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Buttwelding

OF POLYBUTYLENE

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Polybutylene Welding Instructions

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Welding technologies for piping and accessories made of polybutylene in medium and large diameters in all grade. The piping accessories are intended for welding by this method and will be welded pipe to accessory, or an accessory to accessory, according to request. The method is intended for connecting polybutylene piping in straight sections, as well as connecting accessories of various types, including arches, branching, diameter transitions, and collars. The buttweld will always be done with the help of suitable welding equipment and according to the welding instructions to be followed hereinafter.

Basic Process

When the polybutylene is heated to a specific melting temperature (265+50C), it is capable of flowing under pressure. Two ends of a pipe (or an accessory) are melted as a result of the heating action and get in contact under pressure. An action of fusion is created between them. The connecting action will terminate when the two ends of the pipe are cooled down.

As a result of the melting action and the pressure between the parts there will be a surplus of heated material (bead) inside and outside of the pipe. The interruption of the bead to the flow of the liquid inside the is minimal.

Basic Equipment

The welding machine is equipped with different sets of bisected and adjustable holders, a set for each diameter. One constant set for the frame of the machine, and the other is installed on gliding bars, which can be moved forward and backward along the longitudinal axis of the pipe.

The two sets and the frame are attached to one another by a leading screw, a hydraulic cylinder, or by any other mechanical arrangement.
The holders' set is exchangeable from one diameter to another.
The piping is connected to the machine by the bisected holders and fastened by special lockers or fastening screws.
The machine is also equipped with a manual or an electric trimmer, whose main parts include a round rotating disk equipped with one or two steel blades. These blades get in touch, align and cut the surface of the pipe or the accessory. This action makes a straight, clean, and smooth surface, which is ready for melting.
The machine has also a heating plate. This plate is made of cast of aluminum, for achieving the best heat conductivity, and it is coated by teflon in order to prevent adhesion of melted material. The heating element is equipped with a temperature controller, and it is adjustable.

Welding Equipment

There are two types of welding machines:

• A mechanical welding machine with a pressure screw or handle, which is regulated by an adjusting spring.

• A hydraulic welding machine with a manual or an electric pump.

Welding machines

• A welding machine, type Gamma110 (mini) for diameters of 90-110 mm.

This machine is intended for outside welding and in cases when welding has to be done on the line of the piping itself.

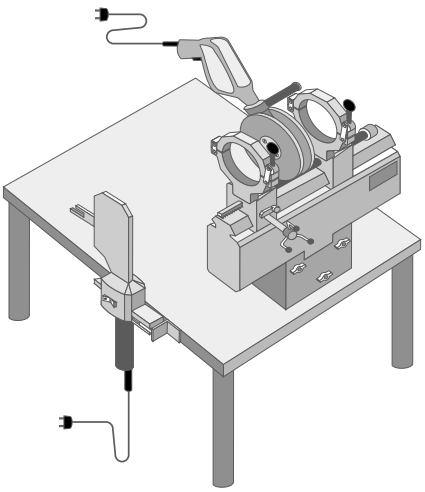
The machine is light and portable. The pressing is done by a screw that is pressed against an adjustable spring. Operating voltage is 220V and the output of the heating element is 1200W. The machine is supplied as a whole kit, which includes a storage and operation box.

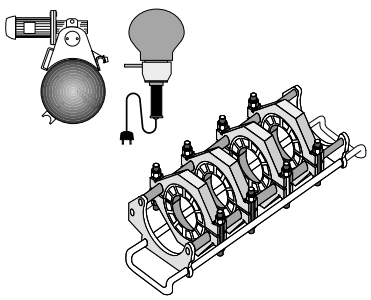
• A welding machine, type Delta 25S TE for diameters of 90-250 mm.

399200 Pressing in this machine is hydraulic, with the help of a manual or an electric pump. The machine is intended for executing welding in piping lines for any use. Operating voltage is 220V.

• A welding machine, type Delta 315 for diameters of 90-315 mm.

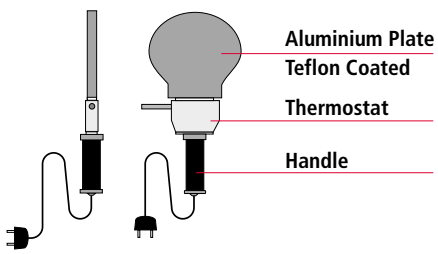
399200 Pressing in this machine is hydraulic by a manual or an electric pump. Operating voltage is 220V.





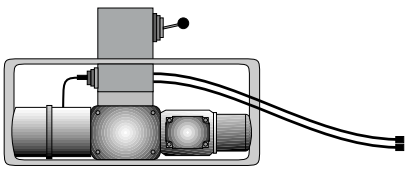
Extra Accessories and Auxiliary Equipment

Heating elements

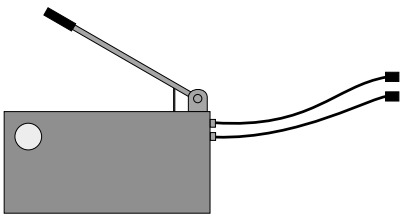


Headling Plate

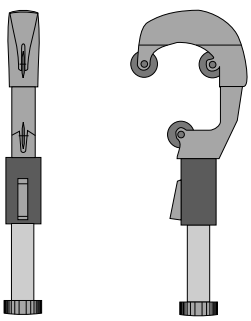
Electric Hydraulic units



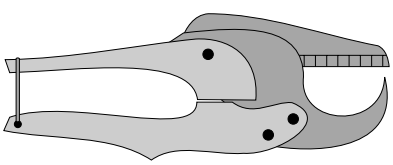
Manual Hydraulic Units



Pipes' Cutters



Shears



Auxiliary Cutting Knife

Welding and Operation (Buttweld)

1. Checking the welding machine:
- Oil leakage and seepage
- Cleaning the heating plate
- Calibrating the melting temperature (265+50C)
- Movement of the oil pressure gauge and adjusting it to the table attached to the machine
- Exposed electric wires
- The trimmer's proper work
- Fastening screws and smooth operation of the machine

2. Lining the two sections of the pipe or the accessory with the bisected holders. Bringing close the two parts and making sure that the two sections are aligned in the axial and the radial direction. When welding a long section of pipe, the pipe has to be raised by special cylinders up to the height of the machine.

3. Detaching the two sections of piping from one another, lowering the trimmer to the center of the machine, and attaching the two detached parts to it. Pressing the sections while rotating the trimmer (manual or electric), and aligning the surface of the two sections.

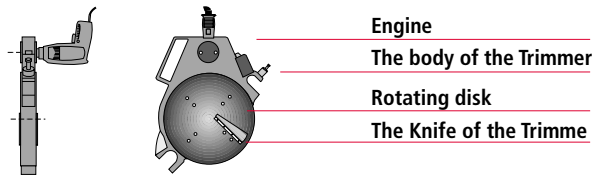
4. Detaching the aligned sections and removing the trimmer to its previous position. Wiping the surface of the pipe with a cloth saturated with denatured spirits.

5. Locating the heating plate in the center of the machine, pressing the two sections of the pipe and clutching them to the hot plate on its both sides. When a bead comes up (melted polybutylene) around the whole perimeter of the two piping sections (about 3 mm width, depending on the perimeter of the pipe), then operating additional pressure on the two piping sections towards the plate. The level of pressure and duration of contact are specified in a table later on.

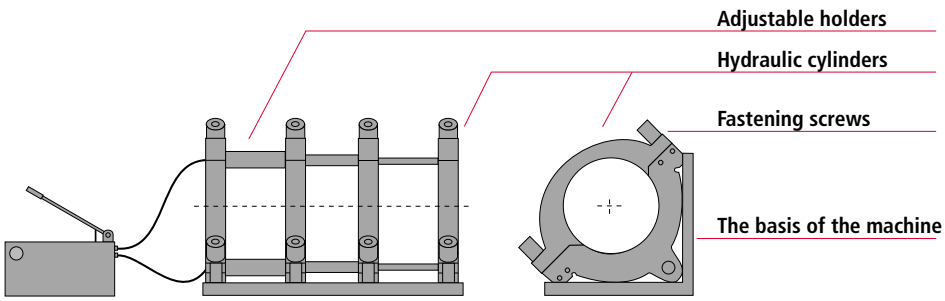
6. At the end of the melting operation, you detach the melted sections and remove the heating plate from the center of the machine. You get the melted ends of the pipe immediately together, fusing them with one another.
3200 The needed level of pressure and duration are specified, too, in the table later on.

7. For welding accessories you have to use special holders, but the operation of welding an accessory to an accessory, or an accessory to a pipe are similar in all stages to the welding operation described above.

8. At the end of cooling down, you remove the two sections from the holders, and the machine is ready for the next welding.



Trimmer



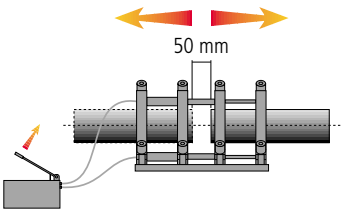
Oil Pressure Pump

The body of machine

Step by Step ButtWelding

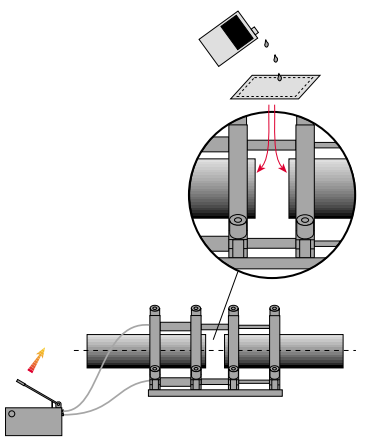
Step 1

Locate the two sections of piping or the accessory with the adjusting holders. Leave a minimal space of 50 mm between the two ends of the pipe.



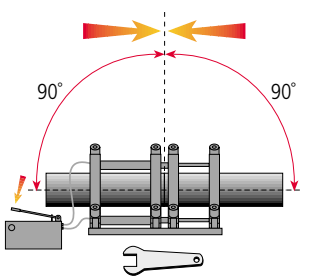
Step 2

Wipe well with a cloth saturated with non-denatured alcohol 95% the two ends of the pipe from the inside and the outside in order to Remove any dirt, dust, and oils.



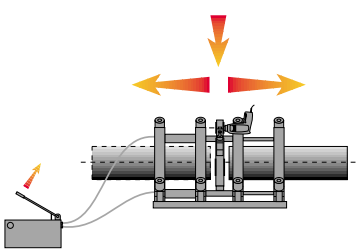
Step 3

Direct the pipes in their location by the bisected holders and align them in the longitudinal and the axial direction. Fasten the holders.



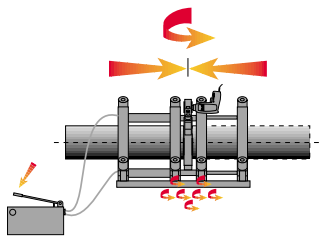
Step 4

Detach the piping sections and lower the trimmer to the center of the machine.



Step 5

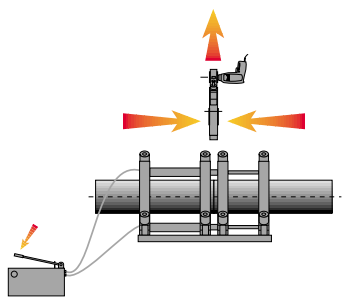
Press the two piping sections towards the rotating trimmer until reaching straightened and smooth surface. Remove all the surplus cutting chips.



- **You should not weld accessories and piping of different grades.**
- **The wall thickness of two welded parts must be the same.**
- **An internal step that is created by differences of the wall thickness reduces the strength of the welding.**

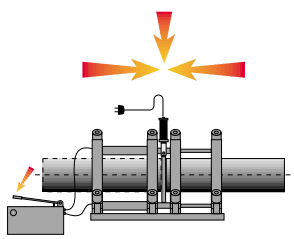
Step 6

Bring the two ends of the pipe into contact again in order to make sure a longitudinal and axial alignment.



Step 7

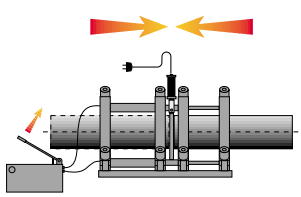
Detach the two aligned sections. Make sure that the heating plate is clean and is in the right temperature. Lower the heating plate to the center of the machine, bring the ends of the pipe into light contact with the heating plate (0.1-0.2 kg/cm2) until melted polybutylene material (bead) comes up around the perimeter of the two pipes. Maximal beadís height: 3 mm.



Note: **Temperature of the heating plate: 265+50C. The plate must be clean after each welding action. Prevent any damage and scratches from the teflon coating on the heating plate. You mustnít touch the heating plate with dirty and oily hands.**

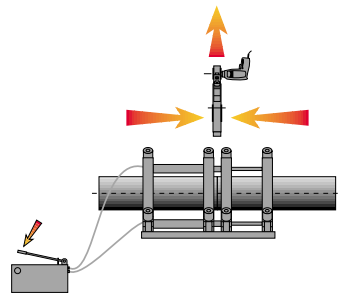
Step 8

Loosen the pressure of the light contact, but leave the ends of the pipe in touch with the heating plate for the duration time specified in the table.



Step 9

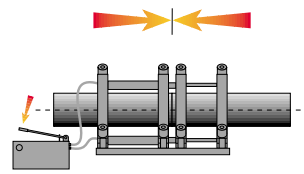
Detach the melted ends of the pipe and remove the heating plate from the center of the machine. Caution! The heating plate must not be moved across the pipeís surface.



- **Recommended pressure: 1.0-1.3 kg/cm² on the surface**
- **Calculation of the specified pressure is dependent on the diameter, the wall thickness of the pipe, and type of machine.**

Step 10

Press the melted pipe's ends towards one another (see the recommended pressure specified in the table). Operate the pressure slowly in order to prevent fast squeeze of the melted material out of the welding area. Leave the contact pressure according to the cooling pressure as specified in the table.

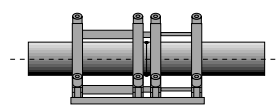


- **Check friction in the machine (2 kg/cm²). Over friction the machine is not in order.**

$$\text{Pressure (pressure gauge)} = \frac{\text{Contact pressure x surface of the pipes profil}}{\text{surface of the hydraulic}} + \text{machineís friction}$$

Step 11

At the end of cooling, release pressure and continue to cool down according to the specification in the table. In a hot day you may cool down by using a humid cloth. The pipe must not be removed from the machine before a complete cooling. Welding accessories should be done with special holders. The external bead should not be removed from the welded pipe.



- **Hydraulic operation by a manual or an electric pump.**
- **machine type Gamma 110. Pressing the pipe by a handle, which operates power by kg against a twist spring.**

Table of pressures and heating/cooling times in welding Polybutylene piping

Pipe dia. (mm)	Grade of pipe	Heating Time (sec)	Cooling Under Pressure (sec)	Cooling w/o Pressure (min)	Hydraulic mahine Pressure (bar)	Manual mahine Welding (Kg)
90	10	50	60	10	3.0	27
90	16	60	60	10	3.5	34
110	10	60	60	15	4.0	40
110	16	60	60	15	4.0	47
160	10	60	60	15	5.0	–
160	16	70	120	20	9.0	–
225	10	70	120	20	11.0	–
225	16	90	150	25	18.0	–
280	10	90	150	25	21.0	–
315	10	90	150	25	34.0	–

Note:
- At the end of the welding, it is recommended to wait for additional cooling of 30 min. outside the machine for releasing the welding efforts.
- The tables are up-to-dated for calibrated machines only.
- Pressure check will be done 24 hours after end of the welding.

Table of pressures and heating/cooling times according to the pipe wallís thickness

Wall Thickness (mm)	Heating Time after appearance of bead (sec)	Cooling time under recommended contact pressure (sec)	Cooling time w/o pressure when the pipe is lined in the machine (min)
2.5	10.0	15.0	5
5.0	20.0	30.0	10
7.5	45.0	60.0	10
10.0	60.0	60.0	10
13.0	60.0	60.0	15
15.0	75.0	60.0	15
18.0	75.0	60.0	20
20.0	75.0	90.0	20
23.0	90.0	90.0	25
25.5	90.0	90.0	25

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