



## Electrofusion Welding Procedures

### IMPORTANT:

- Plasson fittings are packaged in a protective plastic bag and should remain packaged and stored out of direct sunlight until ready for use. This plastic bag can be used to hold the fitting during installation to prevent contamination.
- Avoid any possible recontamination of the prepared surfaces. Do not touch the inside of fittings or scraped pipe surfaces with your hands. Use a shelter in wet/windy conditions to avoid water/dust contamination.
- Hands must be cleaned with wipes to avoid contamination or wear disposable gloves
- To clean dirty scraped pipes or fittings remove excess dirt with a clean cloth. Thoroughly clean with Plasson Pipewipes. Must be dry before welding.
- **KEEP WELDING TERMINALS CLEAN - NEVER DROP WELD TIPS IN THE DIRT**

### THE BASICS OF THE ELECTROFUSION WELDING PROCESS:

- Clean pipes
- Scrape/peel pipes
- Clean pipes
- Clamp pipes and fittings
- Weld
- Cool in the clamped position

### IN ALL CASES:

- Follow the detailed Instructions and be qualified and trained in Electrofusion welding procedures.
- Refer [www.pipa.com.au](http://www.pipa.com.au) - Industry Guidelines POP001. for Plastic Industry recommended procedures.
- Detailed demonstration video available from Plasson Australia

### CAUTION:

Plasson Automatic Electrofusion is to be operated in a gas-free environment only and away from any flammable materials. Since Plasson Automatic Electrofusion is an electronic device, the possibility of ignition during the joining process does exist. If users choose to use Plasson Automatic Electrofusion in a gaseous environment, they do so at their own risk.

### NOTE:

15A Earth pin is fitted to all plugs. If used with other fittings, check with fittings supplied for earth requirements - the power consumption of the fitting should not exceed 2400w (eg; 60 amps @ 40V output).

### For more information

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### Safety: Know Your Pipes

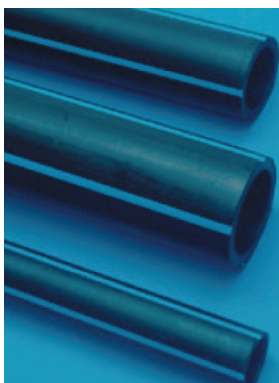
Polyethylene pipes manufactured to Australian Standard AS/NZ 4130 can be manufactured from either PE63, PE80 or PE100 materials. When pipes are made to the same dimensions but from different rated materials, they have different pressure ratings. The relationship between SDR, Pressure Rating (PN) and the PE Pipe material Classification is shown in **Table1**.

#### Pipe Reversion

Check pipe diameter with pi tape to ensure the minimum OD complies with AS/NZS 4130 at 5% of diameter back from pipe end.

**Table1.** Comparison of SDR & Pressure Ratings for PE80 & PE100 Materials for Series 1 pipes

Material	SDR41	SDR33	SDR26	SDR21	SDR17	SDR13.6	SDR11	SDR9	SDR7.4
PE80	PN 3.2	PN 4	-	PN 6.3	PN 8	PN 10	PN 12.5	PN 16	-
PE100	PN 4	-	PN 6.3	PN 8	PN 10	PN 12.5	PN 16	PN 20	PN 25
SDR	Nominal ratio of outside diameter to wall thickness								
PE Classification	Long term rupture stress at 20°C (MPa multiplied by 10 to which the minimum safety factor of 1.25 for Series 1 pipes is applied in order to obtain the 20°C design hoop stress)								
PN	Nominal pressure rating at 20°C (MPa multiplied by 10)								





### Selecting the Correct Electrofusion Fitting for Pipe SDR

The wall thickness and its relation to pipe outside diameter – SDR – determine which Electrofusion fittings can be safely welded. Plasson have developed two Electrofusion systems to cover the broad range of working pressures (PN) and Standard Dimension Ratio (SDR) – either PN 16 and 25 Socketed Fittings/Saddles or PN 10 Lightfit Fittings. It is important to select the correct Plasson fittings system for the pipe SDR you are working with, this is summarised in **Table2**.

**Table2. Electrofusion Fittings Compatibility to PE Pipe Thickness/SDR Specification**

PN 16 and 25 Socketed Fittings & Saddles		PN10 Lightfit Fittings	
Diameter	Safe Pipe SDR	Diameter	Safe Pipe SDR
16 - 75	≤ 11	63 - 90	≤ 26
90 - 710	≤17 ≤11 for PN 25	110 - 710	≤ 33

**In All Cases:**

The system pressure rating is determined by the lowest PN rated component in the system.

**In Some Cases:**

Some pipes outside these general guidelines can weld successfully; specific applications can be evaluated by Plasson. The following SDR 21 pipes have been evaluated to produce satisfactory long term welds with the following PN 16 fittings

90 SDR 21 Pipes - Cat 9050 Elbow, Cat 9040 Tee

110 SDR 21 Pipes - Cat 9050 Elbow, Cat 9040 tee

160 mm SDR 21 Pipe - Cat 9050 Elbow, Cat 9040 tee

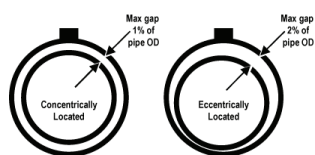
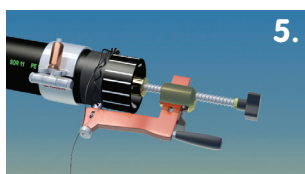
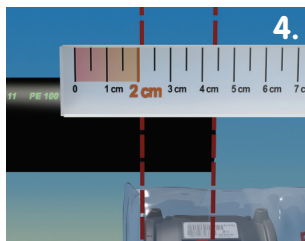
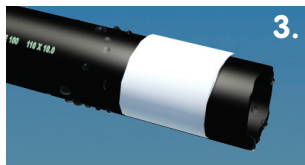
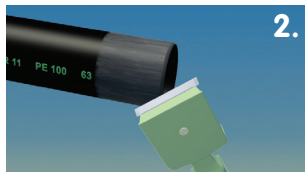
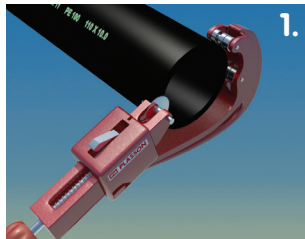
### Safety & Good Welding Practices

The Electrofusion welding process involves heat and pressure between the pipe wall and the Electrofusion fitting. If a heavy duty (PN 16 and 25) fitting is welded onto a thin (high SDR) pipe, the pressure exerted on the hot pipe can cause it to collapse. Incorrect assembly with heavy duty PN 16 and 25 systems can also result in melt outs and situations which can allow air to flow into the hot molten PE (>150C) and may cause a fire to start. At the very least the weld would be inadequate and failures may occur.

**NOTE: Plasson Mechanical Compression Fittings** are safe for use on all pipe SDRs and available in diameter range from 16 to 160mm (provided the maximum working pressure of the pipe or fitting is not exceeded).



### Joining Electrofusion Socketed Fittings



**Maximum gap between eccentrically located pipe and fitting i.e.: pipe touching fitting at one point, gap must not exceed 2% of pipe OD.**

A shelter should be used to provide shade and protection for pipe, fittings and equipment against adverse weather conditions and contamination of the jointing surfaces by dust and/or moisture, which can result in unsatisfactory joints. Fittings should only be removed from their original packaging immediately before use.

1. The pipe ends must have a **square, even cut** and comply with AS/NZS4130 pipe specification. (Remove reverted ends if necessary)
2. Remove any burrs or shavings from the pipe ends (**chamfering leading edge to ease insertion**).
3. **Ensure clean hands** with Pipewipes or wear disposable gloves. **Clean pipe ends on the outside and inside** with Plasson Pipewipes to remove any dirt or contaminants (inside first). Use a new Pipewipe for each.

Clean the fitting bore, followed by the pipe surface with a new approved pipe wipe to remove traces of dirt, mud and other contamination. When using slip couplings clean the entire area where the fitting will pass over the pipe. The area of the pipe to be fusion jointed may be washed with clean water if necessary and dried with lint free material prior to peeling. Ensure the fusion area is completely dry before proceeding.

4. Measure and mark the pipe ends at proper stab depth. This is equal to half the fitting length + 20mm with fitting in bag. Use a marking pen to mark lines around the circumference on the entire area to be scraped. This helps to identify gaps in scraping when using a hand scraper.

Check ovality as described below and use rerounding tools as appropriate.

Check the peeling tools are clean of dirt or other contaminants prior to use.

5. **Scrape/peel pipe and spigot ends on fittings up to measurement mark to remove all oxidation and contaminants.** Use a Plasson rotational scraper\*. If using hand scrapers - long even scrapes starting from outside the marked areas to avoid "cratering" in the fusion zone of the fitting until all marks are removed. One pass or approx. 0.3mm of pipe surface is to be removed. **Do not use metal files or emery paper. Clean with Plasson Pipewipes and allow to fully dry before proceeding.**

\*Rerounding tools should be used with rotational scrapers.

6. Remove fitting from plastic bag. Slide fitting onto pipe until end meets with the stops in the ID of the fitting. Check measurement mark for proper stab depth. If **pipe ovality** exceeds 1% **re-rounding clamps** will be needed to round pipe. The pipe should be checked for ovality. If ovality causes a gap between concentrically located pipe and fitting to exceed 1% of pipe OD, then pipe must be re-rounded to ensure correct welding. After re-rounding if the gap still exceeds 1% of pipe OD then check pipe OD dimensions as it may be under specified OD.

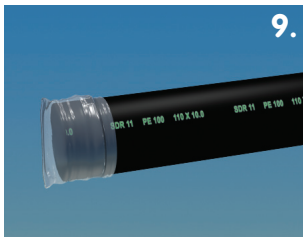
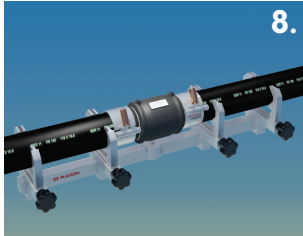
**Use a Plasson rotational scraper to reduce oversize pipe.**

**NOTE:** Some coiled pipes may be too oval to fit into couplers, or the bend of the pipe may make alignment of the end impossible. A number of approaches have been proposed, including:

- (i) use of a mechanical pipe straightener or re-rounding tool;
- (ii) butt fusing a straight length of pipe onto the end of the coil before joining.



### Joining Electrofusion Socketed Fittings (cont.)



7. Repeat steps 1 through 6 for opposite end of fitting.
8. The pipe end(s) and the fitting must be correctly aligned and free of any bending stress. Use pipe clamps, or other suitable means, to secure the pipe(s) so they cannot move and ensure that the fitting is satisfactorily supported to prevent it sagging during the fusion procedure.
9. **Block pipe ends** to stop wind blowing through pipe and cooling the weld zone.

**NOTE:** Cleaning of the prepared surface is a critical step and one that has the potential to introduce contaminants if not done correctly – remember this is the surface that is about to be welded and the presence of contaminants can readily result in a poorly welded joint. To avoid contamination **ONLY** wipe the peeled fusion zone area.

Do not under any circumstances use methylated spirits, acetone, methyl ethyl ketone (MEK) or other solvents to clean the fusion area. Rags are not recommended for use with any alcohol solvent to clean the fusion area given the possibility of dirt being transferred into the fusion zone.

Other important factors relating to this procedure:

- Ensure wipes are saturated with alcohol i.e have not dried out
  - To avoid contamination **ONLY** wipe the peeled fusion zone area
  - Only use the wipe once
  - Do not touch the prepared pipe surface – sweat, sunscreen, dirt and skin oils are all potential sources of contamination. Disposable latex or nitrile gloves are recommended when handling the wipes for preparation of the surface.
  - Ensure alcohol left by the wipe on the cleaned surface has evaporated and the prepared surfaces is completely dry before assembling the joint.
10. ENSURE GENERATOR HAS REQUIRED PROPERTIES. CHECK SUPPLIED OPERATING BOOKLET. ENSURE GENERATOR HAS SUFFICIENT FUEL FOR THE COMPLETE WELD CYCLE.

**Min required generator output power 230V, 50Hz, 1-phase. General Use Minimum 4.5 kW**

Diameter	Output Power
20-75 mm	2 kW
90-160 mm	3.2 kW
180-710mm	4.5 kW (Mechanically Controlled) 5 kW (Electronically controlled)



### Joining Electrofusion Socketed Fittings (cont.)



11. When fitting is properly clamped, follow the operating instructions supplied with the Plasson Automatic Control Box to complete the welding process. PF Control boxes can be operated in the temperature range of -10 degrees C to +45 degrees C.



12. Refer to the welding time as shown on the fitting. These should be identical to the weld time on the display of the control box. (Plasson Automatic, Barcode or Manual). The fittings have melt indicators. These will rise to indicate that fusion has taken place. They do not indicate the weld quality.

13. Do not remove the clamping device before cooling time (as shown on the fitting) has elapsed.

14. Do not pressurize the system before 4 x the indicated cooling time

#### NOTE: Electrofusion Indicator Pins

The fusion indicators protrude/rise following the completion of the fusion process indicating that fusion pressure has developed but does not guarantee the quality of the joint. The height of the extended pin is dependent upon the fitting in use, component tolerances and prime material.



In the event that the pin does not rise the supervisor or operator must investigate the following:

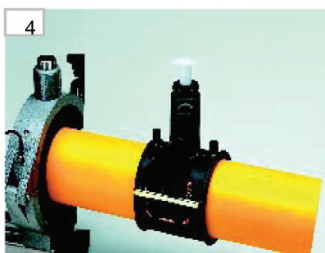
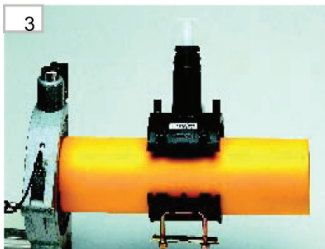
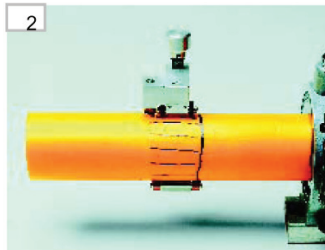
- Dimensional check and compliance of the pipe spigot OD and ovality
- Fitting socket internal diameter by measurement or batch traceability
- The maximum gap between the pipe and socket does not exceed 1% concentric and 2% eccentric
- No disruption to the input power supply from the fusion box with no control box error messages
- Correct heat fusion parameters
- Correct pipe to fitting alignment with no visible plastic extruded out from the fitting

Upon confirmation that the above requirements have been satisfied and within specification then in the event that the pin does not rise the joint does not require to be cut out and replaced.



## Tapping Saddles and Branch Saddles with Underparts

**IMPORTANT:** Do not cut hole in the pipe until welding and cooling is fully complete.



The Electrofusion procedures are the same as with socketed fittings except that Plasson Saddle fittings are supplied with their own integral underpart clamping system. The Plasson 9630 underpart clamped tapping saddles have a unique patented under-pressure leak tight tapping system.

1. **Clean pipe with Plasson Pipewipes** to remove dirt/contaminants and allow to fully dry.
2. Mark area on pipe where saddle will be located using underpart. Mark a centre line with a marking pen. Mark lines on the pipe surface for the full area and 20mm beyond the saddle surface. Mark lines perpendicular to scraping direction, this will assist noticing unscraped areas. Scrape/peel pipe surface with Plasson rotational scraper for one pass or to a depth of about 0.3mm. **If using hand scrapers** - long even scrapes starting from outside the marked areas to avoid "cratering" in the fusion zone of the fitting until all marks are removed. Approx. 0.3mm of pipe surface is to be removed. **Do not use metal files or emery paper. Clean with Plasson Pipewipes and allow to dry.**
3. Remove saddle from bag and fit to scraped clean pipe surface if contaminated clean with pipe wipes. Equally tighten nuts with a socket until saddle upper and lower parts meet (for saddles with straps, the metal bar to meet the upperpart). (Use an elongated 25x13mm socket to tighten nuts for dimensions 63-180mm and 25x11mm for  $\leq 50$ mm).
4. Carry out the welding process. Do not pressurize the system with Branch Saddles **or cut the hole** in the pipe with Tapping Saddles **before the following times have elapsed.**

### Tapping Saddle, Branch, Transition and Balloon Saddle, Tapping Valve

Dmm	Time
40 -180	20 min
200-315	30 min

### Balloon Saddle Outlet

Dmm	Time
90-160	25 min
180-250	30 min



### Operation of Gas Tight Cutter in Plasson 9630 Saddles

**IMPORTANT:** Do not cut hole in the pipe until welding and cooling is fully complete.



1. Ensure that the white sleeve is in position by pushing and twisting it.



2. To pressure test the branch outlet, insert the hex. key (200x12mm) via the white sleeve and turn it counter clockwise until the cutter reaches the upper stopper and a further 1/3 turn to ensure sealing. Remove the hex. key and carry out the branch outlet pressure test (follow the installation company procedures) after the following cooling time has elapsed from the time the saddle was welded or 20 minutes from the time the branch fitting was welded, whichever is the longer.

Dmm	Time
40 - 180	20 min
200 - 250	30 min



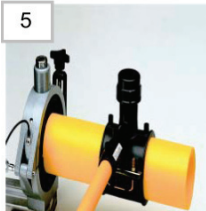
### 3. CUTTING THE HOLE

Insert the hex. key (200x12mm) via the white sleeve and turn it clockwise until the white sleeve shoulder reaches the upper surface of the barrel.



### 4. WITHDRAWING THE SLEEVE

Turn the hex. key counter clockwise until the cutter reaches the upper stopper and a further 1/3 turn to ensure sealing. Remove the hex. key and thereafter the white sleeve, using a twisting motion.



5. Tighten the cap until it is firmly locked.

**NOTE:** The cap can be opened by using a pipe wrench.

### For more information

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