

Shimadzu Vacuum Furnace

For safety use

This furnace is for heat-treatment of products.

Heat-treatment involves risk of accident. Please pay attention when use.

Please read the instruction manual carefully and use it correctly.

It should be used only by those who have been educated about the operation method.

Confirmation and precautions before heat-treatment.

Before starting heat treatment preparation, be sure to check and confirm the following items. If the inspection is not performed correctly, an accident may occur.

🕂 Warning

When checking, be sure to turn off the main power breaker.

Touching exposed parts of the battery may cause electric shock and death or serious injury.

🕂 Caution

If an alarm is generated, check the device and release it. Refer to the instruction manual for details of the alarm display items.

- Inspection and confirmation
 - (1) Check water volume, gas pressure and air pressure.
 - (2) Check the oil level of the rotary pump.
 - (3) Check that the heater is not loose.
 - (4) Check that the processed material is correctly and stably set within the effective dimensions of the furnace.
 - (5) Check the door seal.
 - (6) Check the furnace door is close.

Treatment when an abnormal alarm occurs

After the operation power is turned on, if there is an error in the device, an alarm screen will be displayed and the error item will light in red.

When the warning is displayed, heat treatment cannot be started.

(1) Check the alarm display items.

or service agent if necessary.

- (2) Press the [Alarm stop] switch.
- \rightarrow The alarm buzzer stops.
- (3) After confirming that the error has been removed, press the [Alarm cancel] switch.
- Details of the alarm display items are described in the instruction manual.

Check the equipment and contact our sales office

 \rightarrow The alarm display disappears.

Alarm display example



©2020-2025 Shimadzu Industrial Systems Co.,Ltd. All rights reserved. Original version is approved in English.

A Note here

The precautions for use are classified by color and symbol for each work. Installation and preparation During heat treatment / After heat treatment





Examples of accident

1 Burns from ignition of vacuum furnace

- When a new setter (alumina) with a lot of impurities was baked in vacuum at 1500 °C, they evaporated and reattached to the cool points inside the Gr sleeve.
- There were more than 900 burned setters, and the amount of impurities evaporated was large.
- When the Gr sleeve was pulled out, the impurities reacted with oxygen and moisture in the atmosphere and ignited and burned.

Impurities contained in setters or processed materials may evaporate under vacuum or reduced pressure even if they do not evaporate at atmospheric pressure. Use the setter with less inpurities and consider the amount of impurities when baking.

Be careful when cleaning as there is a risk of fire.



Examples of accident

2 Hydrogen explosion in the exhaust duct

- During atmospheric pressure flow operation with hydrogen in a vacuum furnace, a power failure occurred for 10 minutes, and a small explosion occurred in the exhaust duct set by the customer after power recovery.
- In this vacuum furnace, nitrogen was automatically introduced into the furnace at the time of power failure, and a mixed gas of hydrogen and nitrogen was released from the self-weighted safety valve installed in the furnace body.
- The exhaust duct from which hydrogen is released was not single piping but also connected to the exhaust duct of the hydrogen combustion apparatus.
- Furthermore, because the forced exhaust system that was prepared by the customer did not have an automatic return function after power recovery, the forced exhaust system did not operate after the power recovery, and when the hydrogen combustion apparatus took fire the hydrogen remaining in the duct ignited and a small explosion occurred.

The exhaust duct from which hydrogen gas is released must be a single pipe. If a forced exhaust system is used in the exhaust duct, make sure that the system is activated when the heat treatment furnace is in operation.

3 Fire due to opening of furnace door during operation using hydrogen in vacuum sintering twin furnaces

- Usually when one side of twin furnaces is in operation, the other side is stop and allowing treatments to be set.
- When the operator intended to open the left furnace door while the display showed not suspension, he wrongly opened the right furnace door which was during the hydrogen flow operation and the fire broke out.

In twin furnaces, a lock mechanism is provided on any place like the door handle to ensure distinction between operation and suspension.

4 Explosion in the exhaust pipe of a vacuum furnace

- During operation with hydrogen pressure control, a furnace alarm occurred and the furnace stopped. The hydrogen in the furnace was evacuated manually.
- When the furnace was exhausted again for heat treatment, a few seconds later, an explosion occurred in the vicinity of the oil mist separator exhaust just above the rotary pump, and aluminum duct hose was broken and scattered.
- The cause is considered to be that hydrogen staying in the vicinity of the exhaust port of the oil mist separator mixed with air (oxygen) due to the exhaust, and the static electricity near the duct became an ignition source and exploded.

The exhaust duct shall be metal piping and grounded to prevent static electricity. Do not share the exhaust duct and use a single pipe.

5 Smoke by opening the door without checking the displayed temperature of the vacuum furnace

- During vacuum heating, smoke was emitted from the furnace because the furnace door was opened after the manual leak valve was opened to atmospheric pressure while the furnace was near the maximum temperature.
- The operator assumed that the temperature inside the furnace was at room temperature even though the temperature displayed on the temperature controller was close to the maximum temperature, opened the manual leak valve to atmospheric pressure, and opened the furnace door.

Check the displayed temperature and pressure before opening the furnace door.







