

Technical Manual

Fuseal Squared™ Double Containment Corrosive Waste Piping System



The technical information given in this publication implies no warranty of any kind and is subject to change without notice. Please consult our Terms and Conditions of Sale.

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Introduction

Product Summary

Fuseal Squared is a polypropylene double containment corrosive waste piping system. Polypropylene is a material that is known to have wide acceptance as a superior thermoplastic material for handling harsh, corrosive fluids.

Fuseal Squared

Fuseal Squared is available in sizes 1½"×4" through 8"×12" in both PPNFR for buried applications and PPFR for above-ground applications.

Fuseal Squared has chemical and physical properties that make the system ideal for handling corrosive, chemical waste solutions up to 212°F intermittently, present in laboratory and industrial DWV applications. Fuseal Squared is capable of handling a variety of mixtures of acids, bases, and solvents.

Fuseal Squared is resistant to the corrosive action of alkalis, alcohols, acids, solvents, and salt solutions. Dilute mineral acids and aqueous solutions of acid salts, which are so destructive to most metals, have no detrimental effect on the Fuseal Squared system. In general, Fuseal Squared is attacked only by strong oxidizing acids and weakened by certain organic solvents and chlorinated hydrocarbons.

Fuseal Squared will not rust, pit, scale, corrode, or be affected by electrolysis.

The following features of Fuseal Squared provide distinct advantages to system design and installation:

- Pipe and fittings are joined with our state of the art fusion technologies.
- Fast electrical connection with duplex plug.
- Fusion coil/collar is rotatable to allow exact positioning of the duplex plug.
- Ability to pressure test primary pipe and containment pipe independently.
- Primary pipe is free-floating, within the containment pipe, allowing for differential expansion.
- Can be electronically leak detected.
- Joins to the standard Fuseal II system without the need for special fittings or tools.
- Added protection with polypropylene for both the primary and containment pipe.
- All standard primary fitting joints are butt-welded and factory tested.

Specifications and Material Properties

Fuseal Squared Suggested Specification Guide

The following specification guide can be used when preparing project orders or inquiries for GF Piping Systems Fuseal Squared Double Containment Corrosive Waste Piping System.

Two forms are included:

1. a general specification form and
2. a specification short form. This system shall be considered for specification in underground applications.

General Specification

Part 1 General

Quality Assurance

The Fuseal Squared system shall be manufactured to the following ASTM standards:

- D 4101 – Standard Specification for Propylene Plastic Injection and Extrusion Materials
- D 3311 – Standard Specification for Drain, Waste, and Vent (DWV) Plastic Fittings Pattern
- D 1599 – Test Method for Short-Term Hydraulic Failure Pressure of Plastic Pipe, Tube, and Fittings
- D 2122 – Test Method of Determining Dimensions of Thermoplastic Pipe and Fittings
- F 1290 – Standard Practice for Electrofusion Joining Polyolefin Pipe and Fittings
- F 1412 – Standard Specification for Polyolefin Pipe and Fittings for Corrosive Waste Drainage Systems
- UPC 164-2001 – Standard Specification for Dual Containment Piping Systems intended to Convey Acid Waste or other Special Wastes (pending)*

Submittals

Catalog Data: Contractor shall submit _____ copies of manufacturer's literature on the Fuseal Squared system. The literature shall contain complete and current installation instructions.

Part 2 Product

Manufacturer

The corrosive drainage waste and vent system shall be Fuseal Squared (1½"×4" — 8"×12") as manufactured by GF Piping Systems.

Materials

The products described in this specification consist of:

- A. Pipe and fittings made of non-flame retardant polypropylene, joined together by electric fusion coils made of conductive-metal wire coated in polypropylene and either molded or independently fit between the fitting and pipe components. Pipe and fittings shall consist of both primary and containment components fabricated by the factory.
- B. Joining Method – The pipe and fittings are joined by use of the electric fusion coils energized by a low voltage power supply. Couplings shall be used as the standard joining connection.
- C. Basic Materials / Compounds – Fittings, pipe, centralizers, and/or other components of the corrosive waste drainage system shall be manufactured in accordance to ASTM D-4101 "Standard Specification for Propylene Plastic Injection and Extrusion Materials" from either Type I, homopolymer polypropylene or Type II, copolymer polypropylene.

Source Quality Control

- A. Pipe Dimensions – Pipe shall be produced to Schedule 40 Iron Pipe Size dimensional standards and meet ASTM F-1412 quality requirements for "Polyolefin Pipe and Fittings for Corrosive waste Drainage Systems."
- B. Fittings Design – Fittings design shall be based upon ASTM D-3311 "DWV Plastic Fitting Patterns."
- C. Electric Fusion Coils – Each coil shall consist of a polypropylene jacketed wire, mandrel wound, and heat fused on the outer surface. The coils shall be either molded into a polypropylene collar or shall be independent and loose fitting pending the size used. Both styles shall have a duplex receptacle for connection to the fusion unit.

Specification and Material Properties

- D. Pipe Markings – All pipe shall be marked with +GF+ Fuseal, pipe size, Schedule 40, PP110, ASTM F1412, UPC, date stamp, “Made in USA”; and be compatible with the coil fusion method.
- E. Fittings – Primary components shall be molded or fabricated via standard plastic injection molding, butt-fusion or electrofusion.
Secondary components shall be molded or fabricated via standard plastic injection molding, butt-fusion, manual hot air welding or electrofusion.
Custom fittings shall be allowed per engineering specification as required; however, they shall conform to the requirements of this specification.
- F. Centralizers for both pipe and fittings shall be installed onto the primary/carrier pipe and fittings (within containment pipe and fittings) at the factory. Extra centralizers are to be provided to the installer to be used in the field if required.
- G. Chemical Resistance – Fuseal Squared meets the same chemical resistance values as standard Fuseal polypropylene material. Please consult the chemical resistance chart located in the Fuseal Squared Technical Specification, Section 6.

Part 3 Execution

Installation

Fuseal Squared primary pipe (1½"—8") and fittings shall be installed according to current Fuseal Squared installation instructions. The primary piping shall be completely installed, fused, and tested prior to fusing joints on the containment piping.

Testing

Joints, 8" and smaller, may be pressure tested 10 minutes after fusing (or 30 minutes for sizes 10" and larger). Testing and testing times shall be in accordance to local plumbing codes. If local plumbing codes are not established in your area, GF Piping Systems recommends that the primary piping shall be visually inspected during a hydrostatic test of the primary system prior to being permanently covered by the containment piping. Primary piping systems shall be tested to a maximum of 30 feet of head. The containment pipe can be tested

pneumatically with a maximum 5- psi air so not to wet the interstitial space of the system, if used for leak detection purposes. All joints are to be inspected with soapy water to detect for the presence of bubbles, indicating leaks.

Short Form Specification

Product Specification for GF Piping Systems Fuseal Squared Double Containment Corrosive Waste Drainage System

Double containment acid waste drain lines shall be GF Piping Systems' Fuseal Squared, as manufactured or produced by GF Piping Systems. All Fuseal Squared fittings shall be as manufactured by GF Piping Systems so that they are compatible with Fuseal pipe. All Fuseal Squared pipe shall conform to the dimensional and quality requirements of ASTM F1412 as produced by GF Piping Systems. Pipe shall be specified as Schedule 40 non-flame retardant "black" polypropylene. The Fuseal Squared system shall be joined by the use of couplings with electrically resistant coils energized by a variable low voltage power supply. Pipe and fittings shall be manufactured from either Schedule 40 ASTM D-4101 Type I homopolymer polypropylene material or Type II copolymer polypropylene material. All Fuseal Squared fittings shall be as manufactured by GF Piping Systems so that they are compatible with Fuseal pipe. All Fuseal Squared pipe shall conform to the dimensional and quality requirements of ASTM F1412 as produced by GF Piping Systems. Pipe shall be specified as Schedule 40 non-flame retardant "black" polypropylene. The Fuseal Squared system shall be joined by the use of couplings with electrically resistant coils energized by a variable low voltage power supply. Pipe and fittings shall be manufactured from Schedule 40 ASTM D-4101 Type I homopolymer polypropylene material.

Specification and Material Properties

Material Physical Properties

Material – Group 1 63153 Homopolymer Pipe Grade

Non-flame Retardant – Group 1 Homopolymer

ASTM Test No.

| | | |
|-------|--|-------------|
| D792 | Specific Gravity @ 23°C | 0.91 |
| D638 | Tensile Yield Strength @ 2 in./min., psi | 5,000 |
| D256 | Izod Impact @ 23°C, ft.lb./in. | 2.2 |
| D747 | Stiffness-Flexural, 108 psi | 1.7 |
| D676 | Hardness, Rockwell R | 95 |
| D648 | Heat Distortion Temp. @ 66 psi, °C | 176°F, 80°C |
| C177 | Thermal Conductivity, BTU/hr.sq.ft./°F/in. | 1.3 |
| D694 | Coefficient of Linear Expansion @ -150°F (in./in. °F × 10 ⁻⁵) | 5.0 |
| D149 | Dielectric Strength, volts/mil; ST | 610 |
| | Power Factor @ 60 cps | 0.007 |
| D570 | Water Absorption in 24 hrs., % | 1.9 |
| D1693 | Environmental Stress Cracking | None |
| D4101 | Propylene Molding & Extrusion Materials | 63153 |

Fuseal Squared Installation & Engineering Data

Thermal Expansion Compensation

Temperature changes in waste systems depend on the quantity and temperature of the liquid waste discharged into the system. In general, the quantity of waste discharged through waste systems in laboratories and in educational institutions is relatively small (a few gallons at a time), while industrial laboratories and processing systems may discharge larger quantities of hot or cold water and other waste products.

Because polypropylene piping is a poor conductor of heat, low volume discharges will not raise the system to the temperature of the waste and therefore, the thermal induced length changes will be limited. High volume of wastes, which take longer to flow through the piping, will bring the system up to, or close, to the waste temperature.

Fuseal Squared, being used for buried applications, is not dramatically affected by thermal expansion for three reasons:

1. If the trench is properly backfilled, the system is considered to be totally restrained and not subject to thermally induced changes
2. buried pipe is not subject to significant changes in ambient temperatures and
3. the primary pipe is free-floating and allows for unhindered thermal expansion.

Polypropylene is not subject to stress cracking. It can be stressed for long periods of time in an unfriendly environment without damage. Polypropylene also exhibits an extremely high fatigue life. Its "self-hinge" characteristic is well documented and the piping material will withstand repeated flexures without harm.

Centralizer (Support) Spacing

| Primary Pipe Size | Sch. 40 |
|-------------------|---------|
| 1 1/2" | 4' |
| 2" | 4' |
| 3" | 5' |
| 4" | 5' |
| 6" | 5' |
| 8" | 5' |

Instructions for Buried Installation

Trenching

1. The bottom of the trench shall be of stable material. Where ground water is encountered, the bottom shall be stabilized with granular material of 1/2" maximum particle size. A 4" cushion shall be placed over rock or hardpan.
2. The trench width should be sufficient to provide working room if the pipe is to be joined in the trench. Minimum width may be used if the pipe is to be joined before placing in the ditch.
3. Trench depth – trenches under building slabs should allow for 12" cover over the pipe. Trenches in exposed locations should permit burial of the pipe at least 12" below the maximum expected frost penetration. A minimum of 24" cover should be provided where the pipe may be exposed to heavy overhead traffic. Applicable plumbing codes may require greater trench depth and cover than technically required.

Fuseal Squared Installation & Engineering Data

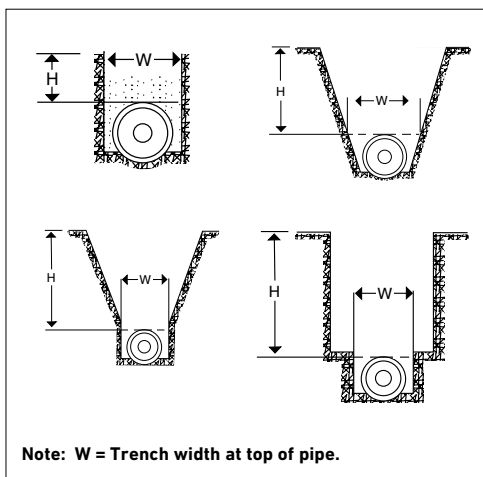
Bedding and Backfill Material

The backfill material surrounding the pipe shall be readily compactible and shall consist of coarse sand, sand with gravel or clay, sand that is free from frozen lumps, stone larger than ½" and excessive fines, silt, or clay. The material shall fall within the Highway Research Board Classification Group A-1, A-2 (plasticity index less than 10) or A-3.

Bedding and Backfilling – ASTM D 2321

1. Bedding – Install in 6" maximum layers. Level final grade by hand.
Minimum depth 4" (6" in rock cuts)
2. Haunching – Install in 6" maximum layers. Work around pipe by hand to provide uniform support.
3. Initial backfill – Install to a minimum of 6" above pipe crown.
4. Embedment Compaction – Minimum density 95% Standard Proctor per ASTM D 698. Use hand tampers or vibratory compactors.
5. Final Backfill – Compact as required by the engineer.

Trench Widths For Polypropylene



Fuseal Squared Soil Load and Pipe Resistance

| Nom. size | Wc' = Load resistance of pipe (lb./ft.) Schedule 40 pipe | | H = Height of fill above pipe (ft.) | Wc = Soil loads at various trench widths at top of pipe (lb./ft.) | | |
|-----------|---|----------|--|---|-------|-------|
| | E' = 200 | E' = 700 | | 2 ft. | 3 ft. | 4 ft. |
| 4 | 564 | 1055 | 10 | 252 | 297 | 324 |
| | | | 20 | 328 | 432 | 504 |
| | | | 30 | 342 | 493 | 603 |
| 6 | 573 | 1313 | 10 | 371 | 437 | 477 |
| | | | 20 | 484 | 636 | 742 |
| | | | 30 | 503 | 725 | 888 |
| 8 | 638 | 1612 | 10 | 483 | 569 | 621 |
| | | | 20 | 630 | 828 | 966 |
| | | | 30 | 656 | 945 | 1156 |
| 10 | 721 | 1944 | 10 | 602 | 710 | 774 |
| | | | 20 | 785 | 1032 | 1204 |
| | | | 30 | 817 | 1177 | 1405 |
| 12 | 809 | 2266 | 10 | 714 | 842 | 918 |
| | | | 20 | 931 | 1225 | 1429 |
| | | | 30 | 969 | 1397 | 1709 |

$$Wc' = \frac{\Delta x(EI + 0.061 E' r^3)80}{r^3}$$

- Wc' = Load Resistance of the Pipe, lb./ft.
 Δx = Deflection in Inches @ 5% (.05 × I.D.)
 E = Modulus of Elasticity = 2.0 × 10⁵ psi
 t = Pipe Wall Thickness, in.

- r = Mean Radius of Pipe (O.D. – t)/2
 E' = Modulus of Passive Soil Resistance, psi
 H = Height of Fill Above Top of Pipe, ft.
 I = Moment of Inertia t³/12

Fuseal Squared Installation & Engineering Data

Installation

The Fuseal electrofusion method is the only practical and reliable way Fuseal polypropylene pipe and fittings can be joined together. The Fuseal system offers consistent and reliable fusion welds on each and every joint.

Entire installations of pipe and fittings can be pre-assembled (i.e. dry fit) prior to the permanent fusion of the joints.

The Fuseal electrofusion process applies precisely the right energy, for a specified duration, to the joint to produce a completely bonded pipe and fitting.

The many advantages of the Fuseal process provide the most efficient and cost effective corrosive waste system offered on the market.

Your local GF representative will be pleased to show you how your corrosive waste system problems can be solved by the installation of a Fuseal Squared drainage system.

Note: You must be certified by authorized GF personnel on Fuseal Squared installation or the standard product warranty is void.

The Fuseal bonding process is covered by U.S. Patent Nos. 3,094,452; 3,378,672; 3,506,519 and 3,465,126 and Canadian Patent Nos. 668,419; 811,837; 837,562 and 846,954. Other U.S. and foreign patents pending. Fusion methods, which apply to Fuseal also, pertain to Fuseal Squared.

Primary Pipe Preparation and Fusion 1½"—6"

1. Remove all burrs from the primary pipe end. A 10° to 15° chamfer will ease insertion of the pipe into the coupling.

2. Using a clean, dry cloth, wipe all dirt from pipe end.

3. Vigorously **sand the outside surface of the pipe** where it enters the fitting socket.

Must use 60 grit abrasive cloth!



Fuseal Squared Installation & Engineering Data



4. Clean sanded pipe surface and inside of fitting socket with Isopropyl Alcohol (*IPA).

The alcohol concentration has to be at least 70%! Do not handle the freshly cleaned surfaces before assembling. If the fittings have become excessively dirty due to the atmosphere, collars should be carefully removed, and fittings, hub, and collar cleaned of debris and dirt. Care should be used when removing collar.

*(For proper use and safety regulations of IPA, please see supplier's Material Safety Data Sheets)

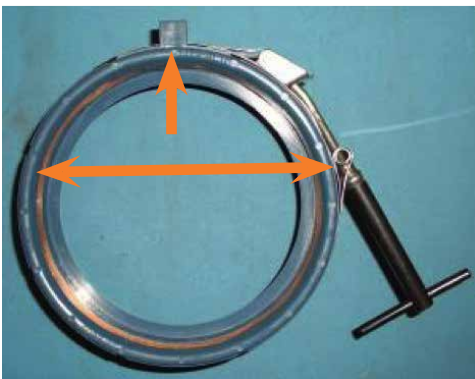


5. Mark socket depth on the pipe.

| Fitting | Socket depth | |
|---------|--------------|--------|
| 1 1/2" | 7/8" | 2.2 cm |
| 2" | 1" | 2.5 cm |
| 3" | 1 1/16" | 2.7 cm |
| 4" | 1 1/16" | 2.7 cm |
| 6" | 1 3/32" | 3.3 cm |



6. The Fuseal coil is factory assembled in the fitting socket and only requires rotating for electrical access. Rotate the band clamp to orient the ratchet closure to the right or left of the duplex receptacle.



7. For 6" joints only, fit the steel band clamp to orient the T-handle on the right or left side of the duplex receptacle.

Fuseal Squared Installation & Engineering Data



- Slide closure coupling over containment pipe.



- Insert the pipe into the fitting and push to the pipe stop. The pipe must be fully inserted into the fitting socket to the pipe stop. Rotate the collar so the socket depth mark is visible when looking at the duplex receptacle.
Check socket depth mark to be sure the pipe is fully inserted.



- Tighten the clamp until a tight mechanical interface is created between the pipe and the coupling. Proper interface will result when the coupling cannot be rotated on the pipe.

Use a channel lock #440 for 1½"–3" plastic clamps and a channel lock #460 for 4" plastic clamps.

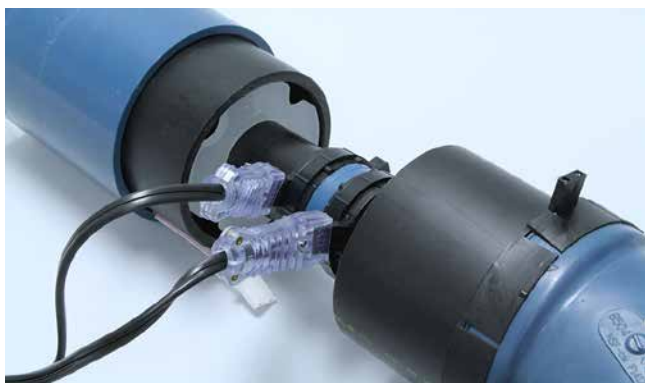


For 6" only: Tighten the steel band clamp using the T-handle. Once aligned, complete tightening as much as possible by hand with no mechanical advantage.

Fuseal Squared Installation & Engineering Data



11. Check the continuity of every fusion collar with the continuity tester before fusing. The MSA comes with a continuity tester. The Electro Plus has a built-in light on the connection plug.
A green light will indicate a good fusion collar.



12. Connect the factory-supplied fusion cables to the duplex receptacle of the fusion collars.
Check how many joints are possible per fusion cycle.



13. See the Instructions for the Electro Fusion Machine Trainings.
MSA250-SE or -EX Multi Training # 236 – MSA250
Electro Plus® Training # 236 – Electro Plus

Fuseal Squared Installation & Engineering Data



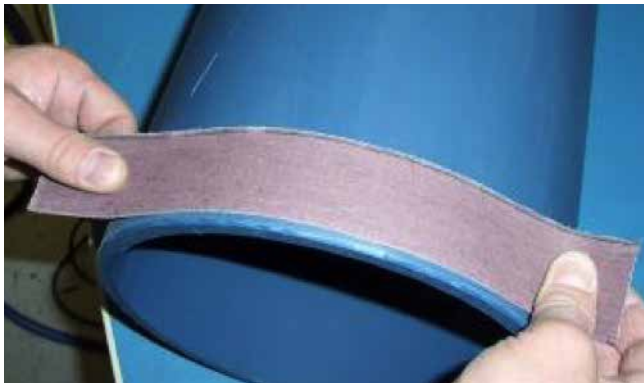
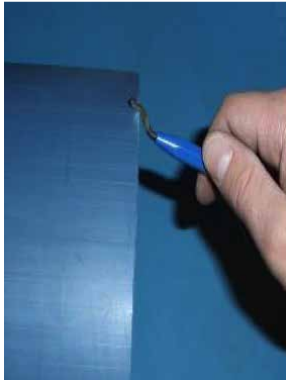
14. Tighten the band clamps within 30 seconds after the fusion cycle is finished! See page 22 for Pressure Testing Procedure.

For 1½"-4", compress the ratchet clamp closure on the band clamp; do not exceed 1 to 2 clicks. If the clamp breaks, replace immediately.



For 6" only: Tighten the steel band clamp approximately one full turn. Caution: the metal clamps can become hot! Allow the joint to cool before pressure testing.

Fuseal Squared Installation & Engineering Data



Primary Pipe Preparation and Fusion 8"

1. **Cut pipe end square with axis of pipe.** Use the GF KS 355 Pipe Cutter or a fine-tooth hand saw with miter box, a power cutoff saw with blade for plastic.
Regardless of tool, pipe needs to remain round and square.

2. Use the GF Chamfering Tool to **chamfer the pipe OD.** This will ease insertion of the pipe into the fitting socket and help prevent the fusion coil from being displaced.
Use a deburring tool to remove any burrs from the ID of the pipe.

3. Using 60 grit sand paper, **vigorously sand the outside surface of the pipe** where it enters the fitting socket.

4. Do not handle the freshly cleaned surfaces before assembling.
If the fittings have become excessively dirty due to the atmosphere, coils should be carefully removed, and fittings, hub, and coil cleaned of debris and dirt.
Care should be used when removing coil.

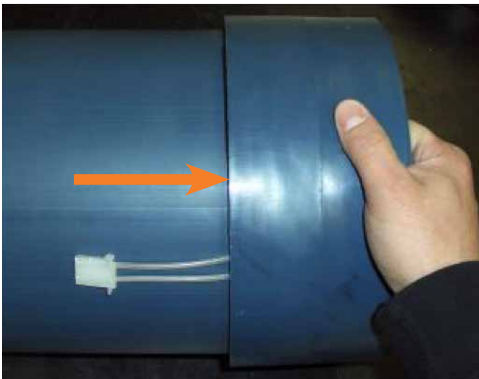
*(Before using IPA, please see supplier's MSDS)

Fuseal Squared Installation & Engineering Data



5. Mark socket depth on the pipe.

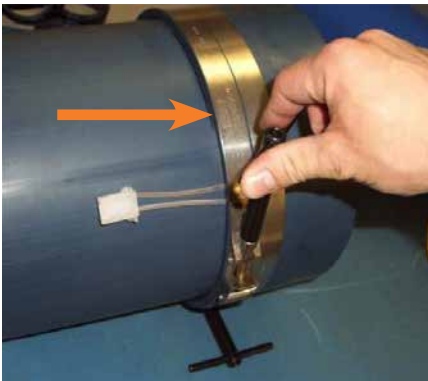
| Fitting | Socket depth | |
|---------|--------------|--------|
| 8" | 1 7/8" | 4.7 cm |
| 10" | 2 3/4" | 6.9 cm |
| 12" | 2 3/4" | 6.9 cm |



6. **Insert the pipe carefully into the fitting socket.**

Push in until pipe end bottoms out on the pipe stop in the fitting.

Check socket depth mark to be sure the pipe is fully inserted.



7. **Fit two GF metal clamps around the fitting socket, flush to the end, and at an angle of 90° to each other.** Tighten each clamp until the pipe can not be easily rotated in the fitting socket.

Note: Clamp does not prevent pipe from being pulled out during handling.



Fuseal Squared Installation & Engineering Data



- Verify continuity of every fusion coil with the continuity tester before fusing. The MSA comes with a continuity tester. The Electro Plus has a built-in light on the connection plug. A green light will indicate a good fusion collar.



- Tie a loop at the end of the fusion cables and loop it onto the T-handle of the metal clamp. Afterward, connect the cable connectors to the male plug of the fusion coils. This prevents the wires of the fusion coil from pulling out during the fusion. **Maximum 2 joints per cycle for 8", 10" & 12".**



- See the Instructions for the Electro Fusion Machine Trainings.
MSA250-SE or -EX Multi Training # 236 – MSA250
Electro Plus® Training # 236 – Electro Plus



- After the fusion cycle, tighten both the metal clamps approximately 1½ to 2 turns within 30 seconds. The metal clamps can be removed after a cooling time of 10 minutes. **Caution: the metal clamps can become hot!** Allow the joint to cool before pressure testing. See page 22 for Pressure Testing Procedure.

Fuseal Squared Installation & Engineering Data



Containment Pipe Preparation and Fusion: All Sizes

1. Remove all burrs from containment pipe end. A 10° or 15° chamfer will ease insertion of the pipe into the coupling.



2. Using a clean, dry cloth, wipe all dirt and foreign material from pipe end.



3. Vigorously **sand the outside surface of the pipe** where it enters the fitting socket.
Must use 60 grit abrasive cloth!



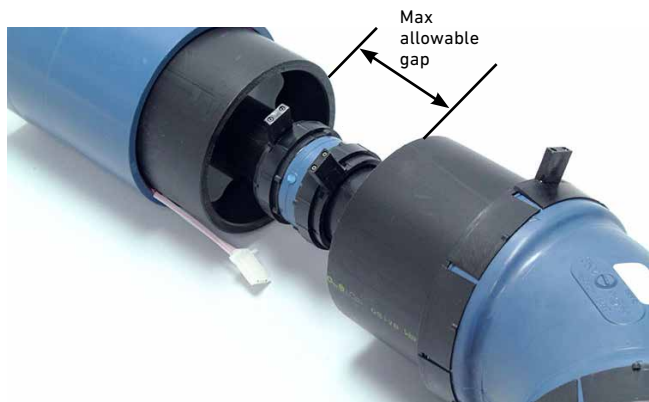
4. **Clean sanded pipe surface and inside of fitting socket with Isopropyl Alcohol (*IPA).**

The alcohol concentration has to be at least 70%!
Do not handle the freshly cleaned surfaces before assembling.

If the fittings have become excessively dirty due to the atmosphere, collars should be carefully removed, and fittings, hub, and collar cleaned of debris and dirt. Care should be used when removing collar.

*For proper use and safety regulations of IPA, please see supplier's Material Safety Data Sheets

Fuseal Squared Installation & Engineering Data



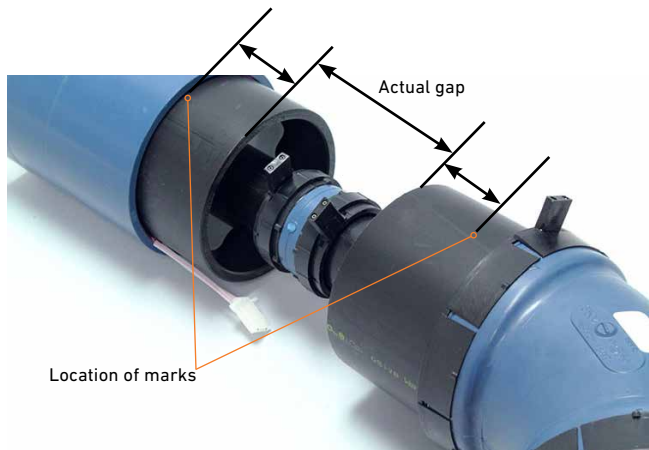
5. Use the gap table below for the maximum allowable distance in between the secondary containment pipe/fitting.

| Size (10 and 20 ft. lengths of pipe) | Max Allowable Gap [inch] |
|--------------------------------------|--------------------------|
| 1½×4 | 4 |
| 2×4 | 4 |
| 3×6 | 4½ |
| 4×8 | 4½ |
| 6×10 | 5½ |
| 8×12 | 5½ |

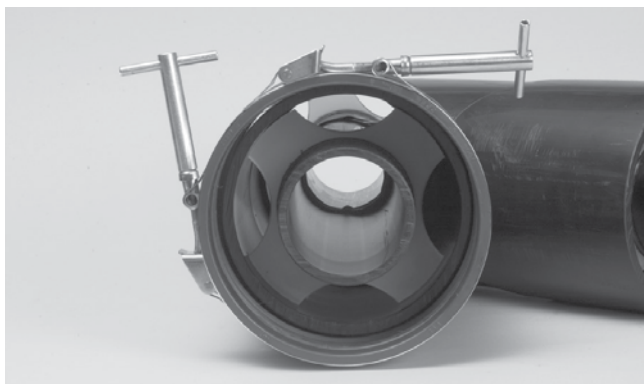
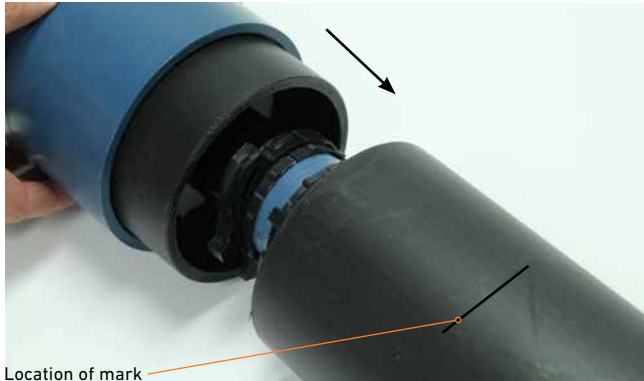


6. Slide the closure coupling into place over the exposed primary joint. Center the closure coupling and mark the containment pipe on both sides to indicate full socket depth. To determine the location to mark, use the formula below:

$$\frac{(\text{Closure coupling length} - \text{Actual gap})}{2} = \text{Location of marks}$$



Fuseal Squared Installation & Engineering Data



7. Move the coupling body toward the exposed primary joint. Center the coupling in between the two markings made on the previous step.

8. For each joint, install (4) band clamps (two on each side) with handles offset at 90°, flush to the end of the closure coupling socket. Tighten each clamp—by tightening handle as much as possible by hand with no mechanical advantage—until the containment pipe can not be easily rotated in the closure coupling socket.



9. Verify continuity of every fusion coil with the continuity tester before fusing. The MSA comes with a continuity tester. The Electro Plus has a built-in light on the connection plug. A green light will indicate a good fusion collar.

Fuseal Squared Installation & Engineering Data



10. Tie a loop at the end of the fusion cables and loop it onto the T-handle of the metal clamp. Afterward, connect the cable connectors to the male plug of the fusion coils. This prevents the wires of the fusion coil from pulling out during the fusion.

Maximum 2 joints per cycle for 8", 10" & 12".



MSA 250



Electro Plus

11. See the Instructions for the Electro Fusion Machine Trainings.

MSA250-SE or -EX Multi Training # 236 – MSA250
Electro Plus® Training # 236 – Electro Plus



12. After the fusion cycle, tighten both the metal clamps approximately 1½ to 2 turns within 30 seconds. The metal clamps can be removed after a cooling time of 10 minutes.

Caution: the metal clamps can become hot!

Allow the joint to cool before pressure testing.
See page 22 Pressure Testing Procedure.

Pressure Testing Procedure

GF Piping Systems DOES NOT RECOMMEND the use of thermoplastic piping products for systems to transport or store compressed air or gases, or the testing of thermoplastic piping systems with compressed air or gases in above or below ground locations. The use of GF piping products in compressed air or gas systems automatically voids the warranty for such products, and their use against our recommendation is entirely the responsibility and liability of the installer. GF Piping Systems will not accept responsibility for damage or impairment from its products, or other consequential or incidental damages caused by misapplication, incorrect assembly, and/or exposure to harmful substances or conditions. The **only** exception to this recommendation is when testing the Contain-It™ Secondary Containment Piping System or the Fuseal Squared™ Double Containment Piping System containment.

The final inspection for both these containment systems should be accomplished via low pressure hydrostatic test as described in the table below. The hydrostatic test pressure is dependent on the size and type of fittings used in the system. **When any of the lower rated components are used in the system, then the entire system is rated at the lower rating.**

| Size | Hydrostatic Pressure (PSI) |
|--------------------|----------------------------|
| Contain-It 4" | 75 |
| Contain-It 6" | 50 |
| Contain-It 45° Wye | 40 |
| Flexible Adapters | 5 |
| Fuseal Squared | 15 |

If you should choose not to hydrostatically test the containment system to prevent wetting the interstitial space, you can choose to test with compressed air or gas. **It is strongly urged not to exceed 5 psi of air pressure for more than 10 minutes** secondary to safety considerations.

The following is a general test procedure recommended for all GF plastic piping systems. It applies to most applications but certain applications may require additional consideration. For further questions regarding your application, please contact your GF representative.

1. All piping systems should be pressure tested prior to being put into operational service.
2. All pressure tests should be conducted in accordance with the appropriate building, plumbing, mechanical, and safety codes for the area where the system is being installed.
3. When testing DWV plastic piping systems, all tests should be conducted hydrostatically and should not exceed 30-foot of head pressure (15 psi). We recommend that in a multistory installation, each floor be individually isolated and tested. The maximum height of each floor tested should not exceed 10 feet. This process is to insure the safety of the installers and to prevent the over stressing of the system.
4. When hydrostatic pressure is introduced to the system, it should be done gradually through a low point in the piping system with care taken to eliminate any entrapped air by bleeding at high points within the system. This should be done in four stages, waiting ten minutes at each stage (adding ¼ the total desired pressure at each stage).
5. Allow one hour for system to stabilize after reaching desired pressure. After the hour, in case of pressure drop, increase pressure back to desired amount and hold for 30 minutes. If pressure drops by more than 6%, check system for leaks.

Note: If ambient temperature changes by more than 10°F (5°C) during the test, a retest may be necessary.

General Product Notes

- All containment elbows, tees, wyes, p-traps, and pipe are designed with spigot ends, with the primary extending 2" beyond the containment portion of the fitting or pipe. This allows for a minimum of 4" of primary spigot to be exposed for the joining area.
- Note: This allows the closure coupling to completely contain a primary joint.
- All centralizers are heat welded to the primary pipe and are difficult to remove. When cutting the pipe to length, care must be taken to avoid these centralizers (refer to Centralizer Support Spacing Table).
- Loose centralizers are available as needed for field modifications. Loose centralizers will require field welding to the primary pipe.
- If the system is to be cable leak-detected, rotate the primary pipe so that the centralizer opening is positioned on the bottom of the pipe, to allow for pulling of the cable.
- Increasesers are a two-part, loose assembly without spacers; molded Fuseal primary increasesers are used where available.
- **For accurate installation, it is extremely important to dry fit the primary joint first and carefully mark the pipe end and/or fitting spigot. This will indicate the correct position of the coupling and will ensure that the pipe is inserted to the required socket depth.**
- **Prior to fusing permanent joints, it is strongly recommended that the next joint be considered (i.e. careful measurement, alignment, dry fit, markings etc.).**

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