ADVANCE WELDING

Electrofusion Welding Procedure

Best Practice

Introduction

This booklet is an illustration of best practice and is not a guide on how to weld. It shows the recommended procedure for Electrofusion welding of small diameter pipes (up to 180mm) as adopted by the UK Gas Industry. This is a generic guide. Check with the fitting manufacturer if a special procedure is required.

This guide does not replace formal training which should be undertaken before any welding is carried out!

Please contact your distributor or Advance Welding if you would like details of companies that offer Electrofusion Welding training.

Important

Cleanliness is VERY important for a good quality weld.

When welding in a dirty environment it is essential to use a groundsheet to protect the work area from mud, dirt and contamination.

When pipe ends have been prepared, they should be kept clean and not touched. They should always be held in the clamp after preparation and must not come into contact with the ground.

Clamping is VERY important for a good quality weld.

The use of clamps is mandatory. Bad joints can easily be created if the pipes or fitting are moved during the cooling period. As the plastic cools and sets after the weld end, if moved it will fracture and cause a leak path. You must leave the joint clamped and undisturbed for the specified cooling period written on the fitting.

- Electrofusion must not be used if the operator suspects that a gaseous atmosphere is present. This must be checked using an approved gas detector prior to the weld and during the weld to confirm that the gas readings remain below 20% LEL (Lower Explosive Limit).
- Do not take the Electrofusion welding unit into the trench or into a gaseous atmosphere.
- A suitable location that is flat and dry must be used to carry out the operation. Do not weld fittings that are standing in water or are wet.
- Do not weld if the ambient temperature is less than -5°C or greater than +40°C.
- Do not weld in the rain or snow. An appropriate shelter must be used.
- Protect the joint from air borne contamination. Use an appropriate shelter if required.
- Protect the joint from wind chill effects by using pipe end stoppers or covering the pipe ends during cold or windy conditions.
- Always use the correct size of fitting for the pipe being used.
- Ensure that the fittings remain in their protective bags until immediately prior to use. Do not use fittings that have been stored out of their bags or in damaged bags.
- Do not scrape any surface containing a heating element.
- The pipe should be checked for ovality prior to fusing and a re-rounding tool used where necessary.
- If the fusion stops mid-weld, allow the fitting and pipe to cool down then cut out the fitting and start again. DO NOT RE-FUSE FITTINGS.

Best Welding Practice

ACT40V
Electrofusion Welding unit

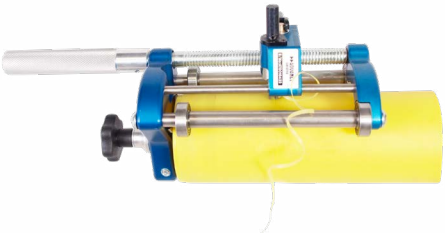
For welding fittings
16mm to 630mm

Universal Variclamp

For clamping pipes
16mm to 75mm

Multiclamp

For clamping pipes
63mm to 180mm



Rotary Scraper

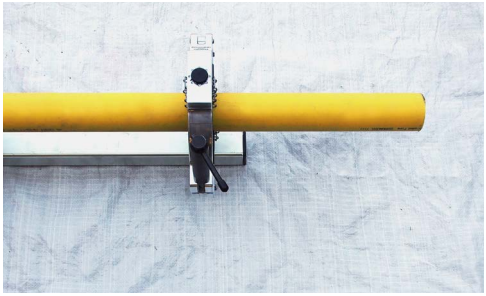
For scraping pipes
63mm to 400mm

1. To begin, you will need:-

- Welding Unit
- Clamp
- Scraper
- Ground sheet
- Paper towel/Lint free cloth
- Marker pen
- Gloves

2. Start with the first pipe end.

Make sure the end is cut square.
Lightly hold it in the clamp.



3. Remove any large debris with a lint-free cloth or paper towel.

4. Keep the fitting in its plastic bag.

Line the middle of the fitting up to the pipe end and mark the pipe 25mm past the end of the coupler.

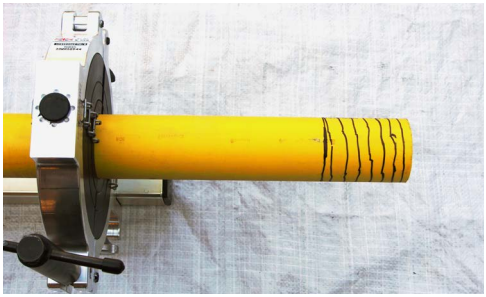
Best Welding Practice

5. Mark the scrape length around the pipe.

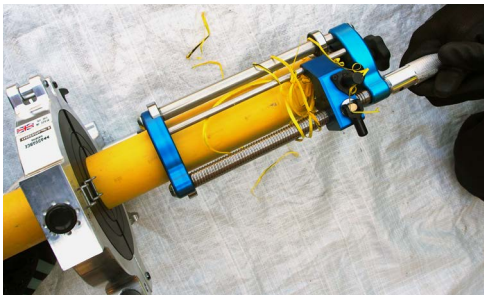
Draw a spiral towards the end of the pipe.

This is the area to be scraped. The spiral should be 25mm apart.

(When using Control Point, a crosshatch pattern should be drawn instead which must extend past the scrape length.)



6. Scrape the pipe end making sure that ALL the black marks are removed.



7. When the pipe end has been scraped DO NOT TOUCH THE SCRAPED SURFACE.

Keep the pipe end clean and away from the ground.

Hold the pipe end in the clamp at all times after preparation.

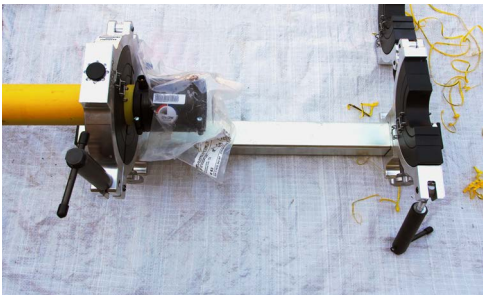
8. Carefully open the fitting bag, but do not remove it from the bag.

Take care not to touch the inside of the fitting.

Push the fitting on to the prepared pipe end. Leave the fitting in its bag.

9. When the fitting is fully on the pipe, mark the pipe by the side of the fitting to indicate the insertion depth.

10. Pull the pipe back into the clamp to allow the second pipe to be held.



11. Make sure the second pipe is cut square then remove any large debris with a lint free cloth or papertowel.

12. Line up the second pipe to the middle of the fitting.

Mark the pipe 25mm past the end of the coupler.

Best Welding Practice

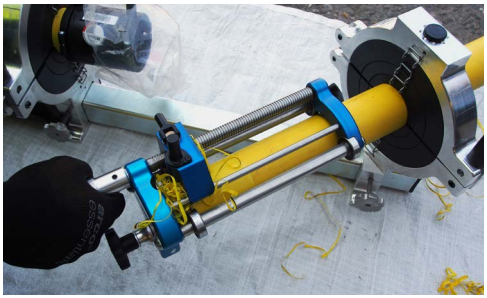
13. Mark the scrape length around the pipe.

Draw a spiral towards the end of the pipe. This is the area to be scraped.

The spiral should be 25mm apart.

(When using Control Point, a crosshatch pattern should be drawn instead which must extend past the scrape length.)

14. Scrape the pipe end making sure that ALL the black marks are removed.



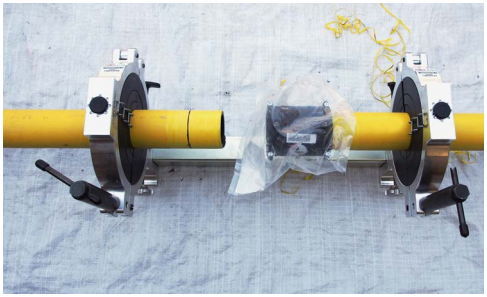
15. When the pipe end has been scraped DO NOT TOUCH THE SCRAPED SURFACE.

Keep the pipe end clean and away from the ground. Hold the pipe end in the clamp at all times after preparation.

Remove the fitting from the first pipe and push it onto the prepared end of the second pipe until fully home. Keep the fitting in it's bag.

16. Mark the pipe by the side of the fitting to indicate the insertion depth.

17. Re-align the pipes.



18. Remove the bag from the fitting.

Push the fitting back onto the first pipe, making sure it fits up to the marked insertion depth.

19. Tighten the clamp on to the pipe so it is held rigid and doesn't move. Mark the pipe on each side of the clamping shells (both sides of the fitting) to show the alignment of the clamp.

The pipe should now be marked on each side of the left clamp shell, each side of the right clamp shell and each side of the fitting. These alignment marks show if anything moves during the weld.

20. Check that the fitting easily rotates around the pipe. If it does not then disassemble the joint, realign it and reassemble. The fitting must be free to rotate but must not move from side to side.

Best Welding Practice

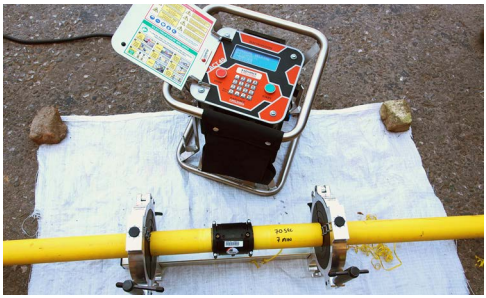
21. Write the welding time and the cooling time on the pipe.

22. To stop wind-chill effects, the open pipe ends should be covered using end caps.

If end caps are not available, then a pipe stopper should be used.

Wind blowing down the pipe will draw heat out of the weld and cause a bad joint. This must be avoided.

23. The joint has been correctly prepared. It is now ready to be welded.



24. Make sure the generator has enough fuel to complete the weld process.

Turn on the welding unit and follow the instructions on the screen.

25. When prompted, connect the output leads to the fitting terminals.

If multi-sized 4.0/4.7 leads are being used, then make sure the lead ends push onto the fitting terminal to the correct depth.

26. If welding in barcode automatic mode the welding unit will ask for the fusion barcode to be read.

Scan the barcode on the fitting.

27. The fitting details will be recognised and checked.

Press the start button to begin the weld.

28. Check the time when the weld starts. 13:34 in this example.

Add the welding time to the cooling time to the start time.

In this example, 70 seconds + 7 minutes + 13:34 gives 13:43.

Write this time on the pipe. This is when the clamp can be removed.

Best Welding Practice

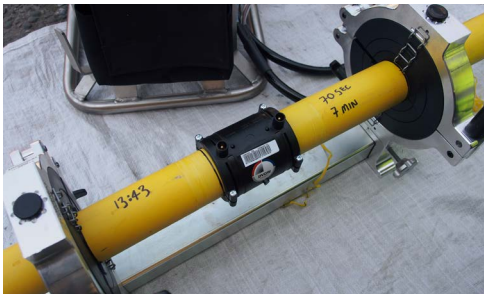
29. Wait for the weld to finish.

30. When the weld is over, the output leads can be carefully removed from the fitting. This should be done immediately at the start of the cooling period when the plastic inside the fitting is still molten, or after the cooling time has ended when the plastic has completely set.

Do not move or rotate the fitting. Do not disturb the fitting during the cooling time. Do not remove the output leads in the middle of the cooling time. Leave the joint clamped until the time marked on the pipe.

31. Make sure the pipe has not pulled out of the fitting and that no plastic or wires have purged out from the sides. The black marks should still line up with the fitting edges and the sides of the clamp.

If any movement or purge has happened then the fitting must be cut out and replaced.

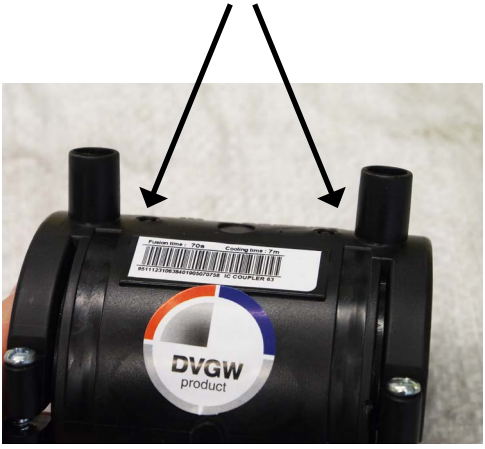


32. Wait until the time written on the pipe before the joint is unclamped.

Quality Checks

- Check that the fusion indicators have risen on the fitting.
- Check that no melted material or wire has extruded from the ends of the fitting.
- Check that the pipe has not moved.
- Check cleanliness around the joint area.
- Check for evidence of scraping.
- If any checks do not pass, then the fitting must be cut out and replaced.

Fusion indicators before weld



Fusion indicators after weld

Please note: The fusion indicators may not rise as much as is shown in the photo. This does not mean the joint is bad.

ADVANCE WELDING

For more information on the electrofusion process or on the equipment needed to carry it out, contact Advance Welding.

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Check out the video for Electrofusion Welding by Advance Welding

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This guide does not replace formal training which should be undertaken before any welding is carried out.

Advance Welding accept no responsibility for any procedures shown within this booklet. It is offered freely as a guide for best practice and it is the operative's responsibility to make sure the correct procedure is followed. Advance Welding accept no liability and offer no warranties.

The quality of the weld should be inspected carefully by the operative. It is their responsibility to make sure the joint is acceptable.

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