

Socket Fusion Welding Manual
For Polypropylene & Polyethylene



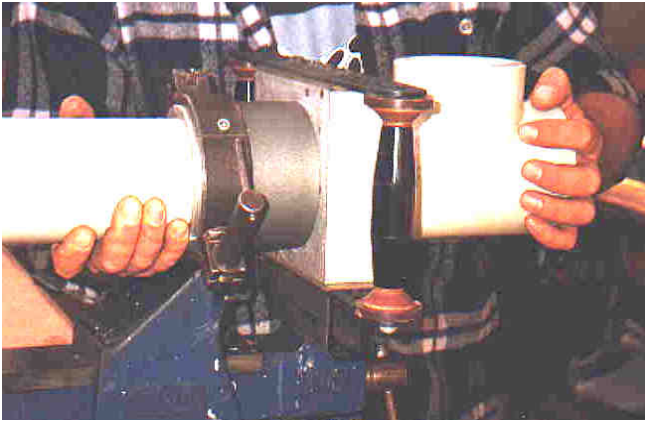
The Chemical Pipe & Vessel Company



Product: CPV Ltd

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Introduction



In this method of heat fusion jointing the pipe end and socket of the fitting are heated to fusion temperature using an electrically heated socket fusion tool with a male (spigot) block for the fitting and female (socket) block for the pipe.

The heated end of the pipe is then pushed into the heated socket of the fitting.

No additional material is used and the resulting homogeneous joint can be tested and operational when cooled to ambient temperature, i.e. 30 minutes +/-.

Polymatic Fusion Tool

Consists of an electric heating element (Fusion Tool) to which fusion tool blocks (male/female) are bolted. Male and female blocks are available to match pipe and fitting sizes in the range 20mm - 110mm and ½" - 4".

The fusion tool blocks are made of aluminium alloy with a non-stick coating. They conform to DVS 2208 Part 1

The fusion tool has an electronic control unit with a factory set temperature of 265 - 270°C. A red LED on the unit indicates when power is on and an amber LED flashes when fusion temperature is reached.

Power supply required - 230v/110v step down isolating transformer, minimum 2KVA rating. If 13 AMP BS 1363 plug top fitted, use 13 AMP fuse.



Equipment Required:

- a) Fusion tool with temperature control unit:-
- b) Single handle for sizes 20mm/ ½" - 63mm/2"
- c) Twin handle for sizes 75mm/2 ½" - 110mm/4"
- d) 110v AC power supply



- e) Alternatively a socket jointing machine may be used when there is a large number of joints to be made and for sizes 90mm - 110mm and 3"-4"
- f) Set of fusion tool blocks with non-stick surface coating
- g) Female (socket) to match pipe O.D.
- h) Male (spigot) to match I.D. of the socket of the fitting
- i) Securing bolts and Allen key Pipe cutter or fine toothed saw
- j) Safety equipment (gauntlets, protective clothing etc).

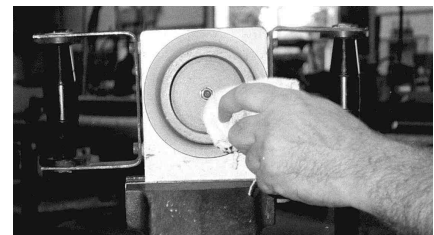


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|---|---|
| k) Pipe re-rounding clamps & Pipe depth gauges | <i>Use to ensure pipe reaches to the correct depth of the socket of the fitting</i> |
| l) Lint free cotton cloth & Cleaning fluid (MEK or similar) | <i>Use to clean the jointing surfaces of the pipe and fitting</i> |
| m) Wooden spatula | <i>To clean the heating tool ends before and after fusion jointing</i> |
| n) Electronic thermometer | <i>To check temperature of the heating tool</i> |

Making a Socket Fusion Joint

1. Secure the fusion tool in a soft jawed vice:
 - a) Single handle tool - clamp the base of the tool just above the handle
 - b) Twin handle tool - clamp the metal rails
2. Bolt the male and female blocks to the hand tool heating element using the bolts and Allen key.
3. Plug into the 110v power supply and switch on - the red LED will glow.

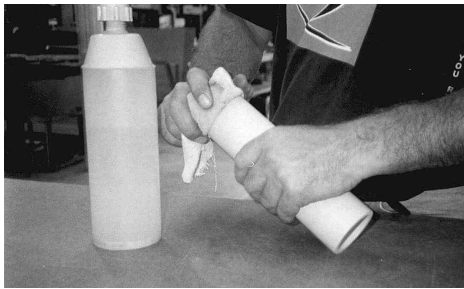
4. When hot, clean off any traces of PP/PVDF or other matter using a clean, lint-free cotton cloth, dry paper or wooden spatula.



5. Cut the pipe square using a pipe cutter or a fine toothed saw. Chamfer the end of the pipe and deburr with a sharp knife. Remove any swarf or loose material.



6. Clean the pipe and socket of the fittings with a clean lint-free cloth and cleaning fluid (MEK or similar)



CAUTION!

When pipe has been left outdoors unprotected for a long period of time a pale deposit of oxidative degradation forms on the outer surface. This must be removed with a pipe scraper **before** welding.

7. Place the depth gauge over the end of the pipe and fit the re-rounding clamp next to the end of the depth gauge. Remove the depth gauge. If no depth gauge is available use the plain depth dimensions listed in the table on page 4.5.



8. Check the temperature of the fusion blocks. After about 10 minutes (longer in cold weather) the amber LED will flash indicating that fusion temperature has been reached.

From time to time check the temperature with an electronic thermometer. Temperature should be 265° to 275°C.



9. When fusion temperature has been reached offer up the pipe to the female fusion tool block, and the fitting socket to the male fusion tool block.
10. Steadily push the pipe and fitting on to the fusion tool blocks without twisting, until full depth has been reached. The pipe and fitting should remain in contact with the fusion tool blocks for the heating times shown in the table on page 4.5. The essential requirement for a good socket fusion joint is a uniform surface melt on the pipe and inside the socket of the fitting. A useful indication of this is the appearance of a 1mm - 2mm bead on the pipe at the mouth of the female heating tool block.



CAUTION!

Pipe and fittings will usually have a slight interference fit with the fusion tool blocks. However, when the pipe and fitting are at extremes of tolerance there could be a small clearance and in this situation the heating time needs to be increased and started when the pipe and socket of the fitting have swelled to just contact the fusion tool blocks.

11. At the end of the heating time (when the 1mm - 2mm bead has formed) withdraw the pipe and fitting from the fusion tool blocks and immediately, without twisting, push the pipe into the socket of the fitting until the pipe re-rounding clamp meets the face of the fitting and correct depth has been achieved

12. The completed joint must be held securely for about 30 seconds or until sufficient bond has been achieved to prevent the fitting sliding off the pipe. The joint must be allowed to cool (see cooling times in table) before subjecting the joint to undue strain, i.e. moving jointed lengths.



13. Remove the re-rounding clamp from the pipe and clean off any residual materials from the fusion tool blocks using the spatula or dry paper/clean cloth.
14. Wait for 30 minutes or until the joint has completely cooled to the ambient temperature before applying working or test pressure

Socket Fusion Heating and Cooling Times

Pipe OD	Pipe Insertion Depth (into fitting)	PP			PVDF		
		Min. Wall (mm)	Heating Time (secs)	Cooling Time (mins)	Min. Wall (mm)	Heating Time (secs)	Cooling Time (mins)
16	13	2.0	5	2	1.5	4	2
20	13	2.5	5	2	1.9	6	2
25	15	2.7	7	2	1.9	8	2
32	17	3.0	8	4	2.4	10	4
40	19	3.7	12	4	2.4	12	4
50	22	4.6	18	4	3.0	18	4
63	25	3.6	24	6	3.0	20	6
75	29	4.3	30	6	3.6	22	6
90	33	5.1	40	6	4.3	25	6
110	39	6.3	50	8	5.3	30	8

Pipe n.b.	Pipe Insertion Depth (into fitting)	Min. Wall (mm)	Heating Time (secs)	Cooling Time (mins)
½"	15	2.9	15	2
¾"	18	3.6	15	2
1"	20	3.7	15	2
1¼"	21	4.6	15	4
1½"	23	4.1	18	4
2"	26	3.5	18	4
3"	35	5.2	30	6
4"	42	6.6	35	8

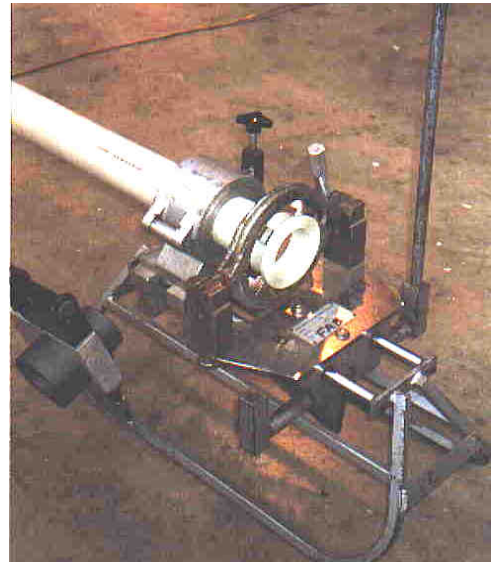
Universal Socket Jointing Machine

Application and Range

The Universal Socket Joining Machine is a mechanical aid for socket fusion of pipe and fittings including tees and elbows etc. The machine will accept fittings of the same nominal size from all major manufacturers without the need for separate liners.

Description

The machine consists of a pipe clamp and floating fittings holder mounted on two sliding bases which are linked together by a system of pivot arms. The fittings holder consists of a steel clamp carrying four knife edge shoes to give maximum grip with minimum fitting distortion.



Operation

The main feature of the Universal Socket Joining Machine is its ease of use. Setting up the machine is carried out in two distinct operations. Firstly the fitting is clamped in the holder, square to the face of the pipe clamp. The complete fitting holder clamp is then floated until it centres on the aluminium mandrel held in the pipe clamp. It is then locked in place, guaranteeing exact alignment with the pipe to be joined.

Illustrated operating instructions are supplied with every machine

For more information of this equipment please consult our sales office.

Socket Fusion Method – Trouble Shooting

FAULT	REASON	CURE
Excessive flash in bore of joint	(a) Pipe & fitting left too long on fusion tool	Rectify accordingly
	(b) Excessive force applied when inserting pipe into fitting	Ensure pipe meets land of socket without further pressure
Excessive flash in one side of joint	(a) Pipe not cut square	Rectify accordingly
	(b) Pipe not inserted squarely into fitting	Rectify accordingly
Leaking joint	(a) Sized ends damaged or not bolted tightly together	Check that faces of Head and Sized Ends are not damaged and are bolted tightly together. Damaged Sized Ends should be replaced
	(b) Fusion weld too cold	Ensure tool is up to temperature before welding
	(c) Pipe & Fitting not left long enough on tool	Rectify accordingly
	(d) Pipe & fitting not joined together immediately after taking off tool	Rectify accordingly
	(e) Sized ends dirty	Clean tool after every joint

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