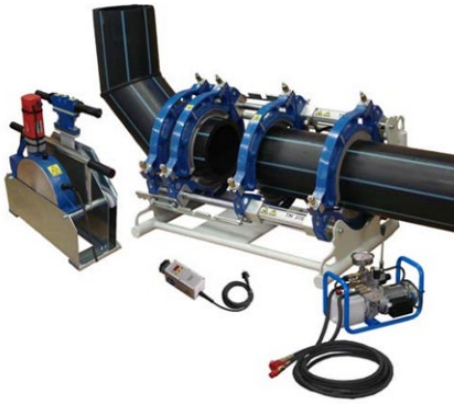
THERMAFLEX ®

Instruction Leaflet

Butt-Fusion Machine ECOS 250

Instruction butt welding of Flexalen® polybutene service pipes (PB-H) OD110-160mm with +GF+ ECOS 250



Required Tools

Cleaner

Tissues

Butt fusion welding equipment

Pipe roller

Tent (depending on weather conditions)

Application Instruction

Application conditions and pipe preparation

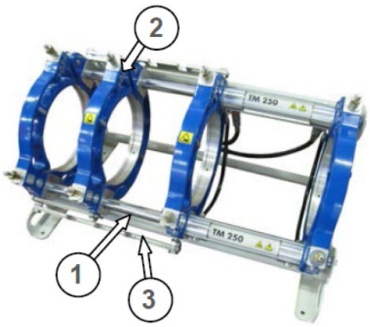
- Ambient temperature: +5 to +40°C
- No rainy or windy (≥3 bfr / 3.4-5.4 m/s) weather conditions

} use a tent to create correct conditions if not already given

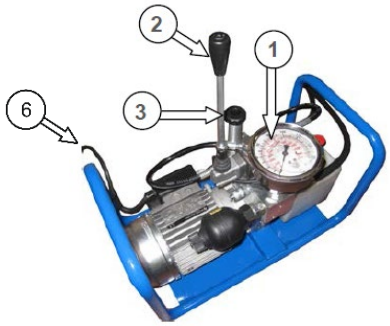
- Service pipe is cut straight and without damage
- Service pipe is free from dirt and condensation

Product description: +gf+ ecos 250

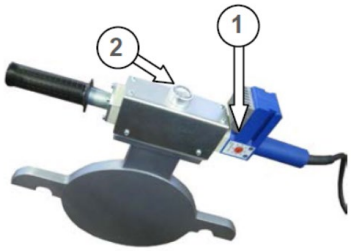
Base machine:

Hardened and hard chrome plated guide shafts (1) Adjustable third clamp (2) Pull-Off mechanism for heating element (3)	

Hydraulic unit:

Pressure gauge (0-160 bar) with precision scaling (1) Control lever for fine adjustment of pressure (2) Hand wheel for pressure preset (3) Fix integrated flexible hydraulic hoses (4) Rapid action couplings with protective caps (5) Main cable; Power supply (6)	 

Heating element:

PTFE-coating Power multi-cord (4 m) Integrated electronic temperature controller (1) Integrated thermometer (2)	

Electric planer:

Torque transmission via robust worm gear device Self-locking device against accidental unhooking (1) Planer blades sharpened on both sides (2) Safety micro switch against accidental starting (3)	

Storage case:

Zinc-coated steel case for transport and storage of both heating element and pipe planer	

Technical specifications: +gf+ tm250 ecos

Machine description	Butt-fusion machine to weld thermo-plastic pipes PE, PP and PB
Type	ECOS 250
Serial No.	
Total piston area	510 mm²
Max. pressure	160 bar
Type of hydraulic oil	LI 46 SHELL (viscositá 46)
Quantity of hydraulic oil	2,0 litre
Noise Level	70 dB (A)
Tension	230 V / 50 Hz
Performance	3070 W
Dimension (packaging)	158x83x84 cm

SERVICE RECOMMENDED EVERY 2 YEARS AT AUTHORIZED SERVICESTATION.

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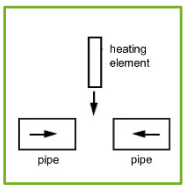
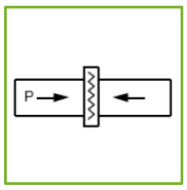
Instruction Leaflet

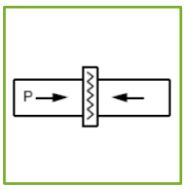
Principle



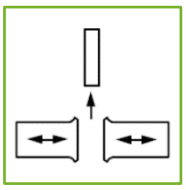
01.
Position the service pipes or the fitting(s) in the hydraulic clamping set. Position the heating element between the parts to be welded.



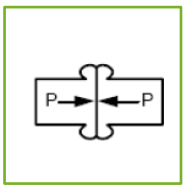
02.
Build up the bead-up (levelling) pressure by pressing the tubes or the fitting against the heating element, until a bead of 1-2 mm (see table) occurs all around the pipe.



03.
Reduce the bead-up pressure to the values of the warm-up pressure and start welding time (warm-up time).



04.
After the welding time, open the hydraulic clamps and remove the heating element.



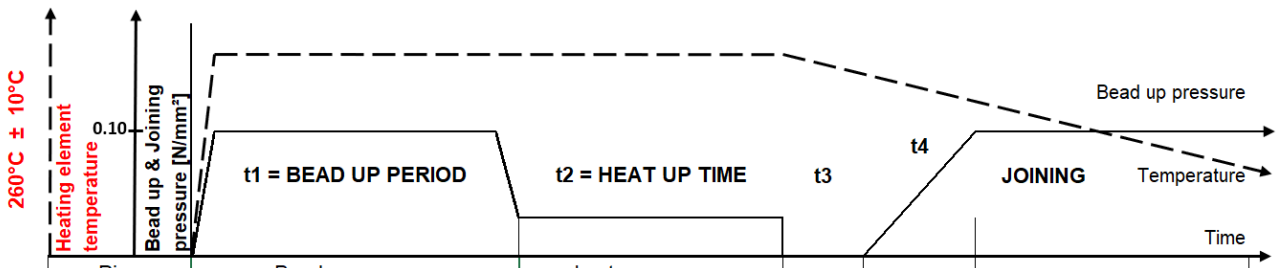
05.
Press the tubes or fitting(s) against each other during the bead formation time and maintain it for the cooling time (joining pressure).

Attention:

- Only the same type of materials are to fuse (e.g. polybutylene with polybutylene)
- The wall thickness in the fusion area need to be the same

Welding parameters

POLYBUTENE PB-H
BUTT FUSION WELDING PARAMETERS



Pipe dimension	Bead up pressure p = 0.1 N/mm²		heat up pressure p = 0.01 N/mm²		t3	t4	p = 0.1 N/mm²	
OD x s [mm]	Bead before beginning of heat up time [mm]	Bead up pressure [bar]	t2 Time [sec.]	heat up pressure [bar]	Dwell time [sec.]	Bead formation [sec.]	t5 Cooling time [min.]	Joining pressure [bar]
110 x 10.0	1.0	6	95	1	6	8 - 12	15	6
125 x 11.4	1.0	8	95	1	6	8 - 12	15	8
140 x 12.8	1.0	10	130	1	7	8 - 12	20	10
160 x 14.6	1.0	13	145	1	7	10 - 15	25	13

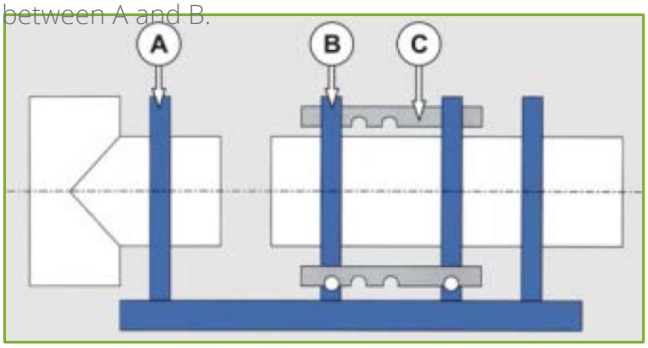
Georg Fischer Type: ECOS 250

Preparation

Preparation clamping unit

The standard configuration of the base machine is prepared to joint pipe to pipe by using 2 clamps to fix each pipe in the base machine. The planer and the heating element is inserted between the two central clamps.

In order to clamp particular constructions, T-pieces, elbows or flange adapters, move the clamping unit B to the desired position. To do this, remove the two spacers C (top and bottom) from the original position, position the clamping unit B and fix it with the two spacers C. The pipe preparation and welding position is now changed, insert the heating element into the pull-off mechanism between A and B.



Clamp the components to be jointed in that way, that the pipe and fitting ends reach out at least 30 mm (and not more than 70 mm, otherwise the planer will not fit) from the clamps in order to perform a proper weld.

Install inset for proper diameter

NOTE:
In choosing the clamping tool and machine size, note that on insulated pipes the jacket pipe may extend into the welding machine and thus determine machine size.
For the fittings in our product range, only clamping devices with narrow welding jaws can be used.

Preparing welding device

(1) Connect the hydraulic hoses (5) to the base machine and to the hydraulic unit.
If the hydraulic hoses are not used, seal the couplings with the protective caps. Clean the protective caps first.

(2) Connect the hydraulic unit, the heating element and the planer to the power outlet or power generator.
Check the voltage!
The generator has to be started before connecting the consumer and must supply a constant output tension! Any sudden changes could compromise the correct welding result and/or damage the control.
Move the hydraulic unit (after transport) fully open and closed at least 4 times to remove any air present in the system (hydraulic hoses).

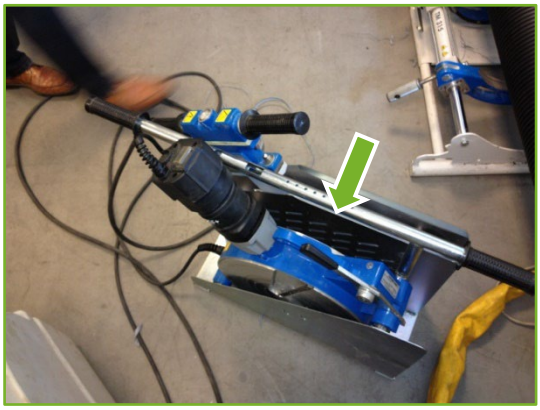
(3) Set the correct fusion temperature on the heating element with the temperature control dial.

Functions of control lights:

Red and green lights are on during heating up.

When the fusion temperature is reached, the red light blinks.

(4) Check the temperature of the heater plate surface with a contact thermometer according to the set temperature.



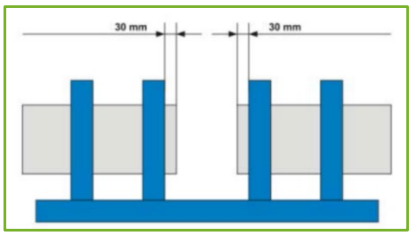
260°C ± 10°C

Before beginning with the first fusion, we recommend waiting approx. 10 minutes after the set fusion temperature has been reached, to allow even heat distribution.

(5) Clean the heating element with dry & clean tissues.

(6) Positioning and aligning pipes

01.
Open carriage by moving the control lever into open direction "<>".



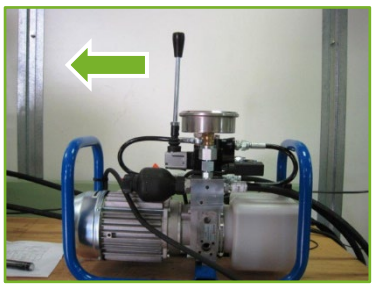
02.
Clamp the pipes to be jointed in that way, that the pipe ends reach out at least 30 mm (and not more than 70 mm, otherwise the planer will not fit) from the clamps, in order to perform a proper weld.

03.
Mark the pipes to be sure that the pipes will stay in the correct position.

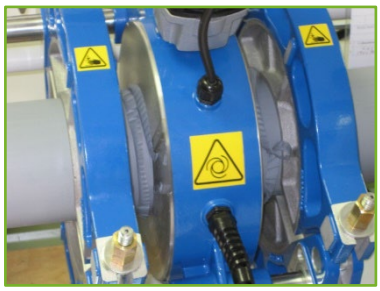
04.
Always use pipe rollers when moving and positioning pipes.

05.
Insert the planer to the base machine with care. Safety mechanism locks automatically. This prevents the planer unit from jumping out of the machine
during planning.

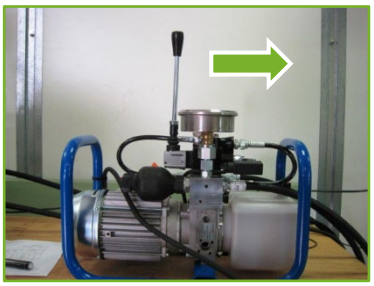
06.
Check that the signal lamp is ON, this indicates that the planer is inserted correctly.



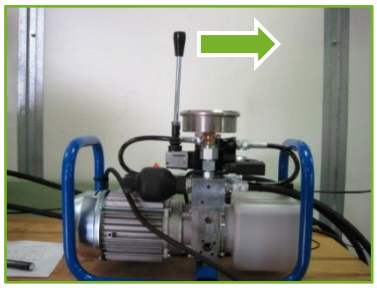
07.
Start the electric planer and the process by pulling the control lever in the “close >< direction”. The max. planer pressure is 10 bar above the drag resistance.



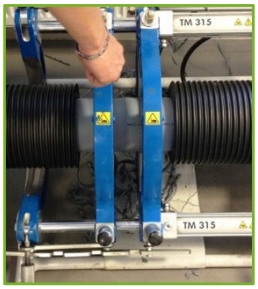
08.
Machine the facing surface of pipes/fittings until shavings are turned out in ribbons which are the same width as the pipe wall thickness.



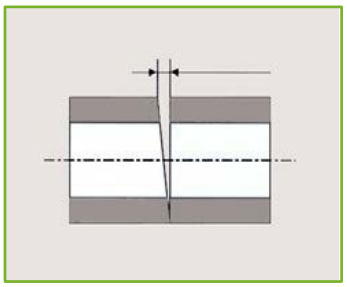
09.
Release the pressure to zero by pulling the control lever halfway between zero-point position and open “<>”. With this procedure the pipe surfaces will not show any
offset.



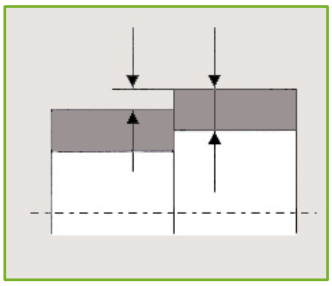
10.
Open completely the machine by moving the control lever into open
direction “<>”. Switch off and remove the planer out of the machine and place it into the case.



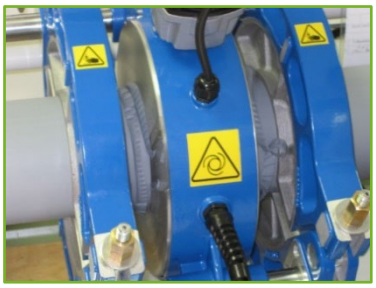
11.
Close machine until pipes/fittings touch each other and check the alignment. Make sure that the pressure is 0 bar!!!



12.
Maximum tolerance of the gap is 0.5 mm



13.
Check the alignment all around the circumference. The wall offset on the outside may not exceed 10 % of the wall thickness.



14.
If it is larger, the pipe/fitting can be turned or the clamping force on the inner clamping units can be changed to achieve a better clamping position. In this case, the fusion surfaces need to be machined again.

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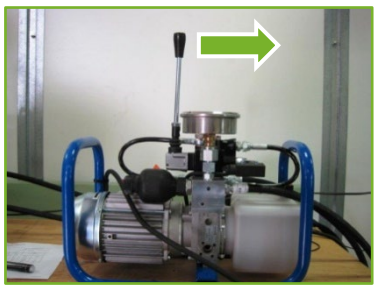
Instruction Leaflet

Calculation of machine drag pressure



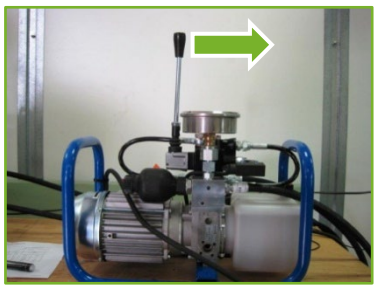
01.
Open the machine to the end position by moving the control lever (2) into open direction “<>”.

02.
Reduce pressure with fine adjustment pressure valve (3) - turn counter- clockwise.

03.
Increase pressure with the fine-adjustment pressure valve (3) (turn clockwise while simultaneously pulling the control lever (2) in the “close >< direction”.
As soon as the movement of the carriage is even, stop increasing the pressure and read the pressure value on the gauge (1) before the pipe ends are in contact. Write the pressure down!

The machine drag pressure must be calculated before each new fusion!

Adjusting bead up / joining pressure



01.
Open the machine to the end position by moving the control lever (2) into open direction “<>”.

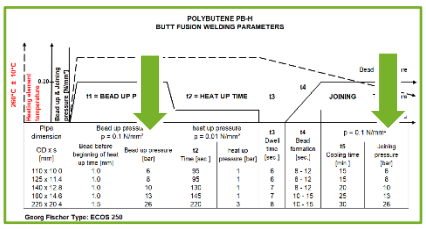
02.
Reduce pressure with fine adjust-ment pressure valve (3) - turn counter- clockwise.

03.
Move control lever towards “close ><” position and increase the pressure on the pressure valve (3) (turn clockwise) until clamping carriage moves smoothly.

04.
Adjust bead up / fusion pressure with the fine adjustment pressure valve as soon as both pipe ends are in contact (turn clockwise, keep control lever in position close).

05.
If the pressure is set too high,
re-adjust:

- Open completely the machine
- Turn the fine-adjustment pressure valve approx. 3 revolutions counter clockwise.
- Start fusion pressure adjustment again.



POLYBUTENE PB-H
BUTT FUSION WELDING PARAMETERS

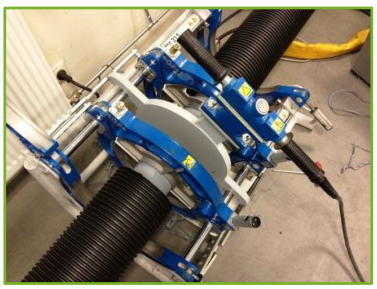
Pipe dimension CD x s [mm]	Bead up pressure p = 0.1 N/mm² Bead before beginning of heat up time (mm)	Bead up pressure (bar)	heat up pressure p = 0.01 N/mm² t2 Time [sec.]	heat up pressure [bar]	t3 Dwell time [sec.]	t4 Bead formation [sec.]	p = 0.1 N/mm² t5 Cooling time [min.]	Joining pressure [bar]
110 x 10.0	1.0	6	95	1	6	8 - 12	15	8
125 x 11.4	1.0	8	95	1	6	8 - 12	15	8
140 x 12.8	1.0	10	135	1	7	8 - 12	20	10
160 x 14.6	1.0	13	145	1	7	10 - 15	25	13
225 x 20.4	1.0	26	220	3	8	10 - 15	30	26

Georg Fischer Type: ECOS 250

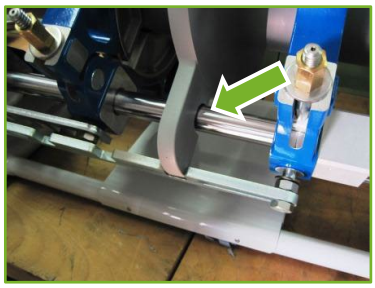
06.
Preset pressure =
= bead up pressure + drag pressure
= joining pressure + drag pressure

Welding

01.
Clean the fusion surfaces with lint-free paper and grease-free
cleaner, e.g. industrial alcohol (Tangit cleaner for PB, PE, PP or PVDF).



02.
Insert the heating element into the machine.

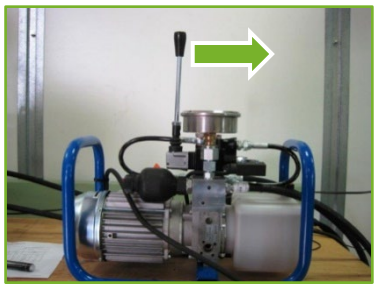


03.
Check that the heating element is inserted correctly.

04.
Move the parts to be joined toge-ther, push the control lever in the
“close ><” direction.

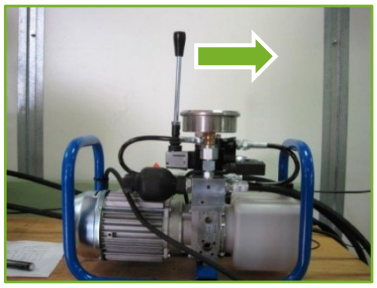
05.
When the preset pressure has been reached, slowly move the control lever back to 0 position.

06.
Wait until a 1 mm bead has formed around the entire pipe circumference.

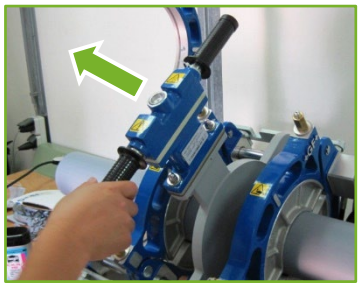


07.
Move control lever towards
“open <>“ (lever position: halfway between neutral and fully open) until pressure on manometer shows nearly 0.
Caution: Do not open the machine! Pipes have to keep contact with the heating
element.

08.
Start timer with preset heat up time, see corresponding welding table on page 4.
The heat up pressure has to be kept between “0” zero bar and the corresponding maximum value according to the welding table during the complete heat up time.



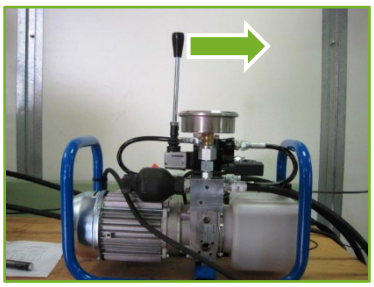
09.
As soon as the heat up time is elapsed: Push the control lever into “open <>“ position, 2 seconds at least, as long as the heating element has no more contact to the pipes.



10.
Immediately remove the heating element from the machine.
Respect the dwell time (see table on page 4)!

11.
Push the control lever into “close ><“, position until the pipes touch each other. Slowly built up the preset joining pressure and respect bead formation time (see table on page 4)!

12.
Wait for cooling time (see table on page 4)! The use of cooling agents is not permitted during cooling.
Release the pressure



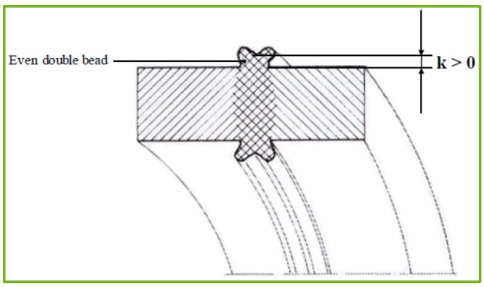
13.
Release the pressure of the hydraulic system before opening the clamps. Move control lever towards “open <>“ (lever position: halfway between neutral and fully open) until pressure on manometer shows nearly 0.
Caution: Do not open the carriage!

14.
Open clamps before removing welded pipes/fittings.

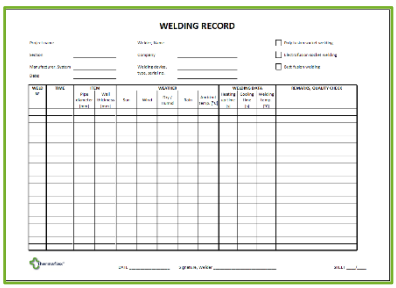
15.
All fusion joints must have cooled completely for 24 hours before the pressure test is performed.

Quality check & Welding report

1.
Immediately after removing the welded pipes/fittings visually check the part for correct cultivated double bead and the k-value.



2.
Even double bead and k-value must be >0.



3.
Fill in “Welding Report”.
Note on joining:

- Weld number
- Time (begin of cooling time)