



Butt fusion machine

FM -225 Butt Fusion Machine Operation Mannual

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1 Equipments Introduction

FM-225 butt fusion machine is applicable to the butt fusion jointing of PE and PP plastic pipe between Dn225-90mm.

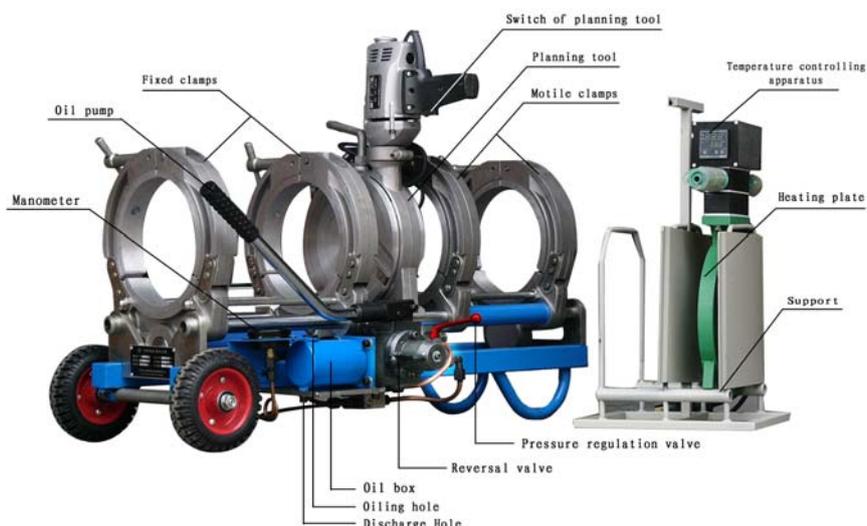
The base framework adopts the structure of two clamps, which leads to the accurate positioning of the pipe. Adjusting 4 locking bolts on the clamps can calibrate the jointing ends of the pipe conveniently. The design of inclined opening plane makes the loading and unloading process quite convenient.

The hydraulic operation by hand is accurate. The pressure is displayed on the manometer.

The electric planning tool shave the end of pipe. The machine is very light, can move easily.

2 Names of Components

FM-225 Butt Fusion machine sketches



2.1 Valve function and pressure control

Shut-off valve which control the oil circuit opening and closing.

When put the valve in:

Position A: The oil circuit open.

Position B: The oil circuit close.

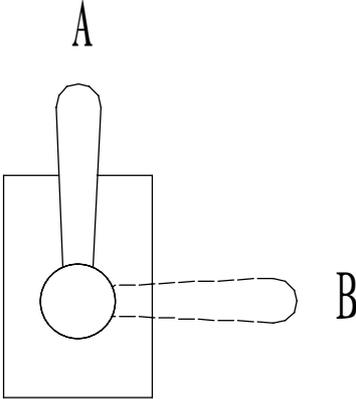


Fig.1

Reversal valve(Fig.2) which controls the movement direction of the motile clamps.

When put the valve in

Position A, the motile clamps can move backward;

Position B, the motile clamps can't move;

Position C, the motile clamps can move forward.

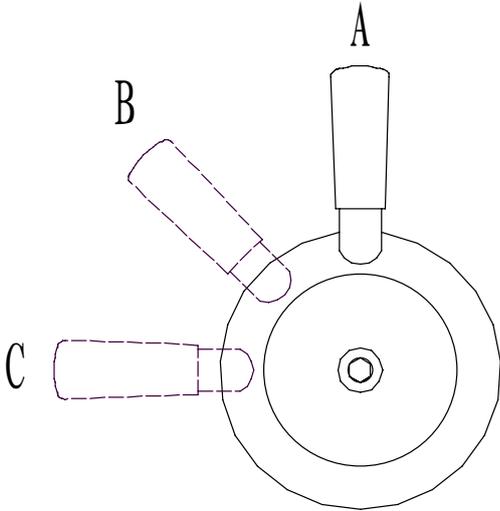


Fig.2

Oil pump lever: Provide the force to make the motile clamp move.

How to increase the pressure?

A: Shut-off valve in position A

B: Reversal valve in position C

C: Operate oil pump lever, increased pressure displayed on the manometer.

How to decrease the pressure?

A: Shut-off valve in position A

B: Move reversal valve from position C to A or B, the pressure decrease.

How to maintain the pressure?

A: Move Shut-off valve from position A to position B

3 Main technical parameter

3.1 Largest Work Pressure: 7.5 Mpa;

3.2 Cylinder surface: 862 mm² (double urns);

3.3 Power Supply Voltage: 240V% .AC;

 planning tool Voltage: 240V.AC;

 Heating plate Voltage: 240V.AC;

If the voltage of power supply differs from the one in China (AC: 220V <single-phase>), you can choose to use an AC generator group or inform us when you place an order, we will try our best to satisfy your requirement.

3.4 Total Power: 2.2 KW;

 Heating plate power: 1.5 KW;

 Planning tool power: 0.7 KW.

3.5 Scope of heating plate temperature: 170~250°C.

3.6 Welding Materials applied: PE, PP.

3.7 Liquid pressure oil: YB-46N or YB-32N the anti-whets liquid pressure oil.

3.8 Clamp jaws: Φ200、(Φ180)、Φ160、(Φ140)、Φ125、Φ110、Φ90、Φ75

 Note: the specifications in parenthesis required can be manufactured only.

4 Operation method

4.1 Operation condition requirement

4.11 The power cable requirement

The power cable must be the rubber power cable ($3 \times 1.5 \text{ mm}^2$) that can bear the physical impact and the chemistry corrosion. When the length of electric cable is longer than 100 meters, its section area should be larger than ($3 \times 2.5 \text{ mm}^2$) square millimeter.

The whole workplace must have an earthing.

4.12 The operator requirement

The operator must be trained so that he can professional operate the machine. At least there should be 2 persons in charge of the whole welding process. One operates butt fusion machine, the other takes the responsibility for assistance and supervision.

4.13 The climate condition requirement

Climate condition under gale and storm are not suitable for welding.

When environmental temperature is lower than 0°C , welding operation need be carried out in cold shed, and two end of pipe should be closed to prevent the cold wind from influencing the welding quality.

When environmental temperature is higher than 25°C , measures should be taken to prevent the sunlight from influencing the welding quality.

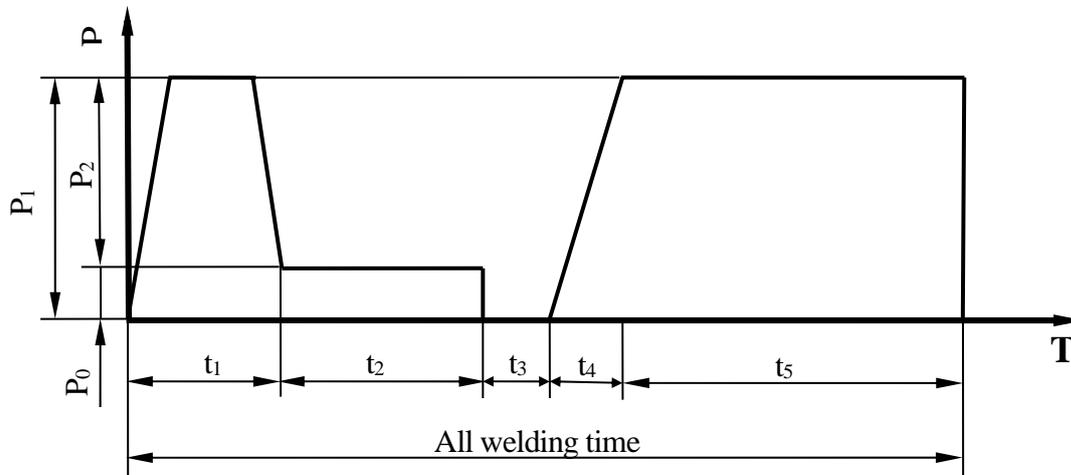
4.2 Welding parameter calculation formula

4.21 Formula

System Welding Pressure (P_1) = System Driving Pressure (P_0) + Standard Welding Pressure (P_2)

4.22 Time Process of welding

Followed diagram displays the pressure in the different period in a whole welding process.



Welding process is divided into five phases:

- | | | |
|---------------------------------|----------------|-------------------------------------------------------------------------|
| a) Heating phase: | t ₁ | correspondent pressure P ₁ = P ₀ + P ₂ |
| b) Heat absorption phase | t ₂ | correspondent pressure P ₀ |
| c) Heating plate take-out phase | t ₃ | |
| d) Welding phase: | t ₄ | correspondent pressure P ₁ |
| e) Cooling phase: | t ₅ | correspondent pressure P ₁ |

4.22 System driving pressure P₀

Load and fix the pipe well.

Regulate the reversal valve to position C and shut-off valve to position A, operate the oil pump lever slightly until the motile clamp can move forward.

Record the pressure which is the system driving pressure P₀.

4.23 Standard Pressure P₂ formula

$$P_2 = \frac{0.15\pi e (D_n - e)}{S} \quad (\text{Mpa})$$

e: thickness(mm)

π: 3.1416

D_n: diameter(mm)

S: Surface of hydraulic cylinder (mm²)

0.15: the pressure coefficient of 0.15 Mpa in German standard DVS2207

For Example:

To weld PE80 pipe of SDR 11 in dn 200mm, and chooses FM-225 Butt Fusion Welder. The executive welding standard is DVS 2207: 1995. Please calculate the standard welding pressure of the liquid pressure system of the Butt Fusion Welder.

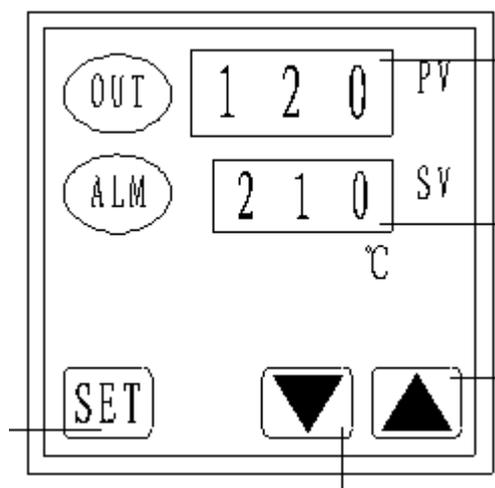
Have already known: Dn=200 mm e=18.1 mm S=862mm²

$$P_2 = \frac{0.15\pi e (Dn-e)}{S} = \frac{0.15 \times 3.14 \times 18.1 \times (200-18.1)}{862} = 1.8 \text{ Mpa}$$

4.3 Operation Process

4.31 Connect the power source and set the heating plate temperature

- Connect the heating plate, the planning tool with the power supply.
- The temperature of the heating plate is displayed and controlled by the intelligent temperature controlling apparatus on the head of the heating plate. Press “ set”, then press arrow up and down to set the temperature. Green digits (SV) represent temperature to be set. Red digits(PV) represent real temperature.



4.32 Pipe loading

Clean the inside and outside of the pipe to be joined by wiping with a clean lint-free cloth.

Remove all foreign matter.

Tighten all the locknuts on the machine.

4.33 Check the system driving pressure P_0

Followed 4.22 then record the system driving pressure P_0 . Through calculation to get standard welding pressure P_2 . Then get P_1 .

4.34 Facing the ends of pipe

a. Regulate the reversal valve to position C, operate the oil pump lever to move the motile clamp forward. When pressure reaches facing pressure (around 2 Mpa), press the switch of facer, start the facing.

b. When the scrap appears continuously, regulate reversal valve from position C to position A, continue 2 circles facing, then loose the the switch of facer to stop the facing.

c. Operate oil pump lever move the motile clamp backward. Take out the facer.

c. Take out the facer and check the ends.

4.35 Check the mismatch of the ends

Move the two ends together and check the mismatch, to adjust the minor mismatch by tightening and loosing the locking nuts.

4.35 Welding process

a. Heating process

When the temperature of the heating plate reaches standard requirement, put it between two ends.

Regulate reversal valve in position C, operate oil pump lever to increase the pressure to P_1 .

When the pressure reaches P_1 , regulate shut-off valve to position B, to close the oil circuit, under this situation, P_1 is maintained.

Start timing and observe the bead.

b. Heat absorption process.

Regulate shut-off valve to position A to open the oil circuit.

Regulate reversal valve to position A, the pressure will decrease.

When the pressure is 0, regulate reversal valve to position C at the same time, operate the oil pump lever to increase the pressure to P0. Regulate the shut-off valve to position B, to maintain pressure P0 for the heat absorption.

c. Heating plate take-out process

Regulate shut-off valve to position A.

Regulate reversal valve to position A.

Operate oil pump lever to move the motile c direction at the same time, move the motile clamp backward very soon.

Take out the heating plate.

d. Fusion process

Regulate the reversal valve to position C and operate oil pump lever to close the ends of melted ends and increase the pressure to P1.

When the contacted bead size reaches , regulate the shut-off valve to position B, to maintain the pressure. Then goes into step cooling.

e. Cooling process

Start timing.