

METROPOLITAN UTILITIES DISTRICT	Construction Standard	No: 11.7.0
Prepared by: Rich Baird	Electrofusion – Couplings and Corp. Saddles for HDPE Water Pipe	Page: 1 of 14
Approved by: James Bartels		<u>Supersedes:</u> 10-3-24
		Effective: 1-10-26

The latest revisions can be found at the end of this document

I. GENERAL

This Construction Standard covers the procedures for electrofusion of couplings on HDPE water pipe and corporation saddles on 6”, 8” and 12” HDPE water pipe using the Georg Fischer Central Plastics processor and the M.T. Deason Electrofusion Processor. All electrofusion corporation saddles shall be installed by District crews or approved contractors. **Note: Before attempting coupling installation, confirm that the size of electrofusion couplings and required power are compatible with the District’s processor and generator.** District crews shall be trained and certified to install electrofusion couplings and corporation saddles by District training employees designated by the Director of Construction. Contractors shall install electrofusion fittings in accordance with this standard, by persons certified with qualifications listed in MUD 120 and/or contract specifications.

Electrofusion is a heat fusion process for joining polyethylene fittings to polyethylene pipe. Electrofusion fittings are manufactured with heating coils imbedded in the joining surfaces. During the fusion process, current flows through the coils and fuses the fittings to the pipe.

NOTE: For this Construction Standard, where specified, peeling shall be the primary method used to remove material from the pipe surface. Scraping shall ONLY be allowed with prior approval from a Construction Foreman.

II. ELECTROFUSION - COUPLINGS

A. PIPE PREPARATION

1. When installing a coupling, it is necessary for the pipe ends to have a square and even cut. This can be accomplished by various methods (e.g. a blade type of pipe cutter, a wood saw and a clamp to use as a guide, or a chain saw without bar oil for larger pipe sizes). Remove any burrs or shavings from the pipe ends.
2. Thoroughly clean all dirt, mud and other debris from pipe ends. Clean the pipe ends, inside and out including the entire area to be fused, with a clean cloth or paper towel. Clean the pipe for a length far enough beyond the area to be fused to ensure that remaining debris on the pipe surface will not be transferred to the area to be prepared during handling. Clean water can be used for initial cleaning of pipe surfaces prior to peeling. *Water cannot be used once the virgin material has been exposed.* Use of a clean, dry, non-dyed, lint-free cloth or paper towel and a **minimum 90%** concentration of isopropyl alcohol is required for cleaning once pipe has been peeled. **Do not use alcohol with any additives other than water.**



METROPOLITAN UTILITIES DISTRICT	Construction Standard	No:	11.7.0
	Electrofusion – Couplings and Corp. Saddles for HDPE Water Pipe	Page:	2 of 14
Prepared by: Rich Baird		Supersedes:	10-3-24
Approved by: James Bartels		Effective:	1-10-26

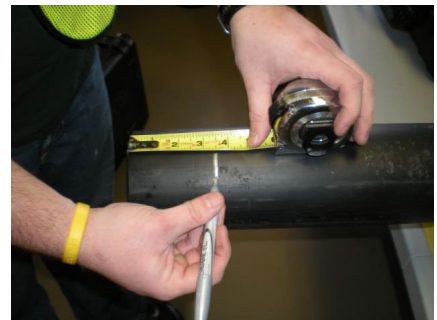
The latest revisions can be found at the end of this document

3. Check pipe for out-of-round condition. If fusion area is found to be out-of-round, take appropriate steps to bring fusion area back within required tolerances by the use of a re-rounding device.

4. When installing a coupling, measure the total length of the coupling to be installed. Make a mark with a fast-drying permanent visible marker of contrasting color to the pipe from each pipe end that is 1/2 the total length of the coupling. The marker must not contain oils or other ingredients that could accidentally contaminate a prepared pipe surface. This mark is for stab depth purposes and will ensure that the pipe ends are inserted to the center of the coupling.



5. Identify the location of the coupling to be installed on the pipe and clean the joining surface with a clean, dry, non-dyed, lint-free cloth or paper towel to remove any dirt or contaminants. With the fitting still in the bag, overlay the fitting on fusion area at the depth of area to be peeled, and mark the fusion area with the same marker used in the previous step. Make some squiggly marks over the area to be peeled and extend the marks just past the area to be peeled. After peeling, if the fusion area marks are gone, it will indicate that the minimum required area has been peeled.



6. Check the pipe surface for any embedded debris that may cause damage to peeling tools, and once more make sure that the outer pipe surface is clean and free of any dirt or mud that could re-contaminate the peeled pipe surfaces. If found, return to [Step 2](#). Check for scratches or gouges. If scratch or gouge is found and is deeper than 10% of pipe wall, repair per Construction Standard [1.2.6](#).

7. Using an approved peeling tool, peel the outside of the pipe surface just past the fusion area marks to remove oxidation and other contaminants. Peel the pipe surface until the outer layer or “skin” of the pipe has been removed. **Do not peel the pipe to round it in order to get the coupling to fit. Use clamps to re-round.** When removing the peeler, unlatch before removing. Do not slide the peeler back over peeled area. Inspect the entire peeled area to ensure total peeling coverage. Mark each pipe end again for 1/2 the total length of the coupling for stab depth purposes.



Ritmo Peeler

METROPOLITAN UTILITIES DISTRICT	Construction Standard	No:	11.7.0
Prepared by: Rich Baird	Electrofusion – Couplings and Corp. Saddles for HDPE Water Pipe	Page:	3 of 14
Approved by: James Bartels		Supersedes:	10-3-24
		Effective:	1-10-26
<i>The latest revisions can be found at the end of this document</i>			

If a coupling is to be pushed completely over one pipe end, peel the pipe end for the entire length of the coupling to prevent contamination of the coupling by sliding over un-peeled pipe.

NOTE: Do not use abrasives, grinding wheels, or other devices that do not cleanly remove the contaminated material. The purpose of peeling is to remove material from the pipe surface. Simply roughing or scraping the fusion area will not allow an acceptable bond to take place.

- Clean the peeled area thoroughly with a clean, dry, non-dyed, lint free cloth or paper towel and a **minimum 90%** concentration of isopropyl alcohol. **Do not use alcohol with any additives other than water.** Optionally, crews may wrap a peeled piece of pipe with blue cellophane while peeling the other side to prevent contamination.



CAUTION: AVOID ALL POSSIBLE RECONTAMINATION OF THE PREPARED SURFACE.

- Clean the inside surfaces of the coupling with a clean, dry, non-dyed, lint-free cloth or paper towel and a **minimum 90%** concentration of isopropyl alcohol. **Do not use alcohol with any additives other than water.** Allow all fusion surfaces to dry completely, then place the coupling on the area to be fused. Avoid touching the peeled pipe surface or the inside of the fitting as body oils and other contaminants can affect fusion joint performance. If the surfaces become contaminated, repeat the cleaning process. If necessary, restrain or support the pipe to keep the pipe and coupling straight and aligned. Ensure stab depth marks are correctly located and visible.

NOTE: If necessary, use rubber mallet (or metal hammer and wood blocks) to move coupling onto pipe. Ensure that stab depth marks are properly located and visible.



METROPOLITAN UTILITIES DISTRICT	Construction Standard	No:	11.7.0
Prepared by: Rich Baird	Electrofusion – Couplings and Corp. Saddles for HDPE Water Pipe	Page:	4 of 14
Approved by: James Bartels		<u>Supersedes:</u>	10-3-24
		Effective:	1-10-26

The latest revisions can be found at the end of this document

10. Attach processor leads to the coupling and proceed with fusion as described in [Section IV](#).



III. ELECTROFUSION SADDLES

A. PIPE PREPARATION

1. Identify the location of the saddle to be installed on the pipe and clean the joining surface with a clean cloth or paper towel to remove any dirt or contaminants. If the pipe is sweating due to temperature and humidity, wipe it dry and keep it dry using a blower from Water D. (Water Distribution Division). Wait a few hours to see if the condensation stops or use a sidewall fusion corporation saddle per C. S. [11.7.1](#).



NOTE: For 1” copper water service, install water corp. saddles at a 45° angle. For 1-1/2” and 2” water services, install the water corp. saddles at top-dead-center or at 90° from top-dead-center. Taps do not need to be staggered on HDPE pipe. Taps should be a minimum of 18” apart.

2. With the saddle still in the bag, center the saddle on fusion area and mark with a fast-drying permanent visible marker of contrasting color that does not contain oils or other ingredients that could accidentally contaminate a prepared pipe surface. Make some squiggly marks over the area to be peeled and extend the marks just past area to be peeled. After peeling, if the fusion area marks are gone it will indicate that the minimum required area has been peeled.



METROPOLITAN UTILITIES DISTRICT	Construction Standard	No:	11.7.0
Prepared by: Rich Baird	Electrofusion – Couplings and Corp. Saddles for HDPE Water Pipe	Page:	5 of 14
Approved by: James Bartels		<u>Supersedes:</u>	10-3-24
		Effective:	1-10-26

The latest revisions can be found at the end of this document

- If the pipe is out-of-round use re-rounding devices on both sides of the area to be fused before proceeding.
- Check the pipe surface for any embedded debris that may cause damage to peeling tools, making sure that the outer pipe surface is clean and free of any dirt or mud that could re-contaminate the peeled pipe surfaces. If found, return to Step 1. Check for scratches or gouges. If scratch or gouge is found and is deeper than 10% of pipe wall, repair per C.S. [1.2.6](#).
- Using an approved peeling tool, peel the outside of the pipe surface just past the marks to remove oxidation and other contaminants. Peel the pipe surface until the outer layer or “skin” of the pipe has been removed. **Do not peel the pipe to round it in order to get the coupling to fit. Use clamps to re-round.** When removing the peeler, unlatch before removing. Do not slide the peeler back over peeled area. Inspect the entire peeled area to ensure total peeling coverage.



NOTE: The purpose of peeling is to remove material from the pipe surface. Simply roughing up the fusion area will not allow an acceptable bond to take place. Do not use abrasives, grinding wheels, or other devices that do not cleanly remove the contaminated material.

- Clean the peeled area thoroughly with a clean, dry, non-dyed, lint-free cloth or paper towel and a **minimum 90%** concentration of isopropyl alcohol. **Do not use alcohol with any additives other than water.**



METROPOLITAN UTILITIES DISTRICT	Construction Standard	No:	11.7.0
	Electrofusion – Couplings and Corp. Saddles for HDPE Water Pipe	Page:	6 of 14
Prepared by: Rich Baird		Supersedes:	10-3-24
Approved by: James Bartels		Effective:	1-10-26

The latest revisions can be found at the end of this document

CAUTION: AVOID ALL POSSIBLE RECONTAMINATION OF THE PREPARED SURFACE

7. Remove the fitting from the bag. Clean the joining surface of the fitting with a clean, dry, non-dyed, lint-free cloth or paper towel and a **minimum 90%** concentration of isopropyl alcohol. **Do not use alcohol with any additives other than water.** Allow all fusion surfaces to dry completely, then place the fitting on the area to be fused. Avoid touching the peeled pipe surface or the inside of the fitting as body oils and other contaminants can affect fusion joint performance. If the surfaces become contaminated, repeat the cleaning process.



a. SADDLES FOR 6” PIPE:

- 1) Without moving the fitting, slide the Under-Clamp onto the base of the fitting.



METROPOLITAN UTILITIES DISTRICT	Construction Standard	No:	11.7.0
	Electrofusion – Couplings and Corp. Saddles for HDPE Water Pipe	Page:	7 of 14
Prepared by: Rich Baird		<u>Supersedes:</u>	10-3-24
Approved by: James Bartels		Effective:	1-10-26

The latest revisions can be found at the end of this document

- 2) Make sure the fitting is centered in the Under-Clamp and then pivot the handle into the secured position.



- 3) Attach processor leads to the fitting and proceed with fusion as described in [Section IV](#).

b. SADDLES FOR 8” AND 12” PIPE (preferred method):

- 1) Install correct fitting holder on the GF Top Load Style Clamp.
- 2) Taking care not to contaminate the peeled pipe surface, attach the GF Top Load Strap Style Clamp and fitting to the pipe and tighten the strap by hand. Begin applying pressure to the fitting by turning the knob clockwise.

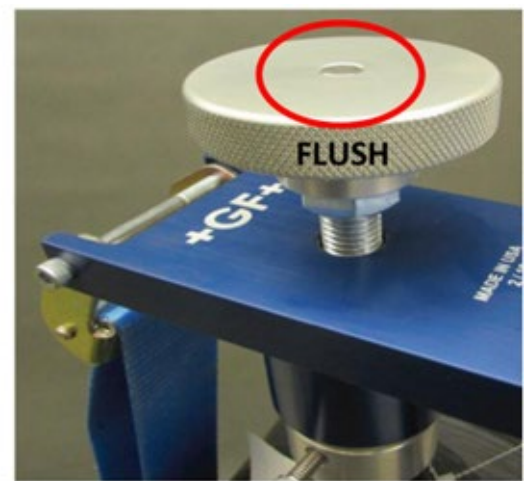
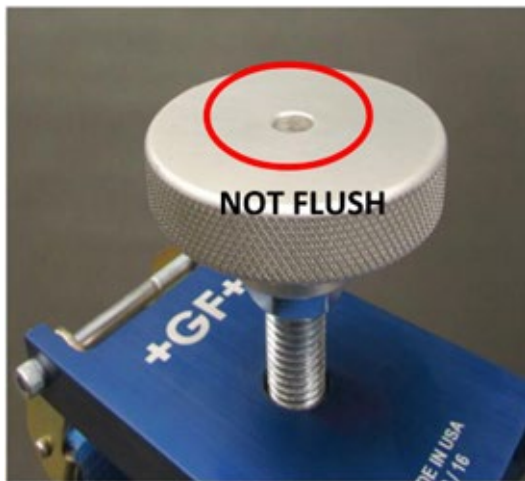


METROPOLITAN UTILITIES DISTRICT	Construction Standard	No:	11.7.0
	Electrofusion – Couplings and Corp. Saddles for HDPE Water Pipe	Page:	8 of 14
Prepared by: Rich Baird		<u>Supersedes:</u>	10-3-24
Approved by: James Bartels		Effective:	1-10-26

The latest revisions can be found at the end of this document



- 3) Tighten until the indicator post (located in the center of the knob) is flush with the top of the knob.



METROPOLITAN UTILITIES DISTRICT	Construction Standard	No:	11.7.0
Prepared by: Rich Baird	Electrofusion – Couplings and Corp. Saddles for HDPE Water Pipe	Page:	9 of 14
Approved by: James Bartels		Supersedes:	10-3-24
		Effective:	1-10-26

The latest revisions can be found at the end of this document

CAUTION: OVER/UNDER TIGHTENING COULD RESULT IN DEFECTIVE JOINTS.

IMPORTANT NOTE: Proper installation of an electrofusion side-wall fitting requires the fitting to remain secured in the clamp until the clamping time shown on the fitting label has been completed! Outlets may be prepared prior to the Tapping Tee installation or at least 10 minutes after the Tapping Tee has been fused to the pipe.

c. SADDLES FOR 8” AND 12” PIPE - ALL METAL TOP LOAD CLAMP (alternate method):

- 1) Without moving the fitting, slide the Under-Clamp onto the base of the fitting. Do not use the handle to carry or adjust the clamp position.
- 2) Taking care not to contaminate the peeled pipe surface, attach the Top Load Clamp and fitting to the pipe. Hold the fitting in place and lower the cross bar. Then lock in place.



NOTE: Clamp weight may need to be supported if fusing to areas other than the 12 o'clock position on the pipe.

- 3) Begin applying pressure to the fitting by turning the handle clockwise.
- 4) Tighten until indicator post located in the center of the handle is flush with the top of the handle.



CAUTION: OVER/UNDER TIGHTENING COULD RESULT IN DEFECTIVE JOINTS.

- 5) When utilizing the nylon straps and U-bolt, wrap nylon straps underneath the circumference of pipe and place U-bolt through the flanged outlet.
- 6) Make sure U-bolt is placed through the steel washer plate for additional strength when tightening the fitting to the main.
- 7) Tighten nuts on U-bolt until fitting is secured. Assure proper tightness has been achieved by grabbing the top of the tapping tee verifying there is no movement or gap between tapping tee and pipe.
- 8) Attach processor leads to fitting and proceed with fusion as described in [Section IV](#).

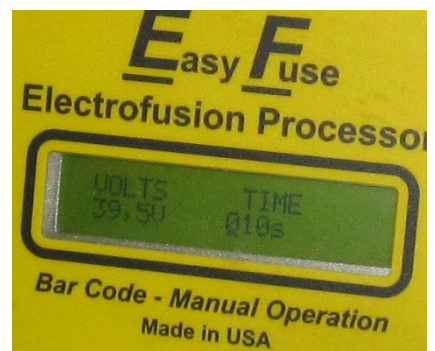
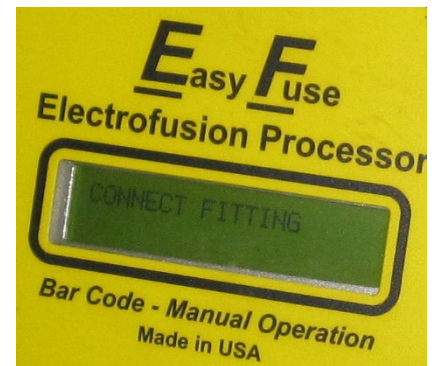
METROPOLITAN UTILITIES DISTRICT	Construction Standard	No: 11.7.0
Prepared by: Rich Baird	Electrofusion – Couplings and Corp. Saddles for HDPE Water Pipe	Page: 10 of 14
Approved by: James Bartels		Supersedes: 10-3-24
		Effective: 1-10-26

The latest revisions can be found at the end of this document

IMPORTANT NOTE: Proper installation of an electrofusion side-wall fitting requires the fitting to remain secured in the clamp until the clamping time shown on the fitting label has been completed! Outlets may be prepared prior to the Tapping Tee installation or at least 10 minutes after the Tapping Tee has been fused to the pipe.

IV. FUSION CYCLE

1. The processor should be connected to an acceptable power source such as a generator, or wall outlet. Use the M.T. Deason processor for M.T. Deason fittings and the Georg Fischer Central Plastics processor for Georg Fischer Central Plastics fittings whenever possible. It is acceptable to use the M.T. Deason processor with Georg Fischer Central Plastics fittings and vice versa, if necessary.
2. The processor will automatically run a self-diagnostic check. "Attach Fitting" will appear on the display when the diagnostic check is complete and the processor is ready for a fusion cycle.
3. Attach the leads from the processor to the fitting terminals. The processor automatically determines the fitting size by sensing its internal resistance. "Fusion Cycle Time", the count-down time, and "Press Start" will appear on the display. Verify that the "Fusion Cycle Time" on the processor matches the "Fusion Cycle Time" on the fitting.
4. Press the start button. The proper voltage range readout will be displayed, and the fusion cycle time will begin to countdown.



METROPOLITAN UTILITIES DISTRICT	Construction Standard	No:	11.7.0
Prepared by: Rich Baird	Electrofusion – Couplings and Corp. Saddles for HDPE Water Pipe	Page:	11 of 14
Approved by: James Bartels		Supersedes:	10-3-24
		Effective:	1-10-26
<i>The latest revisions can be found at the end of this document</i>			

V. RE-FUSION OF ELECTROFUSION FITTINGS (one time only)

Electrofusion fittings can be re-fused **only** in the event of an input power interruption, i.e. fusion leads were detached during fusion, generator runs out of gas, or other circumstance that results in processor *input power interruption*. The recommended procedure for re-fusing fittings is:

1. Fitting should remain in clamped position and be allowed to cool to ambient temperature.
2. The fitting should be reconnected to the processor and fused for the entire fusion time.

NOTE: This re-fusion procedure should be used for fusions that terminated due to input power reasons only. Fittings that fault for any other reason should be cut out and replaced.

NOTE: Be sure to update applicable information that has been written on the pipe per [Section VI](#).

VI. COOLING TIME

IMPORTANT NOTE: *Proper installation of the fitting requires the recommended cooling times are observed.*

1. On the pipe next to the fusion area, write down the following information using a fast-drying permanent visible marker of contrasting color to the pipe:
 - a. **Time of day fusion process is complete**
 - b. **District employee number or installer name**
 - c. **Date of fusion**
2. “Fusion Complete” and “Recommended Clamped Cooling Time” will appear on the display when the fusion cycle is complete, and the leads can be disconnected. Leave the clamps in place during "Recommended Clamped Cooling Time" displayed on processor or according to the chart below, whichever is greater. The times listed in the chart below indicate when rough handling can resume, include clamp time and are required minimums.

ELECTROFUSION FITTINGS

TOTAL COOLING TIME

4” DIPS	35 min.
6” DIPS	45 min.
8” DIPS	45 min.
12” DIPS	60 min.

3. As a safety precaution leave the bottom clamp in place on 6” water mains until the tap has been completed.

METROPOLITAN UTILITIES DISTRICT	Construction Standard	No: 11.7.0
Prepared by: Rich Baird	Electrofusion – Couplings and Corp. Saddles for HDPE Water Pipe	Page: 12 of 14
Approved by: James Bartels		Supersedes: 10-3-24
		Effective: 1-10-26
<i>The latest revisions can be found at the end of this document</i>		

- Remove the top loading clamps on 8” and 12” mains. As a safety precaution install two cinch straps between the electrofusion pins and the corporation body to hold the electrofusion saddle to the main until the tap is complete.

NOTE: If inspection reveals the fusion is not complete, do not tap the main. Abandon the fusion saddle in place but strip the threads so there won't be any attempt to use it again.

- Install corporation, pressure test, and tap according to Construction Standard [6.0.6](#).

CAUTION: When tightening the corporation, make sure a wrench is used to hold the saddle's brass insert in place and prevent it from turning. A slight turn of the brass insert is not detrimental to the saddle, but significant rotation could result in a leak.

VII. EXAMPLES OF INCORRECT ELECTROFUSION JOINTS

The most common cause of joint failure for an electrofusion fitting falls into a category of failure classified as *improper pipe preparation*. Most issues associated with improper pipe preparation can be controlled by the installer and with adherence to proper installation techniques. Improper pipe preparation is avoidable.

NO PIPE PEELING

The radial depressions are created by the wire-heating element of the fitting and indicate that the fitting achieved the proper temperature for fusion. This pipe section has many grooves and scratches from its insertion into a steel main. These defects along with the dirt that has been melted into the surface make it apparent that no peeling or other pipe preparation was done.



METROPOLITAN UTILITIES DISTRICT	Construction Standard	No: 11.7.0
Prepared by: Rich Baird	Electrofusion – Couplings and Corp. Saddles for HDPE Water Pipe	Page: 13 of 14
Approved by: James Bartels		Supersedes: 10-3-24
		Effective: 1-10-26

The latest revisions can be found at the end of this document

PIPE OVER-PEELED

The complete removal of the co-extruded stripes on this pipe indicates that more than .060 of an inch was removed from the outside diameter of the pipe. This required 12 – 15 passes with a rotary peeler. Removing this much material from the pipe creates a gap between the pipe and fitting that is too great to seal during the fusion process.



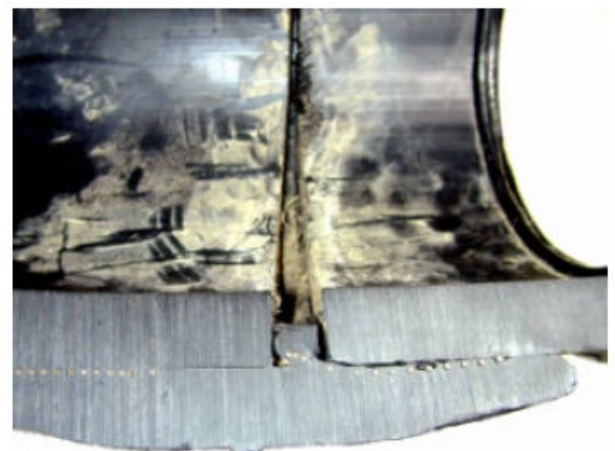
PIPE UNDER-PEELED

The visible tool marks show that some effort was made to peel the pipe. Unfortunately, there was not enough material removed to allow a proper fusion. While most of the fitting did not fuse to the pipe, a small section did. When the joint failed, the stress on the section that did fuse was too great, causing the coupling to break.



PIPE MIS-STAB

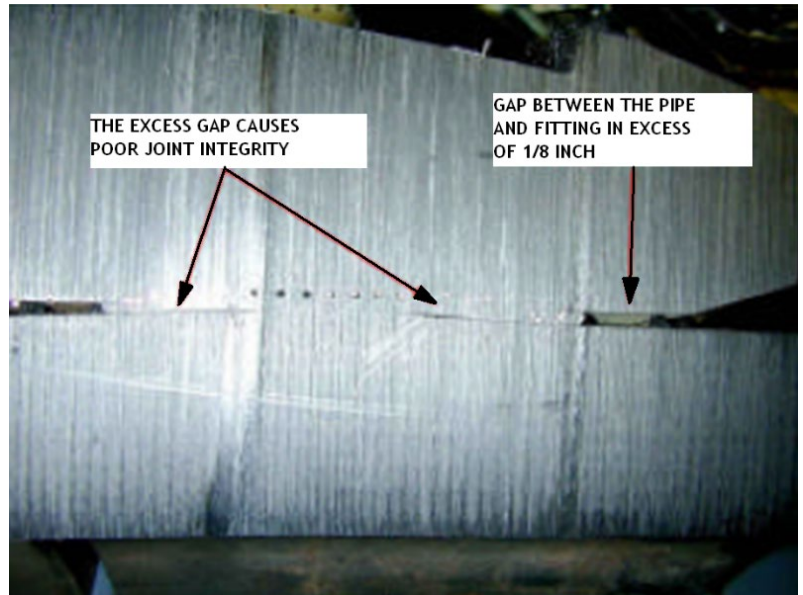
The combination of a crooked cut on the end of the pipe, and the pipe ends not being centered in the pipe, have created a condition known as a mis-stab or a short-stab. When this occurs, the pipe does not create an adequate seal in the center cold zone. This causes molten material to flow toward the center of the fitting. The loss of material and pressure at the joint interface result in poor joint integrity.



METROPOLITAN UTILITIES DISTRICT	Construction Standard	No: 11.7.0
	Electrofusion – Couplings and Corp. Saddles for HDPE Water Pipe	Page: 14 of 14
Supersedes: 10-3-24		
Effective: 1-10-26		
Prepared by: Rich Baird	The latest revisions can be found at the end of this document	
Approved by: James Bartels		

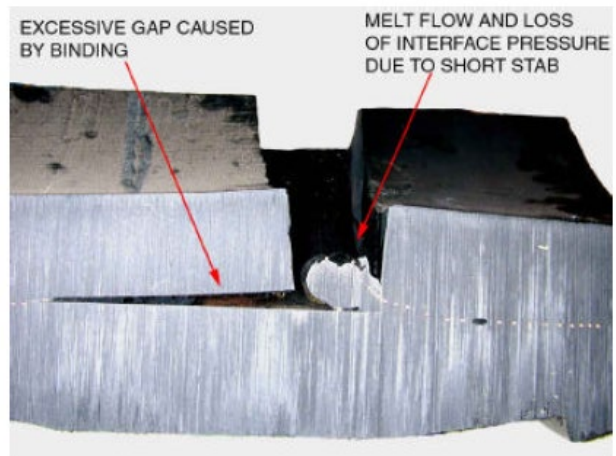
EXCESS GAP

When the gap between the pipe and fitting is excessive the expansion of molten polyethylene cannot completely fill the space for a successful fusion. This can be caused by undersized pipe, over peeling, or severely out of round pipe.



SHORT-STAB / BINDING

A short-stab is the result of not centering the pipe ends in the fitting. Binding is caused by a severe misalignment or excessive lateral forces on the joint. The result of either of these situations is excess flow of molten material, loss of pressure at the fusion interface, and poor joint integrity.



Revision

The latest revision is detailed on the following page(s).

Pages affected: #1, #2, #3, #4, #5, #6, #11
& #12

METROPOLITAN UTILITIES DISTRICT	Construction Standard	No:	11.7.0
	Electrofusion – Couplings and Corp. Saddles for HDPE Water Pipe	Page:	1 of 14
Prepared by: Rich Baird		Supersedes:	10-19-
Approved by: James Bartels		4410-2-24	
		Effective:	10-2-24

The latest revisions can be found at the end of this document

I. GENERAL

This Construction Standard covers the procedures for electrofusion of couplings on HDPE water pipe and corporation saddles on 6”, 8” and 12” HDPE water pipe using the Georg Fischer Central Plastics processor and the M.T. Deason Electrofusion Pprocessor. All electrofusion corporation saddles shall be installed by District crews or approved contractors. ***Note to District Crews: Before attempting coupling installation, confirm that the size of electrofusion couplings and required power are compatible with the District’s processor and generator.*** District crews shall be trained and certified to install electrofusion couplings and corporation saddles by District training employees designated by the Director, of Construction. Contractors shall install electrofusion ~~couplings-fittings~~ in accordance with this standard, by persons certified with qualifications listed in MUD 120 and/or contract specifications.

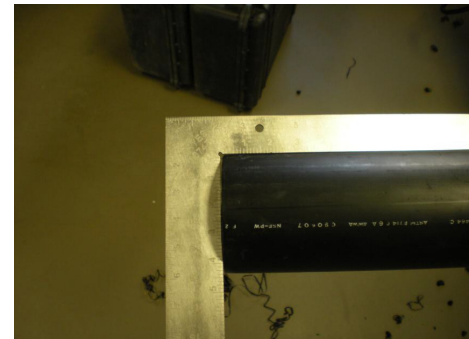
Electrofusion is a heat fusion process for joining polyethylene fittings to polyethylene pipe. Electrofusion fittings are manufactured with heating coils imbedded in the joining surfaces. During the fusion process, current flows through the coils and fuses the fittings to the pipe.

NOTE: For this Construction Standard, where specified, peeling shall be the primary method used to remove material from the pipe surface. Scraping shall ONLY be allowed with prior approval from a Construction Foreman.

II. ELECTROFUSION - COUPLINGS

A. PIPE PREPARATION

- When installing a coupling, it is necessary for the pipe ends to have a square and even cut. This can be accomplished by various methods (e.g. a blade type of pipe cutter, a wood saw and a clamp to use as a guide, or a chain saw without bar oil for larger pipe sizes). Remove any burrs or shavings from the pipe ends.
- Thoroughly clean all dirt, mud and other debris from pipe ends. Clean the pipe ends, inside and out including the entire area to be fused, with a clean, ~~dry, non-dyed, lint free~~ cloth or paper towel. Clean the pipe for a length far enough beyond the area to be fused to ensure that remaining debris on the pipe surface will not be transferred to the area to be prepared during handling. Clean water can be used for initial cleaning of pipe surfaces prior to peeling. Water cannot be used once the virgin material has been exposed. Use of a clean, dry, non-dyed, lint-free cloth or paper towel and a minimum 90% concentration of isopropyl alcohol is required for cleaning once pipe has been peeled. Do not use alcohol with any additives other than water. ~~Remove dirt, mud, and other debris from pipe ends. Clean water can be used for initial cleaning of pipe surfaces prior to peeling. Water cannot be used once the virgin material has been exposed.~~



METROPOLITAN UTILITIES DISTRICT	Construction Standard	No: 11.7.0
	Electrofusion – Couplings and Corp. Saddles for HDPE Water Pipe	Page: 2 of 14
Prepared by: Rich Baird		<u>Supersedes:</u> 10-19- 4410-2-24
Approved by: James Bartels		Effective: 10-2-24

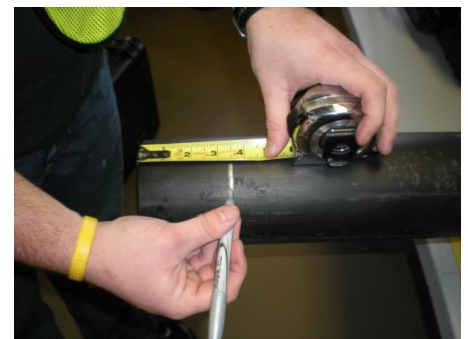
The latest revisions can be found at the end of this document

3. Check pipe for out-of-round condition. If fusion area is found to be out-of-round, take appropriate steps to bring fusion area back within required tolerances by the use of a re-rounding device.

4. When installing a coupling, measure the total length of the coupling to be installed. Make a mark with a ~~non-greasy, non-petroleum-based~~ fast-drying permanent visible marker of contrasting color to the pipe from each pipe end that is 1/2 the total length of the coupling. The marker must not contain oils or other ingredients that could accidentally contaminate a prepared pipe surface. This mark is for stab depth purposes and will ensure that the pipe ends is/are inserted to the center of the coupling.



5. Identify the location of the coupling to be installed on the pipe and clean the joining surface with a clean, dry, non-dyed, lint-free cloth or paper towel to remove any dirt or contaminants. With the fitting still in the bag, overlay the fitting on fusion area at the depth of area to be peeled, and mark the fusion area with ~~a non-greasy, non-petroleum-based marker~~ the same marker used in the previous step. Make some squiggly marks over the area to be peeled and extend the marks just past the area to be peeled. After peeling, if the fusion area marks are gone, it will indicate that the entire minimum required area has been peeled.



6. Check the pipe surface for any embedded debris that may cause damage to peeling tools, and once more make sure that the outer pipe surface is clean and free of any dirt or mud that could re-contaminate the peeled pipe surfaces. If found, return to Step 2. Check for scratches or gouges. If scratch or gouge is found and is deeper than 10% of pipe wall, repair per Construction Standard 11.5.01.2.6.

7. Using an approved peeling tool, peel the outside of the pipe surface just past the fusion area marks to remove oxidation and other contaminants. Peel the pipe surface until the outer layer or “skin” of the pipe has been removed. Do not peel the pipe to round it in order to get the coupling to fit. Use clamps to re-round. When removing the peeler, unlatch before removing. Do not slide the peeler back over peeled area. Inspect the entire peeled area to ensure total peeling coverage. Mark each pipe end again for 1/2 the total length of the coupling for stab depth purposes.



Ritmo Peeler

METROPOLITAN UTILITIES DISTRICT	Construction Standard	No:	11.7.0
	Electrofusion – Couplings and Corp. Saddles for HDPE Water Pipe	Page:	3 of 14
Prepared by: Rich Baird		Supersedes:	10-19-11
Approved by: James Bartels			10-2-24
<i>The latest revisions can be found at the end of this document</i>		Effective:	10-2-24

If a coupling is to be pushed completely over one pipe end, peel the pipe end for the entire length of the coupling to prevent contamination of the coupling by sliding over un-peeled pipe.

NOTE: Do not use abrasives, grinding wheels, or other devices that do not cleanly remove the contaminated material. The purpose of peeling is to remove material from the pipe surface. Simply roughing or scraping the fusion area will not allow an acceptable bond to take place.

- Clean the peeled area thoroughly with a clean, dry, non-dyed, lint free cloth or paper towel and a **minimum 90%** concentration of isopropyl alcohol. **Do not use alcohol with any additives other than water.** Optionally, crews may wrap a peeled piece of pipe with blue cellophane while peeling the other side to prevent contamination.



CAUTION: AVOID ALL POSSIBLE RECONTAMINATION OF THE PREPARED SURFACE.

- Clean the inside surfaces of the coupling with a clean, dry, non-dyed, lint-free cloth or paper towel and a **minimum 90%** concentration of isopropyl alcohol. **Do not use alcohol with any additives other than water.** Allow all fusion surfaces to dry completely, then place the coupling on the area to be fused. Avoid touching the peeled pipe surface or the inside of the fitting as body oils and other contaminants can affect fusion joint performance. If the surfaces become contaminated, repeat the cleaning process. If necessary, restrain or support the pipe to keep the pipe and coupling straight and aligned. Ensure stab depth marks are correctly located and visible.

NOTE: If necessary, use rubber mallet (or metal hammer and wood blocks) to move coupling onto pipe. Ensure that stab depth marks are properly located and visible.



METROPOLITAN UTILITIES DISTRICT	Construction Standard	No: 11.7.0
	Electrofusion – Couplings and Corp. Saddles for HDPE Water Pipe	Page: 4 of 14
Prepared by: Rich Baird		Supersedes: 10-19-11 10-2-24
Approved by: James Bartels		Effective: 10-2-24

The latest revisions can be found at the end of this document

~~10-10. Attach processor leads to the coupling and proceed with fusion as described for standard joining in Section IV. When the fusion cycle is complete, a recommended cooling time will appear on the display. Refer to the “Cooling Time” in Section VI for the total cooling time recommended. Write down time of day fusion is complete, not after cooling time.~~



III. ELECTROFUSION SADDLES

A. PIPE PREPARATION

1. Identify the location of the saddle to be installed on the pipe and clean the joining surface with a clean, ~~dry, non-dyed, lint free~~ cloth or paper towel to remove any dirt or contaminants. If the pipe is sweating due to temperature and humidity, wipe it dry and keep it dry using a blower from Water D. (Water Distribution Division). Wait a few hours to see if the condensation stops or use a sidewall fusion corporation saddle per ~~construction standard C.S. 11.7.1.~~



NOTE: For 1” copper water service, install water corp. saddles at a 45° angle. For 1-1/2” and 2” water services, install the water corp. saddles at top-dead-center or at 90° from top-dead-center. Taps should be a minimum of 18” apart. Taps do not need to be staggered on HDPE pipe. Taps should be a minimum of 18” apart.

2. With the saddle still in the bag, center the saddle on fusion area and mark with a fast-drying permanent visible marker of contrasting color that does not contain oils or other ingredients that could accidentally contaminate a prepared pipe surface~~non-greasy marker, non-petroleum-based marker~~. Make some squiggly marks over the area to be peeled and extend the marks just past area to be peeled. After peeling, if the fusion area marks are gone it will indicate that the ~~entire~~ minimum required area has been peeled.



METROPOLITAN UTILITIES DISTRICT	Construction Standard	No:	11.7.0
	Electrofusion – Couplings and Corp. Saddles for HDPE Water Pipe	Page:	5 of 14
Prepared by: Rich Baird		Supersedes:	10-19-44 10-2-24
Approved by: James Bartels		Effective:	10-2-24

The latest revisions can be found at the end of this document

- If the pipe is out-of-round use re-rounding devices on both sides of the area to be fused before proceeding.
- Check the pipe surface for any embedded debris that may cause damage to peeling tools, making sure that the outer pipe surface is clean and free of any dirt or mud that could re-contaminate the peeled pipe surfaces. **If found, return to Step 1.** Check for scratches or gouges. If scratch or gouge is found and is deeper than 10% of pipe wall, repair per [Construction Standard 11.5.0 C.S. 1.2.6](#).
- Using an approved peeling tool, peel the outside of the pipe surface just past the marks to remove oxidation and other contaminants. Peel the pipe surface until the outer layer or “skin” of the pipe has been removed. **Do not peel the pipe to round it in order to get the coupling to fit. Use clamps to re-round.** When removing the peeler, unlatch before removing. Do not slide the peeler back over peeled area. Inspect the entire peeled area to ensure total peeling coverage.



NOTE: The purpose of peeling is to remove material from the pipe surface. Simply roughing up the fusion area will not allow an acceptable bond to take place. Do not use abrasives, grinding wheels, or other devices that do not cleanly remove the contaminated material.

- Clean the peeled area thoroughly with a clean, dry, non-dyed, lint-free cloth or paper towel and a **minimum 90%** concentration of isopropyl alcohol. **Do not use alcohol with any additives other than water.**



METROPOLITAN UTILITIES DISTRICT	Construction Standard	No:	11.7.0
	Electrofusion – Couplings and Corp. Saddles for HDPE Water Pipe	Page:	6 of 14
Prepared by: Rich Baird		<u>Supersedes:</u>	10-19-11 10-2-24
Approved by: James Bartels		Effective:	10-2-24

The latest revisions can be found at the end of this document

CAUTION: AVOID ALL POSSIBLE RECONTAMINATION OF THE PREPARED SURFACE

7. Remove the fitting from the bag. Clean the joining surface of the fitting with a clean, dry, non-dyed, lint-free cloth or paper towel and a **minimum 90%** concentration of isopropyl alcohol. **Do not use alcohol with any additives other than water.** Allow all fusion surfaces to dry completely, then place the fitting on the area to be fused. Avoid touching the peeled pipe surface or the inside of the fitting as body oils and other contaminants can affect fusion joint performance. If the surfaces become contaminated, repeat the cleaning process.



a. SADDLES FOR 6” PIPE:

- 1) Without moving the fitting, slide the Under-Clamp onto the base of the fitting.

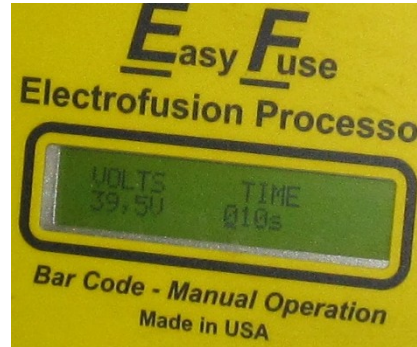


METROPOLITAN UTILITIES DISTRICT	Construction Standard	No: 11.7.0
	Electrofusion – Couplings and Corp. Saddles for HDPE Water Pipe	Page: 11 of 14
Prepared by: Rich Baird		Supersedes: 10-19-14 10-2-24
Approved by: James Bartels		Effective: 10-2-24

The latest revisions can be found at the end of this document

4. Press the start button. The proper voltage range readout will be displayed, and the fusion cycle time will begin to countdown.

~~“Fusion Complete” and “Recommended Clamped Cooling Time” will appear on the display when the fusion cycle is complete. Check total cooling time chart below.~~



5. ~~Disconnect the leads from the fitting.~~

V. RE-FUSION OF ELECTROFUSION FITTINGS (one time only)

Electrofusion fittings can be re-fused **only** in the event of an input power interruption, i.e. fusion leads were detached during fusion, generator runs out of gas, or other circumstance that results in processor *input power interruption*. The recommended procedure for re-fusing fittings is:

1. Fitting should remain in clamped position and be allowed to cool to ambient temperature.
2. The fitting should be reconnected to the processor and fused for the entire fusion time.

***NOTE:** This re-fusion procedure should be used for fusions that terminated due to input power reasons only. Fittings that fault for any other reason should be cut out and replaced.*

***NOTE:** Be sure to update applicable information that has been written on the pipe per Section VI.*

VI. COOLING TIME

***IMPORTANT NOTE:** Proper installation of the fitting requires the recommended cooling times are observed.*

1. On the pipe next to the fusion area, write down the following information using a fast-drying permanent visible marker of contrasting color to the pipe:
 - a. Time of day fusion process is complete**
 - b. District employee number or install name**
 - c. Date of fusion**

2. ~~“Fusion Complete” and “Recommended Clamped Cooling Time” will appear on the display when the fusion cycle is complete, and the leads can be disconnected.~~ Leave the clamps in place during "Recommended Clamped Cooling Time" displayed on processor or according to

METROPOLITAN UTILITIES DISTRICT	Construction Standard	No: 11.7.0
	Electrofusion – Couplings and Corp. Saddles for HDPE Water Pipe	Page: 12 of 14
Prepared by: Rich Baird		Supersedes: 10-19-11 10-2-24
Approved by: James Bartels		Effective: 10-2-24

The latest revisions can be found at the end of this document

the chart below, whichever is greater. The times listed in the chart below indicate when rough handling can resume, include clamp time and are required minimums.

~~**IMPORTANT NOTE: Proper installation of an electrofusion saddle requires the saddle to remain secured in the clamp until the clamping time shown on the saddle label has been completed.**~~

- ~~2. Write down time of day fusion is complete, not after cooling time.~~
- ~~3. Before subjecting the joint to bending, burying, pressure testing, or similar handling stress, allow the joint to cool according to the chart below. These times include clamp time.~~

ELECTROFUSION COUPLINGS FITTINGS TOTAL COOLING TIME

4” DIPS	35 min.
6” DIPS	45 min.
8” DIPS	45 min.
12” DIPS	60 min.

- ~~34. As a safety precaution leave the bottom clamp in place on 6” water mains until the tap has been completed.~~
- ~~45. Remove the top loading clamps on 8” and 12” mains. As a safety precaution install two cinch straps between the electrofusion pins and the corporation body to hold the electrofusion saddle to the main until the tap is complete.~~

~~**NOTE: If inspection reveals the fusion is not complete, do not tap the main. Abandon the fusion saddle in place but strip the threads so there won’t be any attempt to use it again.**~~

- ~~65. Install corporation, leak-pressure test, and tap according to Construction Standard 6.0.6.~~

~~**CAUTION: When tightening the corporation, make sure a wrench is used to hold the saddle’s brass insert in place and prevent it from turning. A slight turn of the brass insert is not detrimental to the saddle, but significant rotation could result in a leak.**~~

VII. EXAMPLES OF INCORRECT ELECTROFUSION JOINTS

The most common cause of joint failure for an electrofusion fitting falls into a category of failure classified as *improper pipe preparation*. Most issues associated with improper pipe preparation can be controlled by the installer and with adherence to proper installation techniques. Improper pipe preparation is avoidable.