

TECHNICAL NOTE PP 750-TN-07

SOCKET FUSION JOINING PROCEDURES

For DriscoPlex[®] Municipal/Industrial/Energy Piping Products

This bulletin has been developed to assist those responsible for the socket fusion joining of Performance Pipe products in municipal, industrial, gas and energy applications. For more specific fusion information and safety requirements, please refer to Performance Pipe Bulletin PP 750 “Heat Fusion Joining Procedures and Qualification Guide.” This procedure is in alignment with ASTM F2620.

OVERVIEW

In socket fusion joining the pipe end is cut squarely, cleaned, chamfered, rounded and is simultaneously melted with a heating tool along with the socket fitting. Using a snap action, the pipe and fitting are removed simultaneously. The pipe is inserted into the socket fitting and held under pressure. As the melted materials cool, they mix and fuse into a permanent, monolithic joint.

SET-UP PARAMETERS

HEATING TOOL SURFACE TEMPERATURE — MINIMUM 490°F – MAXIMUM 510°F (254 – 266°C)

Heating tool surfaces must reach the specified temperature range before you begin. This includes any and all points that will come in contact with the pipe. Heating tool surfaces must be clean to allow proper fusion.

PROCEDURE

- 1. Clean and Cut.** Clean the inside and outside of the pipe and fitting with a clean, dry, lint-free cloth or paper towel. Do not touch cleaned surface with your hands. Cut the pipe squarely.
- 2. Chamfer.** For all pipe and tubing sizes, use a chamfer tool to remove the sharp outer edge on the pipe OD. Remove all burrs from pipe ends.
- 3. Round.** Place the Depth Gauge snugly over the chamfered end of the pipe and clamp the Cold Ring Clamp on the pipe OD immediately behind the Depth Gauge. Remove the Depth Gauge.
- 4. Melt.** Verify that the heating tool is between 490°F- 510°F. Push the socket fitting onto the male socket face. **Do not twist.** The socket fitting must bottom out completely and be held against the back surface of the male heater face. Then and only then, push the pipe or tubing end into the female socket face. **Do not twist.** The Cold Ring Clamp must be completely against the female socket face and held in place. Heat the pipe end and the fitting socket for the time required in **Table 1**.
***Please note that for socket fusion joining of medium density and high density, the heating and cooling time of the high density material should be used.*
- 5. Join.** At the end of the heating time, quickly remove the pipe and fitting from the Heating Tool simultaneously using a snap action. **Do not twist.** Inspect the melt pattern on the pipe and fitting socket. Within 3 seconds after removing from the Heating Tool, firmly push the pipe end and the fitting socket straight together; **Do not twist Pipe or Fitting**, until the Cold Ring Clamp makes firm contact with the end of the fitting socket.

6. **Hold.** Hold the pipe and socket fitting firmly together until the **Table 1** cooling time has been met. **Do not twist Pipe or Fitting.** For ambient temperatures 100°F and higher, additional cooling time may be needed. Add an additional 5 minutes of cool time before exposing the joint to any type of stress.
7. **Inspect.** Remove the rounding clamp and inspect the end of the socket fitting at the pipe. There should be a clear impression of the Cold Ring Clamp into the melt ring at the end of the fitting with no visible gaps or voids around the pipe at the socket melt ring. The pipe and fitting should be aligned straight with each other. Use **Table 2** for common socket fusion problems. If flaws are observed in the joint, find the cause of the flaw and repeat the procedures to prepare a new joint.

Table 1. Socket Fusion Heating & Cooling Times

Pipe Size	PE 2406 / PE 2708		PE 3408 / PE 3608 / PE 4710	
	Heating Time, seconds	Cooling Time, seconds	Heating Time, seconds	Cooling Time, seconds
1/2" CTS	6 – 7	30	6 – 10	30
3/4" CTS	6 – 7	30	6 – 10	30
1" CTS	9 – 10	30	9 – 16	30
1-1/4" CTS	10 – 12	30	10 – 16	30
1/2" IPS	6 – 7	30	6 – 10	30
3/4" IPS	8 – 10	30	8 – 14	30
1" IPS	10 – 12	30	15 – 17	30
1-1/4" IPS	12 – 14	45	18 – 21	60
1-1/2" IPS	14 – 17	45	20 – 23	60
2" IPS	16 – 19	45	24 – 28	60
3" IPS	20 – 24	60	28 – 32	75
4" IPS	24 – 29	60	32 – 37	75

Table 2. Socket Fusion Troubleshooting Guide

Observed Condition	Possible Cause
No cold-ring impression in socket fitting melt bead	Depth gauge not used; Cold ring not used or set at incorrect depth; Insufficient heat time
Gaps or voids around pipe at socket fitting edge	Pipe or fitting not inserted or removed straight from heater face; Joining together at an angle; Twisting while joining pipe and fitting together; Cold ring not used or set too deep
Voids in fusion bond area	
Wrinkled or collapsed pipe or tubing end	Incorrect heating sequence –Push the pipe or tubing into the heater after the fitting. (Inserting the tubing first heats the tubing too long); Cold ring set too deep; Cold ring not used
Un-bonded area on pipe or tubing at end of pipe or tubing	Cold ring not used or set too deep
Socket melt extends past end of pipe or tubing	Cold ring set too shallow
Rough, sandpaper-like, bubbly, or pockmarked melt bead surface	Hydrocarbon contamination

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