Socket Fusion

Socket Fusion

This technique consists of simultaneously heating both the external surface of the pipe end and the internal surface of the socket fitting until the material reaches the recommended fusion temperature, inspecting the melt pattern, inserting the pipe end into the socket, and holding it in place until the joint cools. Figure 4 illustrates a typical socket fusion joint. Mechanical equipment is available to hold both the pipe and the fitting and should be used for sizes larger than 2" CTS to help attain the increased force required and to assist in alignment. Most pipe manufacturers have detailed written procedures to follow. The majority refer to ASTM F 2620.

Follow these general steps when performing socket fusion:

1. Thoroughly clean the end of the pipe and the matching inside surface of the fitting
2. Square and prepare the pipe end
3. Heat the parts
4. Join the parts
5. Allow to cool

Equipment Selection

Select the proper size tool faces and heat the tools to the fusion temperature recommended for the material to be joined. For many years, socket fusion tools were manufactured without benefit of any industry standardization. As a result, variances of heater and socket depths and diameters, as well as depth gauges, do exist. More recently, ASTM F1056(7) was written, establishing standard dimensions for these tools. Therefore, mixing various manufacturers' heating tools or depth gauges is not recommended unless the tools are marked "F1056," indicating compliance with the ASTM specification and, thereby, consistency of tooling sizes.

Square and Prepare Pipe

Cut the end of the pipe square. Chamfer the pipe end for sizes 1¼"-inch diameter and larger. (Chamfering of smaller pipe sizes is acceptable and sometimes specified in the instructions.) Remove scraps, burrs, shavings, oil, or dirt from the surfaces to be joined. Clamp the cold ring on the pipe at the proper position, using the integral depth gauge pins or a separate (thimble type) depth gauge. The cold ring will assist in re- rounding the pipe and provide a stopping point for proper insertion of the pipe into the heating tool and coupling during the fusion process.

Heating

Check the heater temperature. Optimal temperature is 500 degrees Fahrenheit (+ or - 10 degrees). Periodically verify the proper surface temperature using a pyrometer or other surface temperature measuring device. If temperature indicating markers are used, do not use them on a surface that will come in contact with the pipe or fitting. Bring the hot clean tool faces into contact with the outside surface of the end of the pipe and with the inside surface of the socket fitting, in accordance with pipe and fitting manufacturers' instructions.

Joining

Simultaneously remove the pipe and fitting from the tool using a quick "snap" action. Inspect the melt pattern for uniformity and immediately insert the pipe squarely and fully into the socket of the fitting until the fitting contacts the cold ring. Do not twist the pipe or fitting during or after the insertion, as is the practice with some joining methods for other pipe materials.

Cooling

Hold or block the pipe in place so that the pipe cannot come out of the joint while the mating surfaces are cooling. These cooling times are listed in the pipe or fitting manufacturer's instructions.

Heating and Cooling Times

Pipe Size	PE 2708 (Yellow)		PE 4710 (Black)	
	Heating Time	Cooling Time	Heating Time	Cooling Time
1/2" CTS	6-7 sec	30 sec	6-10 sec	30 sec
3/4" CTS	6-7 sec	30 sec	6-10 sec	30 sec
1" CTS	9-10 sec	30 sec	9-16 sec	30 sec
1 1/4" CTS	10-12 sec	30 sec	10-16 sec	30 sec
1/2" IPS	6-7 sec	30 sec	6-10 sec	30 sec
3/4" IPS	8-10 sec	30 sec	8-14 sec	30 sec
1"IPS	10-12 sec	30 sec	15-17 sec	30 sec
1 1/4" IPS	12-14 sec	45 sec	18-21 sec	60 sec
1 1/2" IPS	14-17 sec	45 sec	20-23 sec	60 sec
2" IPS	16-19 sec	45 sec	24-28 sec	60 sec
3" IPS	20-24 sec	60 sec	28-32 sec	75 sec
4" IPS	24-29 sec	60 sec	32-37 sec	75 sec

Joint Inspection

After completing the specified cooling and waiting time, remove the cold ring clamp and the socket fitting holder. Inspect the joint. A good joint will have a uniform melt ring that is flat against the socket fitting and perpendicular to the pipe. There should be no gaps, voids or unbonded areas between the fitting and the pipe.