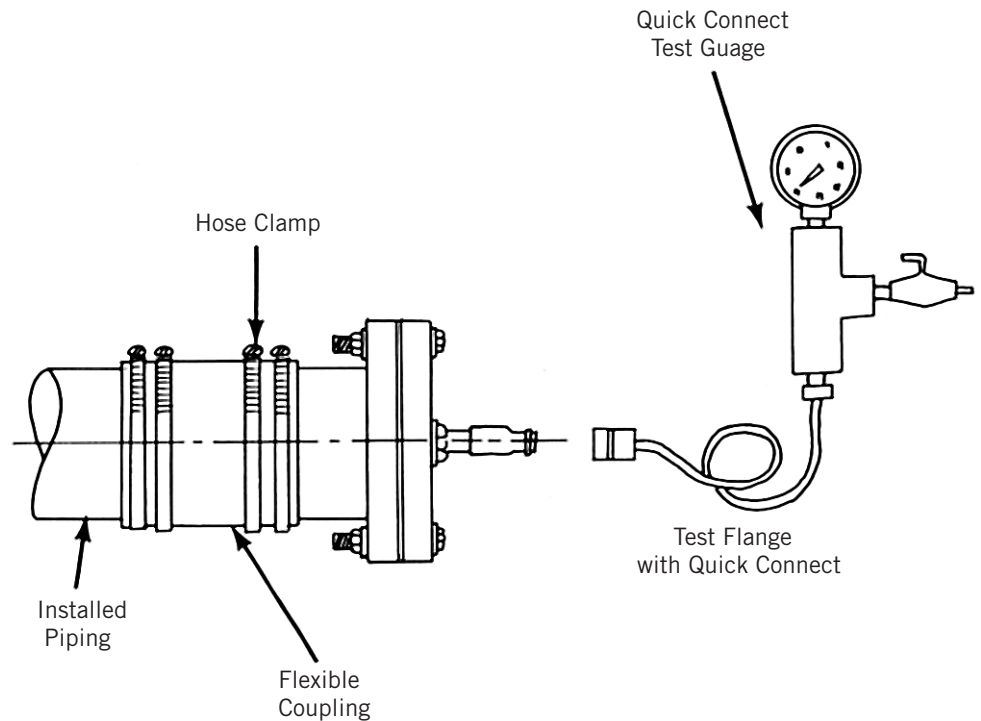
Conduct this test only when the ambient temperature is 50°F or above.

The secondary pipe should never be pressurized to any more than 5 psi when using air.



1. For cable leak detection systems, an alternative to hydrostatically testing the secondary pipe exists. This alternative testing uses dry, low pressure air, subject to the engineer and/or authority having jurisdiction.
2. Leave the primary pipe at a 10-foot head hydrostatic pressure to avoid any possibility of the primary pipe collapsing due to external load from the secondary pipe test.
3. Fill secondary pipe with air to a maximum of 5 psi for 1 hour using the Encase test cap (see below).
4. While taking great care not to impact or damage the secondary pipe, the exposed secondary joints should be wiped with an IPEX approved leak detector. In addition, check the pressure gauge to make sure that there is no pressure decay. It is essential that the system is closely monitored and that the pipe suffers no impact or other damage during the test.

Note: If the secondary system is tested using air, IPEX recommends using the Encase test cap. This test cap is designed to be used with the system and will provide safe, repeatable test results. It comes complete with air valve, quick disconnect, gage and regulator valve. These test caps are available in all secondary pipe sizes. Contact our Customer Service Department to order.



Properties	Materials	
	Valve	Standards
Specific Gravity	0.94	D1505
Tensile Yield Strength @ 2"/Min.	4400 psi	D638
Flexural Modulus	215,000 psi	D790
Hardness, Rockwell R	100	D1706
Izod Impact, Notched	1.0 ft. lbs/in.	D256
Coefficient of Linear Expansion	6×10^{-5} in/in/F	D696
Heat Deflection Temperature @ 66 psi load	220 – 240°F	D648
Heat Deflection Temperature @ 264 psi load	195°F	D648
Water Absorption. 24 hrs.	0.01%	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

