

### 1. Standards and Regulations

AGRU large diameter couplers can be used with PE 100, PE 3408, PE 4710, PE 80, PE 2406, PE 3608 and PE 2708 pipes according to DIN 8074/75, EN 1555-2, EN 12201-2, ISO 4427, ISO 4437, ASTM F1055, and ASTM D2513 National Local & National regulations must be considered separately. The pipes that are to be used must have a melt flow index (MFR 190/5) between 0.2 g/10' and 1.7 g/10'.

### 2. Processing Information

The ambient temperature must be between 32 °F and 114 °F during the fusion. The welding area should be protected from weather (rain, direct sunlight, etc). Direct sunlight may raise the temperature of the pipe and fittings to an unacceptable range. The welding zones of the e-coupler and the pipe must be dry during the entire welding process on the inside as well as the outside. Welding while media leaks from the pipe is not allowed. Pipes and fittings should be allowed to condition until they are the same temperature before starting the fusion process!

### 3. Cutting the Pipe

The pipe must be cut perpendicular to the length of the pipe with a suitable cutting tool and the insertion length must be marked.

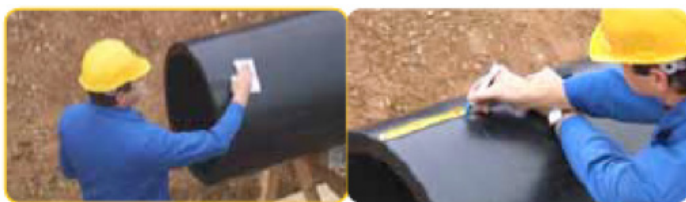
$$\text{Insertion Length} = \text{Coupler Length} \times 0.5$$

The pipe ends, are tapered or have a distinctive conical shape, need to be shortened removing the defective end of the pipe.

### 4. Pre-cleaning

If the pipe must be cleaned from rough dirt in the insertion area, use a clean and dry cloth. Never use soapy water for pre-cleaning.

### 5. Removing the Oxide Layer



Shortly before the assembling of the joint, the diameter must be checked for defects that could affect joint integrity. Then the oxide layer must be removed completely for the entire length to be inserted into the coupling by a suitable rotatory scraper. The pipe must meet the following requirements after scraping:

$$\text{Minimum Diameter} = \text{Nominal Diameter} - .157''$$

A single removal of minimum .008" with complete coverage, depending on the fit, may be enough. Damages within the welding zone such as grooves or scratches are not allowed.

Due to the large tolerance range of pipes, it may be necessary to scrape the pipe again. In order to avoid multiple attempts, we recommend measuring the pipes diameter prior to scraping.

Localized areas that exceed the maximum diameters, which are detected while checking the annular gap, can be removed with a hand scraper.

If a fitting is used instead of a pipe for welding, the fitting must be cleaned and scraped just like a pipe. The cleaning and scraping process is exactly the same.

The prepared area must be protected from impurities and unacceptable weather conditions (humidity effects such as dew or frost formation).

### 6. Chamfering Raw Edges



In order to ease the coupler's installation, chamfering of the pipe's outside edge on the face to be inserted (0.2" x 45°) is helpful. The pipe's inside edge must not be chamfered. Chips from scraping or cutting must be removed from the pipe.

### 7. Re-Rounding Ovalities

Usually pipes become oval during storage. When ovalities within the welding area (max. 0.125") occur, a re-rounding tool must be used.

Hydraulic or mechanical rounding clamps should be installed at the end of the coupler's insertion length marks.

### 8. Unpacking the E-coupler

The packaging of the electrofusion fitting should be removed shortly before the welding. The coupler's inside surface and the scraped pipe ends must not be touched with bare fingers.

### 9. Cleaning



Prior to assembly, the welding areas of the pipe and of the e-coupler must be cleaned with a suitable PE cleaning agent (90 % Isopropyl Alcohol) and with an absorbent, lint-free and undyed disposable paper. Cleaning cloths are not suitable. Care must be taken to assure the areas, which are to be welded, are free from any cleaning agent deposits and that the coupler stays clean and dry until assembly is complete. Touching the welding zone with the hands must be avoided. If the welding zone has been touched, the cleaning must be repeated.

The insertion depth must be marked all around the pipe's circumference to ensure that the correct amount of pipe is inserted into the coupling and that the ends are centered.

# AGRU Pipe & Fitting Systems

## Installation Manual IPS Electro-Fusion Couplers Bifilar



The Plastics Experts.

### 10. Installing the E-coupler



When installing the coupling, taking care that the coupler's connectors code as well as the pre-heating code as well as the welding code are easily accessible. The assembly can be assisted by evenly distributed blows with a soft hammer until the marked insertion length (marked

around the pipe's circumference) is reached.

In order to avoid damage to the coupling, measure the diameter in the joining zone by means of a measuring tape.



Pipe and coupler must be aligned and free of stress. This can be achieved by a clamping system / support bar or by bracing the assembly with something underneath the pipeline and coupler. The assembled joint must be

free of side loads and tensile stress before starting the fusion process. They must be free of this stress until after the joint is fused and cooled completely.

The second pipe that needs to be welded with the coupler must be prepared and installed as described above.

### 11. Installing the Tension Belts

After assembly, both of the 2" wide tension belts must be installed. They must be ordered separately and can be reused after the end of the cooling phase. The usage of additional tools is not allowed.

### 12. Putting on the Tension Belts



Both tension belts must be put into the groove and tightened as follows.

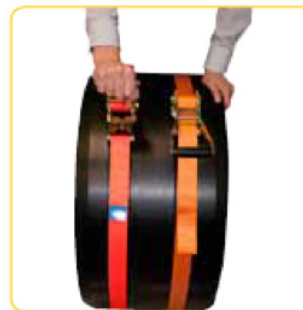
Open the ratchet lever, insert the loose end into the ratchet brace and draw it through.



Tighten the belt.



Tighten the belt by hand with the ratchet lever until the belt is so tight that it cannot be moved by hand.



Bring the ratchet lever into the closure position.



After the cooling time is over pull the function slider of the ratchet lever and move it 180° into the end position in order to open the tension belt.

### 13. Power Supply

Both contact plugs of the coupler must be connected to the connection sockets of the electrofusion processor. Make sure the processor has 4.0 mm connector or adapters. Care must be taken to assure a processor and generator of a sufficient performance is used for the welding process.

### 14. Pre-heating and Reducing the Fusion Gap

The inputting of the pre-heating parameters is done by reading in the white pre-heating bar code with a bar code pen or scanner. The pre-heating is a means to reduce the annular gap between the coupler and the pipe to a maximum clearance of <math><0.08''</math>. This gap can be measured with the provided feeler gauge.

Execute the pre-heating of the first coupler half with the white bar code. Execute the pre-heating of the second coupler half again with the white bar code.



Check the annular gap of the first coupler half after the pre-heating - within the stated cooling time (see Welding Parameters on page 4). If the gap is okay, start the welding of the first coupler half within

the time frame of the holding time. If the gap is too big, repeat the pre-heating.

Check the annular gap of the second coupler half after the pre-heating - within the stated cooling time (see Welding Parameters on page 4). If the gap is okay, start the welding of the second coupler half within the time frame of the holding time. If the gap is too big, repeat the pre-heating.

The open pipe ends have to be closed in order to prevent a stack-effect.

### 15. Executing the Welding

After at least one preheating process, and in consideration of item 13 (Pre- heating and Reducing the Fusion Gap), the weld can be started.

Input the welding parameters by using a bar code pen or a scanner for the white code of the two-colored main bar code. The yellow highlighted code contains the product traceability data.

The correct procedure of the welding is described in the manual of the respective welding machine.

After the welding process, the specified cooling time must be met (see Welding Parameters on page 4). If an interruption of the welding occurred (e.g. power failure) a repetition of the welding is permissible after a total cooling down (<95°F). At which the pre-heating and checking of the annular gap must be done again before starting the welding.

After the end of the cooling down (see Welding Parameters on page 4) the belts can be removed from the coupler.

### 16. Inspection & Technical Documentation

The actual welding time must be compared with the target time on the machine. This, the date and the welder's name must be written onto the coupler.

A correct execution of the welding can be documented by either a hand-written log or the automated recording of the device.

### 17. Weldability

Attention: It is required that the weldability between the welding components has to be proven by performing welding tests under the given circumstances on site.

Dimension [inch]	SDR				
	41	33	26	17	11
18 SDR 17		✓	✓	✓	
18 SDR 11					✓
20 SDR 17		✓	✓	✓	
20 SDR 11					✓
22 SDR 17		✓	✓	✓	
22 SDR 11					✓
24 SDR 17		✓	✓	✓	
24 SDR 11					✓
26 SDR 17		✓	✓	✓	
26 SDR 11					✓
28 SDR 17		✓	✓	✓	
30 SDR 17		✓	✓	✓	
32 SDR 17		✓	✓	✓	
34 SDR 17		✓	✓	✓	
36 SDR 17		✓	✓	✓	
42 SDR 17		✓	✓	✓	
48 SDR 17		✓	✓	✓	

### Safety instructions

**Non-compliance of this installation guideline as well as the following safety instructions may lead to serious accidents, personnel injury and property damage.**

- Local standards and regulations concerning occupational health and safety must be followed. If available the security and safety plan on the construction site must be adhered to.
- During the entire installation procedure, appropriate safety shoes must be worn.
- While working in a trench and/or the possible danger of falling objects (e.g. rockfall) an appropriate hard hat must be used.
- When working with knives as well as burring and scraping tools it is recommended to wear cut resistant gloves.
- PE cleaners are highly flammable. Fumes from cleaning agents can form potentially explosive mixtures. Keep away from ignition sources. Do not smoke. Avoid open flames and sparks. Keep the container of the PE cleaner tightly closed.
- If pipes are not cut perpendicular and/or not completely inserted into the e-fitting the heat generated by the resistance wire cannot be passed on to the pipe. This may result in overheating, uncontrolled melt formation or selfignition.
- In general, it is recommended to keep a safe distance of at least 6 ft. to the e-fitting during the welding process. If this is impossible, appropriate personal protective equipment is necessary (long sleeved clothes, gloves and sealed protective glasses).

### Welding Parameters

Dimension [inch]	SDR	Tension Belts	Pre-heating											Voltage [V]	Holding Time <sup>3</sup> [min]
			Pre-heating Time - Ambient Temperature [s]												
			0 °C	5 °C	10 °C	15 °C	20 °C	25 °C	30 °C	35 °C	40 °C	45 °C			
18	17	yes	637	613	589	564	540	535	529	524	518	513	25	15 up to 60	
18	11	yes	637	613	589	564	540	535	529	524	518	513	25	15 up to 60	
20	17	yes	850	817	785	752	720	709	698	688	677	666	25	15 up to 60	
20	11	yes	850	817	785	752	720	709	698	688	677	666	25	15 up to 60	
22	17	yes	944	908	872	836	800	768	736	704	672	640	25	15 up to 60	
22	11	yes	848	836	824	812	800	764	728	692	656	620	30	15 up to 60	
24	17	yes	1062	1022	981	941	900	887	873	860	846	833	25	15 up to 60	
24	11	yes	1062	1022	981	941	900	887	873	860	846	833	25	15 up to 60	
26	17	yes	1531	1478	1426	1373	1320	1274	1228	1181	1135	1089	30	15 up to 60	
26	11	yes	1531	1478	1426	1373	1320	1274	1228	1181	1135	1089	30	15 up to 60	
28	17	yes	1699	1634	1570	1505	1440	1397	1354	1310	1267	1224	30	15 up to 60	
30	17	yes	1699	1634	1570	1505	1440	1397	1354	1310	1267	1224	30	15 up to 60	
32	17	yes	1770	1703	1635	1568	1500	1485	1470	1455	1440	1425	30	15 up to 60	
34	17	yes	2310	2258	2205	2153	2100	2048	1995	1943	1890	1838	25	15 up to 60	
36	17	yes	2620	2520	2420	2320	2220	2198	2176	2153	2131	2109	25	15 up to 60	
42	17	yes	3328	3201	3074	2947	2820	2735	2651	2566	2482	2397	30	15 up to 60	
48	17	yes	4177	4018	3859	3699	3540	3381	3221	3062	2903	2744	30	15 up to 60	

Dimension [inch]	SDR	Tension Belts	Welding											Cooling <sup>1</sup> [min]	Waiting Time <sup>2</sup> [min]
			Welding Time - Ambient Temperature [s]												
			0 °C	5 °C	10 °C	15 °C	20 °C	25 °C	30 °C	35 °C	40 °C	45 °C	Voltage [V]		
18	17	yes	626	605	583	562	540	521	502	483	464	446	42	>75	>120
18	11	yes	626	605	583	562	540	532	524	516	508	500	42	>75	>120
20	17	yes	835	806	778	749	720	695	670	644	619	594	42	>75	>120
20	11	yes	835	806	778	749	720	695	670	644	619	594	42	>75	>120
22	17	yes	944	908	872	836	800	768	736	704	672	640	42	>75	>120
22	11	yes	848	836	824	812	800	764	728	692	656	620	42	>75	>120
24	17	yes	1044	1008	972	936	900	869	837	806	774	743	44	>75	>120
24	11	yes	1044	1008	972	936	900	869	837	806	774	743	44	>75	>120
26	17	yes	1531	1478	1426	1373	1320	1274	1228	1181	1135	1089	42	>90	>180
26	11	yes	1531	1478	1426	1373	1320	1274	1228	1181	1135	1089	44	>90	>180
28	17	yes	1699	1634	1570	1505	1440	1397	1354	1310	1267	1224	42	>90	>180
30	17	yes	1699	1634	1570	1505	1440	1397	1354	1310	1267	1224	42	>90	>180
32	17	yes	1770	1703	1635	1568	1500	1485	1470	1455	1440	1425	42	>90	>180
34	17	yes	2310	2258	2205	2153	2100	2048	1995	1943	1890	1838	42	>90	>180
36	17	yes	2620	2520	2420	2320	2220	2198	2176	2153	2131	2109	42	>90	>180
42	17	yes	3328	3201	3074	2947	2820	2735	2651	2566	2482	2397	44	>90	>180
48	17	yes	4177	4018	3859	3699	3540	3381	3221	3062	2903	2744	46	>90	>180

<sup>1</sup> Cooling time before removing the clamping device and tension belts.

<sup>2</sup> Total time after ending the cooling time before a full test and/or operating pressure can be applied.

<sup>3</sup> Between pre-heating and welding a holding time is required to enable sufficient pre-heating of all items