

Operation Manual for Hydraulic Welding Machine

1, Brief

The most popular and reliable welding method for HDPE pipe is Butt fusion welding. Butt fusion welding is thermal jointing. The principle is to heat two pipe ends to designated temperature, and then fuse them together by application of sufficient force. The quality of joints then depends on the quality butt welding machine, proper welding parameters and experience of the welder.

This manual is for plastic pipe butt welding machine. It's suggested to read and follow carefully the following safety rules and maintenance rules before operating the machine.

2, Special Description

Before operating the machine, anyone should read this description carefully and keep it well to ensure the equipment and operator's safety, as well as others' safety.

2.1 The machine is used to weld pipes made from PE, PP, PVDF and cannot be used to weld material without description, otherwise the machine may be damaged or some accident may be resulted in.

2.2 Don't use the machine in a place with potential hazard of explosion

2.3 The machine should be operated by responsible, qualified and trained personnel.

2.4 The machine should be operated on a dry area. The protective measures should be adopted when it is used in rain or on wet ground.

2.5 The machine is operated by 220V±10%, 50 Hz. If extended wire should be used, it should have enough lead section according its length.

3, Safety

3.1 Precautions for Safety

Take care when operating and transporting the machine according to all the safety rules in this instruction.

3.1.1 Notice when using

- The operator should be responsible and trained personnel.
- Completely inspect and maintain the machine per year for the safety and machine's reliability.
- Dirty and crowed work site would not only lower working efficiency, but cause accident easily, so it is important to keep work site clean and no other obstacles.

3.1.2 Storage of electrical equipment

For the min. dangers, all equipment must be used and stored correctly as follows:

- ※ Avoid using temporary wire not complying with standard
- ※ Do not touch electrophorus parts
- ※ Forbid hauling off the cable to disconnect

- ※ Forbid hauling cables for lifting equipment
- ※ Do not put heavy or sharp object on the cables, and control the temperature of cable within limiting temperature (70°C)
- ※ Do not work in the wet environment. Check if the groove and shoes is dry.
- ※ Do not splash the machine

3.1.3 Check insulation condition of machine periodically

- ※ Check the insulation of cables specially the points extruded
- ※ Do not operate the machine under extreme condition.
- ※ Check if the leakage switch works well at least per week.

3.1.4 Clean and check the machine carefully

- ※ Do not use materials (like abrasive, and other solvents) damaging the insulation easily when cleaning the machine.
- ※ Make sure the power is disconnected when finishing job.
- ※ Make sure there is no any damage in the machine before reusing.

If only following above mentioned, the precaution can work well.

3.1.5 Starting

Make sure the switch of the machine is closed before powering it on.

3.1.6 Tightness of parts

Make sure the pipes are fixed correctly. Ensure that it can move well and prevent it from sliding down.

3.1.7 Work in environment with hazards

- ◎ When work in a ditch, check if there is fender which stop the earth or stones from falling down to the machine, and also check if it has a water or other fluid leaking, if there be, the operator may get an electric shock.
- ◎ When lift the machine to ditch, the weight of the machine should be within the rated lifting weight, and person is forbidden staying under the lifting arm.
- ◎ Avoid using the machine in the environment full of paint, gas, and smoke, since the infection of eyes and respiratory tract would be caused.
- ◎ Do not put the machine in a dirty place.

3.1.8 Personnel safety while working

Remove jewelry and rings, and does not wear loose-fitting clothing avoid wearing shoe lace, long mustache or long hair that may be hooked into the machine

3.1.9 Untrained person is not allowed to operate the machine anytime.

3.2. Potential Dangers

3.2.1 Butt fusion machine controlled by hand pushing:

This machine is only operated by professional person or others with a certificate for operation, otherwise unwanted accident maybe caused.

3.2.2 Heating Plate

The max temperature can reach 270°C, so the following things should be noticed:

-----Wear safety gloves



-----Never touch the surface of the heating plate



3.2.3 Milling Cutter

Before shaving the pipes, ends of pipes should be cleaned, especially clean the sand or other draff crowd around the ends. By doing this, the lifetime of edge can be prolonged, and also prevent the shavings are thrown out to danger people.

3.2.4 Main Frame:

Make sure the pipes or fittings are fixed correctly to get the right alignment. When joining pipes, the operator should keep a certain space to the machine for personnel safety.

Before transporting, make sure all the clamps are fixed well and cannot fall down during transportation.

Follow all the safety marks in the machine.

4. Applicable Range and Technical Parameter

Sheet 1

Type	WH160	
Materials	PE, PP-R, PB, PVDF, PVC	
Range of diameter	63-160 mm	
Ambient temp.	- 5 ~ 45℃	
Power supply	220V±10 %	
Frequency	50 Hz	
Total power	2.6kW	
Dielectric resistance	>1MΩ	
Operation Pressure Range	0-6MPa	
Total Section of Cylinders	15 cm ²	
Hydraulic oil	46#	
Max. Temperature of heating plate	299℃	
Difference in surface temperature of heating plate	±3℃	
Basic Frame	Size, mm	885*475*500
Hydraulic Unit	Size, mm	495*565*520
Total Weight	W.G., kg	112.5

Sheet 2

Type	WH200	
Materials	PE, PP-R, PB, PVDF, PVC	
Range of diameter	63-200 mm	
Ambient temp.	- 5 ~ 45℃	
Power supply	220V±10 %	
Frequency	50 Hz	
Total power	3kW	
Dielectric resistance	>1MΩ	
Operation Pressure Range	0-6MPa	
Total Section of Cylinders	15 cm ²	
Hydraulic oil	46#	
Max. Temperature of heating plate	299℃	
Difference in surface temperature of heating plate	±3℃	
Basic Frame	Size, mm	885*530*570
Hydraulic Unit	Size, mm	495*565*520
Total Weight	W.G., kg	120

Sheet 3

Type	WH250	
Materials	PE, PP-R, PB, PVDF, PVC	
Range of diameter	90-250 mm	
Ambient temp.	- 5 ~ 45℃	
Power supply	220V±10 %	
Frequency	50 Hz	
Total power	3.85kW	
Dielectric resistance	>1MΩ	
Operation Pressure Range	0-6MPa	
Total Section of Cylinders	11 cm ²	
Hydraulic oil	46#	
Max. Temperature of heating plate	299℃	
Difference in surface temperature of heating plate	±3℃	
Basic Frame	Size, mm	900*580*460
Hydraulic Unit	Size, mm	770*550*615
Total Weight	W.G., kg	146

Sheet 4

Type	WH315	
Materials	PE, PP-R, PB, PVDF, PVC	
Range of diameter	160-315 mm	
Ambient temp.	- 5 ~ 45°C	
Power supply	220V±10 %	
Frequency	50 Hz	
Total power	4.85kW	
Dielectric resistance	>1MΩ	
Operation Pressure Range	0-6MPa	
Total Section of Cylinders	20 cm ²	
Hydraulic oil	46#	
Max. Temperature of heating plate	299°C	
Difference in surface temperature of heating plate	±3°C	
Basic Frame	Size, mm	1010*665*550
Hydraulic Unit	Size, mm	730*645*680
Total Weight	W.G., kg	189

Sheet 5

Type	WH355	
Materials	PE, PP-R, PB, PVDF, PVC	
Range of diameter	160-355 mm	
Ambient temp.	- 5 ~ 45°C	
Power supply	220V±10 %	
Frequency	50 Hz	
Total power	5.85Kw	
Dielectric resistance	>1MΩ	
Operation Pressure Range	0-6MPa	
Hydraulic oil	46#	
Max. Temperature of heating plate	299°C	
Difference in surface temperature of heating plate	±3°C	
Basic Frame	Size, mm	1170*810*840
Hydraulic Unit	Size, mm	730*645*680
Total Weight	W.G., kg	230

Sheet 6

Type	WH450	
Materials	PE, PP-R, PB, PVDF, PVC	
Range of diameter	280-450 mm	
Ambient temp.	- 5 ~ 45°C	
Power supply	380V±10 %	
Frequency	50 Hz	
Total power	11.6kW	
Operation Pressure Range	0-6MPa	
Total Section of Cylinders	22 cm ²	
Hydraulic oil	46#	
Max. Temperature of heating plate	299°C	
Difference in surface temperature of heating plate	±3°C	
Basic Frame	Size, mm	1170*810*840
Hydraulic Unit	Size, mm	1140*550*910
Accessories	Size, mm	900*610*1150
Total Weight	W.G., kg	440

Sheet 7

Type	WH500	
Materials	PE, PP-R, PB, PVDF, PVC	
Range of diameter	315-500 mm	
Ambient temp.	- 5 ~ 45°C	
Power supply	380V±10 %	
Frequency	50 Hz	
Total power	12.1kW	
Dielectric resistance	>1MΩ	
Operation Pressure Range	0-6MPa	
Hydraulic oil	46#	
Max. Temperature of heating plate	299°C	
Difference in surface temperature of heating plate	±3°C	
Basic Frame	Size, mm	1360*900*1030
Hydraulic Unit	Size, mm	1140*550*910
Accessories	Size, mm	945*650*1250
Total Weight	W.G., kg	610

Sheet 8

Type	WH630	
Materials	PE, PP-R, PB, PVDF, PVC	
Range of diameter	400-630 mm	
Ambient temp.	- 5 ~ 45°C	
Power supply	380V±10 %	
Frequency	50 Hz	
Total power	12.6kW	
Operation Pressure Range	0-8MPa	
Total Section of Cylinders	23 cm ²	
Hydraulic oil	46#	
Max. Temperature of heating plate	299°C	
Difference in surface temperature of heating plate	±3°C	
Basic Frame	Size, mm	1500*1040*1100
Hydraulic Unit	Size, mm	710*530*600
Accessories	Size, mm	1030*830*1250
Total Weight	W.G., kg	610

Sheet 9

Type	WH800	
Materials	PE, PP-R, PB, PVDF, PVC	
Range of diameter	630-800mm	
Ambient temp.	- 5 ~ 45°C	
Power supply	380V±10 %	
Frequency	50 Hz	
Total power	15.5kW	
Operation Pressure Range	0-10MPa	
Total Section of Cylinders	32 cm ²	
Hydraulic oil	46#	
Max. Temperature of heating plate	299°C	
Difference in surface temperature of heating plate	±3°C	
Basic Frame	Size, mm	2050*1260*1150
Hydraulic Unit	Size, mm	900*510*650
Accessories	Size, mm	1050*900*1500
Total Weight	W.G., kg	1171

Sheet 10

Type	WH1000
Materials	PE, PP-R, PB, PVDF, PVC
Range of diameter	800-1000 mm
Ambient temp.	- 5 ~ 45°C
Power supply	380V±10 %
Frequency	50 Hz
Total power	22kW
Operation Pressure Range	0-10MPa
Total Section of Cylinders	37 cm ²
Hydraulic oil	46#
Max. Temperature of heating plate	299°C
Difference in surface temperature of heating plate	±3°C

Sheet 11

Type	WH1200
Materials	PE, PP-R, PB, PVDF, PVC
Range of diameter	800-1200 mm
Ambient temp.	- 5 ~ 45°C
Power supply	380V±10 %
Frequency	50 Hz
Total power	27.2kW
Operation Pressure Range	0-10MPa
Hydraulic oil	46#
Max. Temperature of heating plate	299°C

Sheet 12

Type	WH1400
Materials	PE, PP-R, PB, PVDF, PVC
Range of diameter	1000-1400 mm
Ambient temp.	- 5 ~ 45℃
Power supply	380V±10 %
Frequency	50 Hz
Total power	30.5kW
Operation Pressure Range	0-10MPa
Hydraulic oil	46#
Max. Temperature of heating plate	299℃

Sheet 13

Type	WH1600
Materials	PE, PP-R, PB, PVDF, PVC
Range of diameter	1200-1600 mm
Ambient temp.	- 5 ~ 45℃
Power supply	380V±10 %
Frequency	50 Hz
Total power	32kW
Operation Pressure Range	0-10MPa
Hydraulic oil	46#
Max. Temperature of heating plate	299℃

5, Instruction for use

5.1 The whole equipment should be placed on a stable and dry plane to operate.

5.2 Before operation make sure the following things:

- ◎The machine is in good conditions
- ◎The power complies with the requirements according to the butt fusion machine
- ◎Power line is not broken or worn
- ◎All instruments are normal
- ◎The blades of milling cutter are sharp
- ◎All necessary parts and tools are available

5.3 Welding

5.3.1 Pipes

Before welding, firstly, check if the material and its pressure grade are the required ones. Secondly check if there are scratches or fissures on the surface of pipes/fittings. If the depth of scratches or fissures exceeds 10% of the wall thickness, cut the section of scratches or fissures. Clean the pipe end's surfaces with clean cloth to keep the pipe's ends clean.

5.3.2 Clamping

Place the pipes/fittings in inserts of frame and keep the ends to be welded be the same length (no effect on the Milling and heating of the pipe). The pipe out of the main frame should be supported to the same central axial of clamps. Fasten the screws of clamps to fix the pipes/fittings.

5.3.3 Milling

Put the milling cutter between the pipes/fittings ends and switch it on, close the pipes/fittings ends by acting on the pushrod until there are continuous shavings appearing on both sides. After a moment later, open the frame, switch off the milling cutter and remove it.

Close the pipes/fitting ends and checks the alignment of them. The maximal misalignment should not exceed 10% of the wall thickness, and it could be improved by loosening or tightening the screws of clamps. The gap between two pipe ends should not exceed 10% of wall thickness; otherwise the pipes/fittings should be planed again.

Caution: The shavings thickness should be within 0.2~0.5 mm and it can be adjusted by adjusting the height of the milling cutter blades.

5.3.4 Heating

Clear the dust or slit on the surface of heating plate (Caution: Don't damage PTFE layer on the surface of heating plate.), and make sure the temperature has reached the required one.

Put the heating plate between the pipe ends after it reaches required temperature. Close the pipes/fittings ends by operating the pushrod till the bead reaches specified height.

5.3.5 Joining and cooling

Open the frame and take out the heating plate and close two melting ends as quickly as possible.

When it reaches the required cooling time, loosen the screw of clamps and then takes out the jointed pipes.

6, Reference for Welding Parameters

Wall thickness (mm)	Bead height (mm)	Bead build-up pressure (MPa)	Soaking time t ₂ (sec)	Soaking pressure (MPa)	Change-over time t ₃ (sec)	Pressure build-up time t ₄ (sec)	Welding pressure (MPa)	Cooling time t ₅ (min)
0~4.5	0.5	0.15	45	≤0.02	5	5	0.15±0.01	6
4.5~7	1.0	0.15	45~70	≤0.02	5~6	5~6	0.15±0.01	6~10
7~12	1.5	0.15	70~120	≤0.02	6~8	6~8	0.15±0.01	10~16
12~19	2.0	0.15	120~190	≤0.02	8~10	8~11	0.15±0.01	16~24
19~26	2.5	0.15	190~260	≤0.02	10~12	11~14	0.15±0.01	24~32
26~37	3.0	0.15	260~370	≤0.02	12~16	14~19	0.15±0.01	32~45
37~50	3.5	0.15	370~500	≤0.02	16~20	19~25	0.15±0.01	45~60
50~70	4.0	0.15	500~700	≤0.02	20~25	25~35	0.15±0.01	60~80

Remark : Bead build-up pressure and welding pressure in the form is the recommended interface pressure, the gauge pressure should be calculated with the following formula.

Expressions:

$$\text{welding pressure} = \frac{\text{Section of welding pipe ends}}{\text{Total section of cylinders}} \times 0.15 + \text{drag pressure (MPa)}$$

7, General joint problems

© Visually check: round bead, good joint



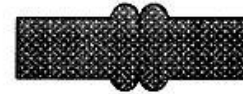
© Narrow and fall bead. Too high pressure while welding



© Too small bead. Pressure is not enough while welding



© There is a ditch between the welding surfaces. Temperature is not enough or change-over time is too long while welding.



© High & low bead. Different heating time or fusion temperature causes that.



© Misalignment. Welding under the condition that the misalignment exceeds 10% of pipe wall thickness while align the two ends.



8, Maintenance

※ Heating plate coating

Please take care on handling the heating plate. Keep a certain distance away from heating plate. Cleaning of its surface must be done with surface still warm by using a soft cloth or paper, avoid abrasive materials in that might damage the coating.

At regular intervals check as follows

- 1) Clean the surface by using a quick evaporation detergent (alcohol)
- 2) check the tightening of the screws and the cable and plug condition
- 3) Verify its surface temperature by using infrared-ray scanning

※ Milling cutter

It is strongly suggested to keep always clean the blades and wash the pulleys by using a detergent. At regular intervals, carry out a complete cleaning operation.

9. Guarantee Clauses

1. The guarantee range refers to the whole machine.
2. Maintenance for malfunctions during normal utilization is free of charge within guarantee time that is 12 months
3. The guarantee time starts with the date of delivery.
4. Fees are charged in case of the following condition:
 - 4.1 Malfunction caused by improper operation
 - 4.2 Damages caused by fire, flood, and abnormal voltage
 - 4.3 Working exceeds its normal function
5. Fees are charged as actual expense. A contract about the fees shall be abided if there is one.