

**THE GOOD GUIDE TO
LARGE DIAMETER
ELECTROFUSION JOINTING**



THE GOOD GUIDE TO LARGE DIAMETER ELECTROFUSION JOINTING



This guide will provide basic information to enable the operative to:

- Understand the principles of large diameter electrofusion jointing.
- Carry out pre-jointing equipment checks.
- Identify pipe and compatible fittings.
- Inspect for, and identify acceptable quality joints.
- Make satisfactory electrofusion joints from compatible pipes and fittings.
- Site the equipment.

Safety Notice

To ensure operator safety and to comply with Health and Safety regulations all electrofusion control boxes must be operated from an effectively earthed supply in accordance with the manufacturers' operating instructions.

Equipment required:



Generator of suitable size to power control box - refer to manufacturers' literature for power requirements



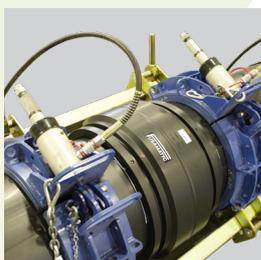
Welding tent/shelter and ground sheet



Indelible marker pen



Electrofusion control box with appropriate leads



Re-rounding and positioning clamps



Scraping equipment



Pipe cutter



Principles

Electrofusion is a method of joining PE pipes using fittings with integral heating elements. Socket fittings are used to join mains and service pipes; and saddle fittings are used to connect services to mains.

Prepare the pipe to be joined by removing the outer surface layer to a depth of around 0.2mm, pipe and fitting are then clamped together to prevent movement. A voltage is applied across the fitting terminals via a control box.

An electric current is passed through the wire which heats the wire and melts the polymer, fusing the fitting to the pipe. After welding, allow the joint to cool before removing the restraining clamps.

Pipe/Fitting Selection



Check that both pipe(s) and fitting to be joined are compatible, **only compatible materials should be joined together**. Check PN and SDR rating marked on fitting and compare with that of the pipe. If in doubt, seek advice from the pipe or fitting manufacturer.

Fusamatic electrofusion fittings up to 630mm are suitable for jointing in ambient temperatures between -10°C and +40°C. For jointing outside these temperatures, or size range, guidance should be sought from the manufacturer.

Siting Equipment

Wherever possible, the electrofusion equipment should be placed on a suitable clean, dry base board or ground sheet inside a tent/shelter to minimise contamination.



Ensure that the area where the weld is to be carried out has surface water removed and some form of groundsheet is used to isolate the jointing area from the trench floor.

THE GOOD GUIDE TO LARGE DIAMETER ELECTROFUSION JOINTING

Pre-Jointing Checks

- Use only equipment which has been regularly serviced and is in good condition.
- Check that clamps and liners are correct and clean. Advice on appropriate clamps and scrapers is available from all fitting manufacturers.
- Check that the scrapers are clean and the blade is not damaged and is in good condition.
- Check that the fitting is still in its original packaging and that the bag is not damaged or contains any condensation or dust.

Pipe preparation

Controlling ovality and flat spots

- Ovality in PE pipe can occur as a result of coiling, storage and transportation.
- Fusamatic electrofusion fittings have been designed to allow for a small degree of ovality (1 – 2%), but excessive gaps should be avoided by using alignment clamps with a re-rounding ability.
- In order to correct the effects of pipe ovality prior to the electrofusion process it is recommended that re-rounding clamps and/or tools are used as appropriate. This is particularly important where thin walled pipe is being used as ovality in these cases can be extreme.
- Use the appropriate re-rounding clamp as per manufacturers' instructions.

LARGE DIAMETER SOCKETS JOINT ASSEMBLY PREPARATION

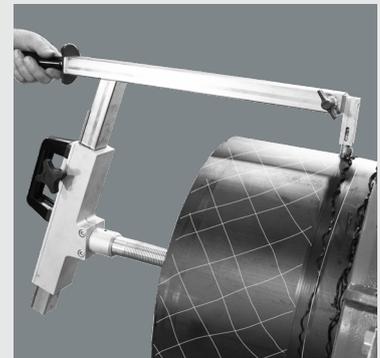
1. Check that the pipe ends are cut square and are free from surface damage and swarf.
2. Wipe loose dirt from the area of pipe to be clamped and fused with a prescribed wipe, damp cloth or paper towel. (Wipe any contaminants from the inside of the pipe).
3. Fit protective caps to all open pipe ends that are not to be welded.
4. Check for pipe ovality and flat spots. Use a re-rounding clamp if necessary.
5. With the fitting still in the protective bag, measure the length to be scraped. Mark this measurement on the pipe.



6. Cross hatch the area to be scraped plus an additional 20-50mm using the indelible marker pen.

7. Scrape one pipe end using a prescribed tool, for the length of the insertion depth plus 10-20mm. Ensure the whole surface area has been scraped.

On larger diameter pipes a second scraping operation may be required to ensure the whole circumference is scraped.



8. For skinned pipe use the manufacturers' recommended tools to remove the skin. Some skinned pipe still requires a scraping operation but advice from the pipe manufacturer should be sought before preparing to join the pipe.

Important Note: It is imperative that both the pipe and fitting jointing surfaces are kept clean and dry during the assembly and welding process. This is best achieved by preparing the pipe and then immediately assembling.

In certain circumstances it is accepted procedure to use alcohol wipes to clean any contamination from the joint surfaces, however we recommend that this practice is only used where absolutely necessary.

9. Open fitting bag, check the fitting is clean and immediately place over pipe end and push up to centre stops. Mark this position on the pipe with the indelible marker pen.

For fittings without centre stops, measure half the fitting length and mark this distance on the pipe prior to insertion. Insert the fitting into the pipe up to the pre-marked line.



Leave bag over fitting for temporary protection.

10. Prepare the second pipe in the same way as the first, as previously described and mark the penetration depth on the pipe.

11. Remove the bag and push the second pipe into the fitting until the two pipe faces are in contact. Centralise the fitting using the insertion depth marks.

12. Check fitting penetration - using previously marked lines on pipe. Visually check pipe alignment in all planes.

13. Assemble the clamp onto the fitting pipe assembly.

It is recommended that hydraulic re-rounding clamps are used on larger diameter pipes



14. The pipe should not be subjected to bending loads or sagging during the assembly process. Position the pipe so that it is not under any stress and ensure the pipe or fitting is supported underneath.

Making the weld

1. Check the generator has sufficient fuel.

2. Start the generator and plug the control box input lead into the generator output socket. Connect the control box output leads to the fitting terminals.

It is recommended that barcode enabled control boxes are used to ensure correct fusion time.



3. Scan the barcode with the barcode scanner and check that the weld time marked on the fitting is displayed on the control box display. For manual fittings, check the weld time marked on the fitting and enter this figure into the control box.

4. Respond to prompts from the box. Press 'START' and hold down until display begins countdown. The weld cycle is complete when the timer reaches zero and the control box 'CYCLE FINISH' indicator shows.

5. Some fittings may require two electrofusion cycles (dual shot), one for each end of the fitting.

6. Allow weld to cool for the full time stated on fitting before removing clamps and moving the assembly.

Quality Checks

- Check for any error messages on the control box.
- Check fusion indicators have risen on both sides of the fitting.
- Check for signs of melt exudation from the ends of the fitting.
- Check that the pipe has not moved by looking at the insertion depth marks.

THE GOOD GUIDE TO LARGE DIAMETER ELECTROFUSION JOINTING



ELECTROFUSION DO'S

- Use a shelter and ground sheet in both wet or dry conditions.
- Always use equipment that has been regularly maintained and calibrated.
- Ensure control box voltage is compatible with fitting.
- Always use alignment/restraining clamps.
- Cut pipe ends square for electrofusion sockets.
- Scrape pipe and/or spigot surfaces fully.
- Keep scraped pipe and/or spigot surfaces and fittings clean.
- Ensure correct fusion and cooling times are adhered to.
- Assemble joint and fuse immediately after scraping pipe.
- Carry out quality checks before cutting through pipe.
- Mark the fused fitting with the joint number for traceability.

ELECTROFUSION DONT'S

- Do not start the joining process unless it can be completed in one go.
- Do not leave fittings out of protective bags.
- Do not use dirty fittings.
- Do not touch prepared pipe surfaces or fusion areas.
- Do not allow assemblies to get damp prior to joining.
- Do not touch fusion indicators during the welding cycle.
- Do not remove joint from clamps until the full cooling time has elapsed.
- Do not use control box in a trench with gaseous atmosphere.
- Never fuse a fitting for a second time.
- Failed joints should not be used. Cut out failed joint and fuse another fitting to the required specification on distance from failed fitting.
- Electrofusion joints should not be carried out on slotted or drilled pipe sections, only solid walled pipe sections.

SAFETY NOTES

Although we make every effort in the design of our products to ensure operator safety, please remember the following precautions:

- Never allow molten or semi-molten polyethylene to come into contact with the skin. However, if this does happen, flush the affected area with cold water and seek expert medical advice.

DO NOT UNDER ANY CIRCUMSTANCE ATTEMPT TO PULL THE MATERIAL FROM THE SKIN AS THIS COULD REMOVE THE SKIN AS WELL.

- Do not attempt to lift long lengths of pipe without assistance or mechanical aid.
- Normal precautions should be observed when handling electrical equipment although, for safety reasons, all 110v portable generator sets should be "Centre Tapped" for site use +55/0/-55 volts.
- To afford protection during jointing, always wear protective workwear such as gloves, safety glasses and safety boots.
- Ensure that equipment is serviced on a regular basis as recommended by the equipment manufacturer.

ADDITIONAL INFORMATION

STANDARD DIMENSION RATIO (SDR)

The SDR is calculated by dividing the minimum (nominal) outside diameter (OD) by the minimum wall thickness (WT) i.e.

SDR =	OD	400	
	WT	36.4	= 11

DISCLAIMER

THE DATA PROVIDED IN THIS DOCUMENT IS NOT BINDING AND MAY BE SUBJECT TO MODIFICATIONS.

THIS DOCUMENT IS SUPPLIED AS A GUIDANCE ONLY. THE WELDING OPERATOR IS RESPONSIBLE FOR ENSURING ALL WORK IS PERFORMED EXCLUSIVELY BY TRAINED AND COMPETENT PERSONNEL; AND IN COMPLIANCE WITH BOTH NATIONAL AND INTERNATIONAL RULES AND GUIDELINES FOR ELECTROFUSION INSTALLATION.





Fusion Group Limited

Chesterfield
Derbyshire
S41 9PZ
England, UK

T: +44 (0) 1246 268666
E: sales@fusiongroup.com
www.fusiongroup.com

