



PMMA PYROLYSIS MACHINE

INSTRUCTION

MANUAL



1. Heating way: Electric furnace

Electric furnace itself relies on its own resistance wire to generate heat ,which is transmitted to the drum, acrylic start melting and cracking when the temperature rise to around 380°C.

1.1 Advantages

1.1.1 High effective heating

Bottom of reactor generates heat by self-conduction, no medium conduction, little heat loss, can achieve more than 80-90% thermal efficiency, one electric furnace can pyrolysis 2.5-3tons feed stock per 24 hours.

1.1.2 Energy saving and Eco-Friendly: no fire,low noise,thermal and electric isolation, only fully cast table without exhaust gas, no pollution while recycling cooling water in the pyrolysis workshop, adopt uncontrollable full-bridge rectification while rectification, which has minimum interference on the power grid, and the power factor is ≥ 0.95 .

1.1.3 Power saving, economical and practical: Adjust the adaptively temperature according the acrylic qty in the drum, control the pyrolysis time according the electricity consumption peaks and valleys, high electric current pyrolysis while low electricity price; when electricity price is high, temperature has been high enough for drying point by low current.

This equipment size is small, require small land area, easy operating. Power consumption will be 450-480 degrees for processing one ton material.

1.2 Technical Parameter

1.2.1 Rated Power 110KVA

1.2.2 Three-phase four-wire system 380V(25mm² copper wire)

1.2.3 Working current 50-110A

Acrylic Pyrolysis Machine aims at solving the problem of the heating temperature up to 400°C-600°C during pyrolysis process. Traditional furnace has been eliminated because of its serious pollution caused by coal fuel, natural gas or coal-to gas has open flames and poor safety,easily coking, and difficult to control their heating temperature.

Our equipment is the industrial version of resistance furnace, which adopts the phenomenon of heat conduction. Bottom of reactor generates heat by self-conduction, no medium conduction, little heat loss, can achieve more than 80-90% thermal efficiency.

When the pyrolysis drum running with full capacity, heating around 40 minutes can achieve cracking temperature,all of solid material liquefied, around 60-80 minutes start vaporize, oil released when vaporize to a certain pressure. Within 4 hours, all of liquefied acrylic material gradually vaporizes. While liquid material continue vaporizing and carrying heat at the bottom of drum, which temperature can be kept as 400-500°C. Heat absorption gradually decreasing as long as acrylic material finished processing, When reactor temperature rise up to 680°C,temperature reach equilibrium and starts to keep warm,while acrylic will quickly and completely vaporize.





PMMA PYROLYSIS MACHINE TECHNICAL SOLUTION

1. Equipment Parts

Our pyrolysis machine covered 2 parts: CNC electronic control console and pyrolysis machine

1.1 **Pyrolysis Machine:** furnace body, insulation layer, heating element, hearth, reactor, temperature measuring thermocouple.

1.2 **Furnace Body:** Vertical cylindrical structure, which overall frame structure is welded by 6mm steel plates. Furnace bottom welded by #10 channel steel, and 5mm thick steel plate is welded flatly on top to make it strong and flat. The other parts are welded with angle irons and flat irons to form the inner and outer parts. The two-layer middle frame is filled with insulation cotton, then the circumferential frame is welded and connected to the furnace bottom; Top of furnace body is also a frame structure which can bearing 1 tons weight, manufactured by two independent blocks for easily disassembling, reactor can be easily lifted out of the furnace for inspecting the reactor interior.

1.3 **Insulation Layer:** Furnace top and circumferential equipped with 350mm insulation layer, which material is high-temperature resistant rock wool; Furnace bottom equipped with two insulation layers, lower layer is 300mm thick rock wool, and upper layer is 30mm refractory bricks

1.4 **Heating Elements:** Adopt iron-chromium-aluminum electric wires as furnace heating elements, which common operating temperature less than 1200°C; Furnace bottom equipped with evenly heating elements, and the circumferential equipped with height of 300mm heating elements; Heating elements are fixed on frame via



high-temperature-resistant ceramic insulating columns; Total heating power 90KW, furnace bottom consume 60KW, furnace circumferential consume around 30KW.

1.5 **Hearth:** Used for supporting the reactor, adopt T-4 refractory bricks, which regularly fixed on the furnace bottom channel steel structure, put insulation layer and heating elements in the middle of two rows refractory bricks.

1.6 **Reactor:** Reactor is cylindrical structure with 1500mm diameter and 1200mm height. Reactor bottom supported by hearth, reactor circumference connect with furnace frame via support legs to ensure its stability and safety. Reactor bottom made of 14mm thickness and 310S stainless steel flat bottom head, There is Dia 450mm feeding hole and Dia 80mm discharging hole on the top of reactor, Feeding door is movable, and there is high-temperature resistant graphite packing between feeding hole and door for sealing; Discharging pipe diameter is 80mm, and a variable diameter pipe is used for transition at the connection between pipe and reactor, large end diameter is 100mm and small end diameter is 80mm.

1.7 **Temperature measuring thermocouples:** Each machine equipped with 3 pcs temperature measuring thermocouples, one measure the bottom, the other two pcs measure the circumferential part.

1.8 **Overall size** of the machine is outside dia 2200mmxH1810mm, which can be lifted as one set and easily moving.

2. CNC electronic control Panel

2.1 **Control panel** is an independent structure, which facilitates on-site installation. Including PLC, thyristor, touch screen, ammeter, voltmeter, intelligent temperature control meter and relay; All electrical components are installed inside of the control panel.



2.2 **Touch screen** is made of 10 inch color screen, set up with 2 interfaces, one is the main operation interface, the other is technology parameter setting interface. Main interface is the operation interface, which displays the device operating status, it will give alarm if there is any abnormality; Currently selected technology program and its status, different parts temperature and temperature curves etc. will be displayed on the main interface. Technology parameter setting interface can save multiple technology programs which set according different production. Each technology process covers 6 stages heating and 6 stages temperature holding, each stage can set the heating rate and temperature holding time, ensure its automatic production and refined production.

3. Performance parameter

3.1 Heating power: 90KW

3.2 Reactor Volume: 2M³;

3.3 Size: ϕ 2200mm*1810mm

3.4 Temperature measure position: one point temperature measurement;

3.5 Working temperature: max 630°C

3.6 Highest working temperature: 630°C

3.7 Machine covering area: 2.7*2.2 m²

3.8 Power supply: Three-phase four-wire, 380 \pm 10%V/50HZ

4. Machine Characteristics



- 4.1 Machine adopts integral frame structure, which is sturdy, durable and easily lifting and transportation.
- 4.2 Use frames for two sides of the insulation layer, which is easily working and replacing.
- 4.3 No refractory bricks on the reactor circumference or bottom, use rock wool which has good insulation effect, less heat absorption or loss; Reduce overall weight and shipping costs.
- 4.4 Heating elements adopt the special resistant wire, which has large cross-sectional area, high strength, durable and less maintenance required. If there is damage, no need replace the whole heating element, only connect the broken point is Ok, greatly reduce maintenance difficulty.
- 4.5 Heating adopt the controllable silicon for controlling the output voltage, PLC for calculation, automatically adjust the heating power according heating speed and temperature, by this way, save electricity and ensure accurate temperature.
- 4.6 Machine equipped with one measuring point, the thyristor automatically adjust the corresponding area heating power according different area temperature, ensure its small temperature difference.
- 4.7 Multiple interfaces are set on the touch screen, ensure convenient human-machine dialogue;
- 4.8 Heating technology adopt modular design, set up with multiple heating processes each heating process equipped with six heating stages and six stages of temperature holding, the heating speed and temperature holding time of each stage



can be freely set, which ensure its more flexible and easier operating, achieve refined production finally.

4.9 Monitor equipment operating status every time, timely alarm and reminding;

4.10 Pyrolysis machine temperature working sheet

150°C	80°C
280°C	120°C
400°C	185°C
500°C	220°C
600°C	270°C
640°C	320°C
680°C	350°C