

Butt Fusion Joints

Fusion Procedure PPI TR-33 and ASTM F2620

Iron Temperature: 400° to 450° F

- Perform initial cleaning of fusion area to remove dirt and contaminants. Use clean rags or paper towel and/or water. If using soap, remove soap from pipe with water and clean rags, wipe dry prior to using Isopropyl Alcohol Wipes.
- Place pipe ends in fusion machine and face down to stops. (facing pressure should be set as low as possible while still facing pipe, excessive pressure can damage the machine)
- Check high/low alignment, if any adjustment is made, the pipe must be re-faced. After facing, use only new, clean lint free non-synthetic cloth or paper towel to clean faced pipe areas.
- Always wipe heater plate with clean dry, lint free non-synthetic cloth or paper towel.
- Heat pipe ends to minimum temperature of 400 °F and maximum temperature of 450 °F (target 440 °F).
 - Hold to maintain **contact only** (no pressure above determined drag pressure) of pipe against the heater (mechanical: engage the locking cam).
 - Look for a uniformly sized melt bead on both pipe ends and continue heating the pipe until the melt bead size has developed against the heater face per **Table 2**.
- Remove heater, inspect melted pipe ends, (melt must be flat and smooth and free of speckled contaminated surface).
 - Butt fuse the pipe, DO NOT slam pipe together.
 - Use pressure from **Table 1** to roll melt bead over to pipe surface and then continue to apply the same pressure for the time specified under fusion cooling time under fusion pressure in **Table 2**.
 - (Mechanical) With cam lock engaged, continue to apply fusion pressure found in **Table 1** for one minute. Cam lock must remain engaged during fusion (mechanical).
 - (Hydraulic) Keep required fusion pressure found in **Table 1** on fusion for the minimum cooling time indicated in **Table 2**.
- Allow fusion to cool in the machine under fusion pressure for 11 minutes per inch of pipe wall. The minimum cool time under fusion pressure is listed on **Table 2**.
- Remove fusion from machine.
- Inspect fusion. Ensure double bead width is 2 to 2-½ times bead height and uniform all around pipe.
- Avoid pulling, installation, pressure testing and rough handling for an additional 30 minutes after fusion cooling time as indicated in **Table 2**. For ambient temperature above 100°F, additional cooling time may be required.
- Do not apply internal pressure until the joint and surrounding material have reached ambient air temperature
- Mark all fusions with fuser ID using permanent marker.**

TABLE 1 - BUTT FUSION PRESSURES (lbs./psi)

Size	SDR	1-¼"	2"	3"	4"	6"	8"	10"	12"
McElroy No. 2LC	11	-	10	-	-	-	-	-	-
McElroy No. 14	10	5	-	-	-	-	-	-	-
	11	-	10	22	-	-	-	-	-
	11.5	-	-	-	34	-	-	-	-
McElroy 28 LF **TEPA 1.66	-	-	-	-	28	-	-	-	-
	11	-	66	144	-	-	-	-	-
	11.5	-	-	-	228	495	838	-	-
McElroy 28 HF **TEPA 4.71	-	-	-	-	197	427	724	-	-
	11	-	23	51	-	-	-	-	-
	11.5	-	-	-	80	174	295	-	-
McElroy 412-618 MF **TEPA 6.01	-	-	-	-	69	151	255	-	-
	11.5	-	-	-	63	137	232	-	-
	-	-	-	-	54	118	200	311	437
McElroy 412-618 HF *TEPA 11.78	-	-	-	-	32	70	118	-	-
	11.5	-	-	-	28	60	102	159	223
	-	-	-	-	-	-	-	-	-

*Indicates sleeve pipe only.
**TEPA = Total Effective Piston Area
HF = Green Piston MF = Orange Piston LF = Yellow Piston
SDR = Standard Dimension Ratio (wall thickness)

- The gauge pressures shown above are target values based on an interfacial fusion pressure of 75 PSI.
- The fusion pressure indicated above does not include drag pressure, insure drag pressure is determined and added to pressure above prior to starting fusion process.
- During heat soak time ensure contact between pipe and heating tool; (heat pressure must be set at drag pressure to maintain pipe contact with iron, if drag pressure is determined to be zero, return carriage control to neutral position during heat soak).

TABLE 2 - BUTT FUSION APPROXIMATE MELT BEAD SIZE AND COOLING TIMES

IPS Pipe Size (Inches)	Bead Size (Inch)	Fusion Cooling Time Under Fusion Pressure (Minutes)	Rough Handling (Minutes)
1-1/4	1/16	2	30
2	1/16	3	
3	1/16	4	
4	1/8 – 3/16	5	
6	1/8 – 3/16	7	
8	3/16 – 1/4	9	
10	3/16 – 1/4	11	
12	3/16 – 1/4	13	

Saddle Fusions Using McElroy Sidewinder

Fusion Procedure PPI TR-41 and ASTM F2620

Iron Temperature: 490° to 510° F

- Wash and wipe dry fusion area to remove contaminants.
- Use 50 grit emery cloth to remove surface skin from melt areas on pipe and tee.
- Brush away any residue with clean, lint-free, non-synthetic cloth or paper towel.
- Insert tee into machine loosely and seat the fitting on the main with approx. 100 pounds-force, secure the tee in tool.
- Place heating tool on main and move the tee against heater.
- Apply bead-up pressure and start heating time, apply initial force until melt is first observed on crown of pipe then reduce pressure to zero for remainder of heat soak time.
- Mark all fusions with fuser ID using permanent marker.**

TABLE 3 - ALL TAPPING TEES

IPS Pipe Size (Inches)	Heating Time (Seconds)	Bead-up Pressure	Fusion Pressure	Cooling Time, Maintain Fusion Pressure (Minutes)
* 1-¼	*25 - 35 Sec Saddle, 15 Sec Max on Pipe	Per Fitting	Per Fitting	**5
2 - 8	25 - 35			**10
3" and larger branch saddle installed on 6" and larger main	***25 - 35			

COOL THE ASSEMBLY FOR AN ADDITIONAL 30 MINUTES BEFORE ROUGH HANDLING, BRANCH JOINING OR TAPPING THE MAIN.

*DO NOT exceed 15 seconds on 1-¼ pipe when fusing tapping tees.
**Never reduce fusion pressure during the cooling time period listed in Table 3. Reducing pressure during the first cooling period may result in blowout during hot tapping.
***Branching saddle fusion procedure.

Place the heating tool on the main centered beneath the fitting base, and then place the Flexible Heat Shield between the heating tool and the fitting, apply initial heat force until the melt is visible on the main all around the heating tool, remove heat shield, apply initial force and start time, continue heat force until bead is visible around fitting base, reduce heat force to Heat soak force.

Total Heat Time ends:

- When the Total Heating Time expires for a pressurized IPS 1-1/4 in. (42 mm) or IPS 2 in. (63 mm) main; or
- When a melt bead of about 1/16 in. is visible all around the fitting base for a IPS 1 1/4 in. or IPS 2 in. non-pressurized main, or a larger pressurized or non-pressurized main.

Socket Fusions

Fusion Procedure ASTM F2620

Iron Temperature: 490° to 510° F

TABLE 4

IPS Pipe Size (Inches)	Heating Time (Seconds)	Hold in Place (Seconds)	Rough Handling (Minutes)
½ CTS	6 - 7	60	5
¾	8 - 10		
1	10 - 12		
1-1/4	12 - 14		
2	16 - 19		
3	20 - 24		
4	24 - 29		

- Cut pipe squarely.
- Clean pipe and fitting inside and outside with clean dry lint free non-synthetic cloth (do not touch cleaned pipe with hands).
- Chamfer outside edge of pipe.
- Fix cold ring to pipe using depth gauge.
- Clean heater face with clean dry, lint free non-synthetic cloth.
- Push socket onto heater face first, (the socket must bottom out completely and be held against the surface of the heater face) then onto pipe.
- Heat for required time see **Table 4** (heating time begins when cold ring is bottomed out on heater surface and the pipe is fully inserted).
- At the end of the heating time, simultaneously remove the pipe and fitting straight out from the tool, using a snap action (**DO NOT twist pipe, iron or fitting**).
- Inspect the melt pattern on the pipe and fitting socket for 100% melt.
- Immediately (within 3 seconds) insert the pipe straight into the socket of the fitting so the cold ring is flush against the end of the fitting socket, hold or block the joint in place to cool for the time specified in **Table 4**.
- Remove cold ring after cooling time and inspect melt pattern for complete impression of cold ring in the melt surface, there shall be no gaps, voids or un-bonded areas.
- *After cold ring removal, allow fusion to cool additional 5 minutes before exposing joint to any type of stress (burial, testing, fusing)**
- Mark all fusions with fuser ID using permanent marker.**

Electrofusion (EF) Joining

Read, understand, and follow manufacturer’s electrofusion processor operating instructions.

- Perform initial cleaning of fusion area to remove dirt and contaminants. Clean water can be used for initial cleaning of pipe surfaces prior to scraping. Use isopropyl alcohol wipe after scraping.
- Ensure that the polyethylene pipe is not out-of-round before attempting electrofusion process.
- Pipe ends should be square for coupling installation, clean and scrape all pipe surfaces that will come into contact with fittings, scrape to remove all permanent marked lines.
- Using a permanent marker, mark coupling stab depth or saddle fitting area on pipe.
- Scrape the outside pipe surface to remove oxidation and contaminants (DO NOT TOUCH SCRAPED PIPE).
- Remove fitting from bag. Clean scraped fitting area on pipe and EF fitting with isopropyl alcohol wipe and allow to dry completely. If areas are touched or contaminated after cleaning, the area must be cleaned again with isopropyl alcohol wipe. (**Use only isopropyl alcohol wipes to clean fittings or scraped pipe areas**).
- Insert pipe ends to center of coupling or center the saddle fitting on scraped section of pipe.
- Clamp pipe or fitting in place.
- Turn on processor and then attach processor leads to fitting.
- Verify time on fitting to be fused.
- Electrofuse fitting following EF processor instructions.
- Remove leads and note cooling clamp removal time.
- Remove clamp after total cooling time has passed.
- Refer to Rough Handling cooling times in table below.

15. Mark all electrofusions with fuser ID using permanent marker.

TABLE 5 - CENTRAL PLASTICS EF & COOLING TIME TABLE

Extension Cord Length & Wire Gauge:

25’ = #10/3 or 50’ = #8/3

Fitting Size (Inches)	Fusion Time (Seconds)	Clamped Position (Minutes)	Pressure Test/Tap (Minutes)	Rough Handling (Minutes)
TAPPING TEE				
1-1/4	45	10	20	30
2 - 6	90	10	20	30
8	60	10	20	30
HIGH VOLUME TAPPING TEE (1-1/4 HV OUTLETS USE SOCKET FUSION ONLY)				
2	90	10	25	30
3 - 6	60	10	25	30
8	80	10	30	30
COUPLINGS				
1-1/4	75	10	20	30
2	60	10	20	30
3	180	15	30	35
4	200	15	30	35
6 - 8	500	20	40	45

Plastic Fusion

Joining PE 2406/2708 MD Plastic Pipe and Fittings

UTAH | WYOMING | IDAHO



WARNING: Federal safety regulations require persons making joints in gas systems must be qualified in the pipeline operators qualified fusion procedures (CFR 49, Part 192).

DuPont Aldyl “A” (Pink or Grayish in Color)

YES - Squeeze

Note:

- Reinforce all squeezed areas on pre-1974 Aldyl “A” DuPont pipe 1-1/4 inch and larger with reinforcement clamp.
- When cutting into Aldyl “A” pipe 1-1/4 inches and larger that was installed between 1970-1975, a minimum 6 inches of pipe shall be cut out and sent to Operations Training Department (TRN01) to determine if cracking, i.e. Low Ductile Inner Wall Cracking exists (LDIW).

YES - Mechanical Joining

YES - Electrofusion

NO - Butt Fusion, conventional Socket or Saddle fusion