GYD Thermal oil heater instruction

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Catalogue

1. Overview

1.1 Product features

GYD series thermal oil heater is a kind of "low pressure and high temperature" type energy-efficient heating equipment.

1.1.1 Able to work at lower working pressure (<0.5MPa = obtain higher working temperature (≤340℃), when the heating temperature is 300 ℃, the operating pressure is only one-seventy of the saturated vapor pressure of water.

1.1.2 High thermal efficiency (> 95%).

1.1.3 Stable and uniform heating can be carried out, and accurate temperature control can be achieved (the temperature control precision can be within the range of ±1℃).

1.1.4 It has advanced and complete control system and safety monitoring device.

1.1.5 The heat transfer medium of the heating system is the organic heat carrier-thermal oil. The medium is odorless, non-toxic, environmentally friendly, has no impact on the health of operating workers, has no corrosion on equipment, and has a long service life.

1.1.6 Thermal oil heater can be installed horizontally near the thermal user (using thermal equipment or thermal environment) without foundation.

1.1.7 Generally, the investment can be recovered in 3-6 months.

1.2 Product applicable working environment

Altitude does not exceed 1000m;

Ambient temperature in the range of 5-40 ° C;

Environmental maximum relative humidity is not more than 90%;

There is no conductive dust, explosive gas and corrosive gas that can seriously damage metal and insulation;

No obvious vibration。

If the product has special requirements such as explosion-proof, or is used under other conditions, the user will negotiate with our factory when ordering.

2. Working principle and system composition

GYD series thermal oil heater is a new type of thermal energy conversion heating equipment. Its working principle is: use electricity as energy, convert electric energy into heat energy through electric heating elements; use organic heat carrier (heat transfer oil) as heat transfer medium, and conduct forced circulation of heat transfer oil in the system through high-temperature oil pumps, making it repeated Heating, so as to meet the needs of thermal users (using thermal equipment or thermal cycle) to continuously obtain the required thermal energy; and can meet the process temperature set in the production process and the requirements of high-precision temperature control.

Generally, the main body of the thermal oil heater (heating body, high-temperature oil pump and oil filter), expansion tank, electric control cabinet, etc., are a heating system that is assembled as a complete set of equipment and heat equipment to form a forced liquid-phase circulation.

If the thermal user (using thermal equipment or thermal environment) has special requirements for the cooling process, then the system should be equipped with oil and water coolers.

3. GYD series thermal oil heater example of heating system circulation (see attached figure 1)

4. Installation and debugging of thermal oil heater

4.1 Preparation for installation

Unpacking inspection: Check whether the random documents and accessories match the packing list;

Check the mainframe, its random accessories, and electrical components. If there is damage or looseness, it should be handled in time;

Check whether the installation site meets environmental requirements and applicable conditions.

4.2 Thermal oil heater host installation

4.2.1 The main unit should be placed horizontally and stably in a position convenient for monitoring, operation and maintenance. In order to facilitate the maintenance and disassembly of the heating body of the host, there should be enough space on the wire connection side of the heating body, and it is recommended to install a valve suitable for

the use conditions at the inlet and outlet pipelines of the host.

4.2.2 Before installation, thoroughly clean the main body, attachments, accessories and all pipelines, and remove the internal water and foreign objects.

4.2.3 Thermal oil heater system piping refers to the GYD series thermal oil heater heating system cycle example (see Figure 1) for construction. The piping layout of the system should adopt the low-in and high-out method, and minimize the bending of the pipeline to ensure that the pipeline is unobstructed. The diameter of various pipelines in the system should be as consistent as possible with the diameter of the thermal oil inlet and outlet of the thermal oil heater host Insulation measures should be taken, but insulation material should not be added at the flange connection. It is recommended to install a short-circuit cycle for a heat-using system with a temperature higher than 120 ° C, and an oil pump is recommended for a heat-using environment where it is not easy to stop heating midway.

4.2.4 The pipeline connection of the thermal oil heater system should adopt a convex flat welded steel pipe flange with a nominal pressure (Pg) of not less than 1.0MPa. The pipeline connection gasket can be a metal wound graphite gasket, expanded graphite composite gasket or high temperature. Heat-resistant rubber asbestos sheet.

4.2.5 An exhaust pipe and an exhaust valve are installed at the highest point of the circulation system pipe network, in order to periodically discharge gas products during operation, and the switch position of the exhaust valve should be convenient for operation.

4.2.6 Under normal circumstances, the expansion tank should not be installed directly above the thermal oil heater.The vertical distance at the top of the machine must not be less than 1.5 meters (except for small ones). The expansion pipe should be connected to the pipeline within 1.5m from the oil inlet of the main engine. There should be no valve on the expansion pipe, no necking part, and no insulation. When the expansion pipe needs to turn, its bending angle should not be less than 120 °.

4.2.7 After the system is installed, the whole hydraulic test is conducted with heat-conducting oil at 1.5 times the working pressure to ensure that there are no leaks in metal walls, welds, piping accessories and connection parts. Moisture is blown clean.

4.3 Selection of thermal oil and system oiling

4.3.1 To choose the manufacturer and brand of thermal oil in accordance with the actual situation, the boiling point of the thermal oil should be higher than the maximum operating temperature of the system. Since it is strictly forbidden to mix thermal oil of different brands, it is recommended to consider the convenience of purchasing or purchase more spares when selecting thermal oil.

4.3.2 After the installation and inspection of the entire heating system is completed, the system is filled with oil. The thermal oil is filled through the oil filling port of the expansion tank. During the oil filling, all valves in the system (except the oil drain valve) are opened, then the thermal oil is slowly injected into the system through the expansion tank.

4.3.3 When the liquid level shows about 1/2 of the expansion tank height, stop filling.

4.3.4 After filling the oil, cover the oil filler cap, connect the oil spill pipe, and carefully check the valve opening and closing of the pipeline.It is forbidden to have oil leakage or oil leakage in the system.

4.4 Dehydration and exhaust of thermal oil heating system

4.4.1 Exhaust at normal temperature: Turn on the power, open the inlet and outlet valves and exhaust valve of the thermal oil heater, press the start button of the oil pump, the oil pump running indicator lights up, the oil pump should operate normally in the direction indicated by the arrow, and the pressure of the pressure gauge is within the specified range According to the operating conditions of the oil pump, if there is any abnormal phenomenon, stop and check immediately, restart the oil pump after removing the fault, and exhaust at normal temperature until the pressure gauge indicates stability. When venting at room temperature, pay attention to the liquid level in the expansion tank, and replenish it in time when it is lower than the specified liquid level.

4.4.2 Warm-up dehydration: After confirming that it is operating normally at normal temperature, warm-up dehydration can be performed (please read the instruction manual of the thermal oil and temperature controller before operating). The warm-up dehydration can be performed as follows:

The heating speed is controlled by adjusting the starting heating power; the constant temperature is achieved by a temperature control setting.

Step 1: Warm up to 100-120 ° C

When starting to raise the temperature, the heating rate should be controlled within 50 ℃ / h, and the pressure gauge should be displayed to show whether it is normal. If no pressure is found or the pressure is unstable, it means that there is still residual gas in the system. At this time, repeat the normal temperature according to 4.4.1 The exhaust operation can be continued after the system pressure is stable. After the temperature is raised to 120 ° C, a long-term heat preservation is performed. The length of the heat preservation time is related to the total capacity of the system and the quality of the thermal oil.

Step 2: Warm up to 150-180 ° C.

Exclude the light components, volatiles and residual moisture in the oil, please refer to the dehydration exhaust gas graph of the GYD series thermal oil heater system (see Figure 2).

Step3: after the dehydration exhaust is completed, the exhaust valve should be closed and put into normal temperature rising operation.

4.4.3 Matters related to the heating and dehydration exhaust process. During the heating process, the pipe may make a bumping sound, indicating that there is a large amount of gas in the system or the pipe is not smooth. At this time, the heating speed should be reduced and the sound can be eliminated after the gas is eliminated; if the pipe is not smooth, it should be eliminated.

A large amount of gas may flow into the expansion tank during the dehydration and exhaust process, causing the thermal oil in the tank to overflow, and an oil spill container must be installed under the oil spill pipe before operation. When dewatering and degassing, staff must be on-site to guard against abnormalities and deal with them in time.

4.5 Temperature control of thermal oil heater system (please refer to the manual of the temperature controller for details)

According to the process requirements, set the relevant parameters of the temperature control instrument for heating and insulation control.

4.5.1 The first time the thermal oil heater is put into use, when the thermal oil heats up to 200 ° C or the required operating temperature (below 200 ° C), the connection parts of the piping of the circulation system need to be checked to prevent heat conduction caused by thermal expansion of the fastener Leakage of oil; fasten the fasteners of the heating unit's wiring parts in the hot state to prevent the connection parts from being thermally expanded and causing the connection to be incorrect and the terminal to be overheated and damaged.

Note! Thermally fasten the heating body wiring fasteners under power off.

4.5.2 Observe and adjust the relevant parameters of the temperature control instrument, implement automatic temperature control operation, and then put into normal operation after stable control.

5. Control system for thermal oil heater

5.1 Control principle

The control system is a closed-loop negative feedback system. The temperature measurement element (thermocouple or thermal resistance) passes the detected temperature signal (mV) to the intelligent PID temperature controller; the temperature controller outputs DC15V, 20mA high level according to the determined duty cycle within the fixed period, and drives Zero-crossing type non-contact controller to control the output power of heat transfer oil heater.

5.2 Control system composition

Centrally controlled electrical control cabinet: the control cabinet panel is set to display, adjust, operate, alarm and other components; internally set power, protection, drive, signal conversion and other components.

5.3 Protective device

5.3.1 Over-temperature alarm: When the oil temperature at the outlet of the thermal oil heater exceeds the set temperature value of the temperature regulator (generally set above the process temperature, the heat-conducting oil is allowed to be used below the temperature), the sound and light alarm signal is issued on the electric control cabinet, The system automatically stops heating.

Note! The circulating oil pump cannot be stopped at this time.

5.3.2 Expansion tank low level alarm: When the system requires a low level alarm protection function, a floating ball level controller is installed on the expansion tank. When the thermal oil in the expansion tank is lower than the lower limit liquid level, the level gauge sends a control signal A sound and light alarm message is issued on the electric control cabinet. After the alarm, the thermal fluid should be refilled into the expansion tank to reach the normal liquid level.

5.3.3 Circulating oil pump outlet pressure gauge: This pressure gauge is one of the indispensable safety accessories in the system. Measure the working pressure value of the circulatory system through this table, monitor and control the operation of the system. If the system requires an over-pressure alarm protection function, an electric contact pressure gauge should be selected. When the pressure gauge pointer coincides with the upper and lower limit positions, an alarm signal is issued.

Note! During the use of the heater, the system pressure should be monitored frequently; the pressure gauge should be replaced in time if it fails or is damaged.

5.4 Electrical control

The main power supply of the heating body of the heating part is adjusted by the solid-state relay zero-crossing trigger switch circuit, which is suitable for frequent switching without interference to the power supply network.

5.5 Precise temperature control

The temperature control instrument uses a PID self-tuning intelligent temperature control instrument, which can control the use temperature within a range of ± 1 ° C from the set value.

5.6 Installation and wiring of electrical parts

5.6.1 Unpacking inspection and installation: After transportation, you should check the electrical components for damage, and the wires are loose or detached. Place the electrical control cabinet horizontally and smoothly in a position convenient for monitoring, operation and maintenance, and the environmental conditions meet the requirements of this manual. Column requirements.

5.6.2 After checking the electric control cabinet to make sure that it is correct, connect the host and the electric control cabinet. The connection should be correct and firm.The grounding is well protected, and the thermocouple or RTD signal line must be arranged or shielded from the power line sub-conduit.

5.6.3 After completing the above process, connect the power cord to the power terminal of the electric control cabinet.

6. Simulation operation

6.1 Close the power switch, the power indicator light is on, and the telecom window on the meter shows that it is ready for work.

6.2 Press the oil pump start button, the oil pump running indicator is on, check if the running direction is correct,Unusual sound. If the reverse phenomenon occurs, it can be corrected by adjusting the phase sequence of the oil pump motor wiring.

6.3 Check whether the expansion tank liquid level alarm is reliable. When the liquid level is lower than 1/3 of the expansion tank height,A low level alarm has occurred; otherwise the settings of the float level controller should be adjusted.

6.4 Manual over-temperature alarm instrument or temperature switch, check whether it is sensitive and reliable.

7. Heating operation

After the simulation operation confirms that everything is normal, you can perform the heating operation.

7.1 Adjust and set the parameters of each instrument according to the temperature requirements.

7.2 Start the oil pump.

7.3 Press the heating button, the heating indicator light will be on, and the system will start to heat upIf correct, check whether the thermocouple or thermal resistance connection is correct in case of reverse marking or indication.

8. Inspection and maintenance of thermal oil heater

8.1 Items for daily inspection

Heating body: If the terminal has overheating damage, check whether the heating element is damaged, decide whether to replace or repair it according to the degree of damage, check the seal of the heating element and the weld between the seal and the tube sheet flange. If there is oil leakage, Timely replacement of electric heating elements;

Pressure gauge: If the pointer fluctuates, check whether there is unpurified moisture or gas in the system, and carry out the corresponding dehydration and exhaust; if there is oil or gas leakage in the gauge, replace it with a new gauge;

High temperature oil pump: If vibration or abnormal sound occurs, this may cause cavitation, and the debris of the oil filter must be removed;

Expansion tank: When abnormal sound or vibration occurs, check the pipeline for blockage;

Liquid level meter: If the liquid level is too low, replenish new oil in time;

Temperature regulator: If the temperature rise is too fast, too slow or cannot be set, check whether the heating elements are damaged, whether the system pipeline is blocked, and whether the components in the electric control cabinet are damaged.

Line valve: Whether the switch position is correct and whether there is oil leakage.

8.2 The filter is set to prevent large solid particles in the pipeline from entering the high-temperature oil pump. During the installation, pay attention to check the filter and do regular cleaning, which can greatly improve the service life of the thermal oil and equipment.

8.3 During normal operation, the oil temperature in the expansion tank should not exceed 70 ° C. If the oil temperature is too high, it means that the system is not running smoothly or the pipeline is improperly connected, which is harmful to the service life of the heat transfer oil. It is necessary to eliminate the fault as soon as possible before putting it into production.

8.4 Regular inspection and tightening of the heating element should be performed.

9. Matters needing attention

For heating bodies and high-temperature oil pumps, absolutely no oil, little oil, or operation at temperatures exceeding the allowable temperature of the thermal oil is absolutely prohibited;

If you find that the pressure is unstable or too low, you should do a careful inspection in time to avoid damage to the heating equipment.

The entire system is strictly forbidden to leak. If leakage is found, it should be handled in time. The flash point of the thermal oil opening is mostly in the range of 130-190 ° C. The equipment startup procedure is to turn on the pump first and then heat up. The shutdown procedure is to stop heating first and then stop the pump.

Note! It is strictly forbidden to stop the pump when the main engine outlet temperature is higher than 120 ℃.

When commissioning, changing new oil or replenishing new oil, be sure to perform dehydration and exhaust operation according to the procedure in 5.4.

When installing and commissioning and putting the system into operation, the correct operation must be performed in full accordance with the requirements of the product manual.

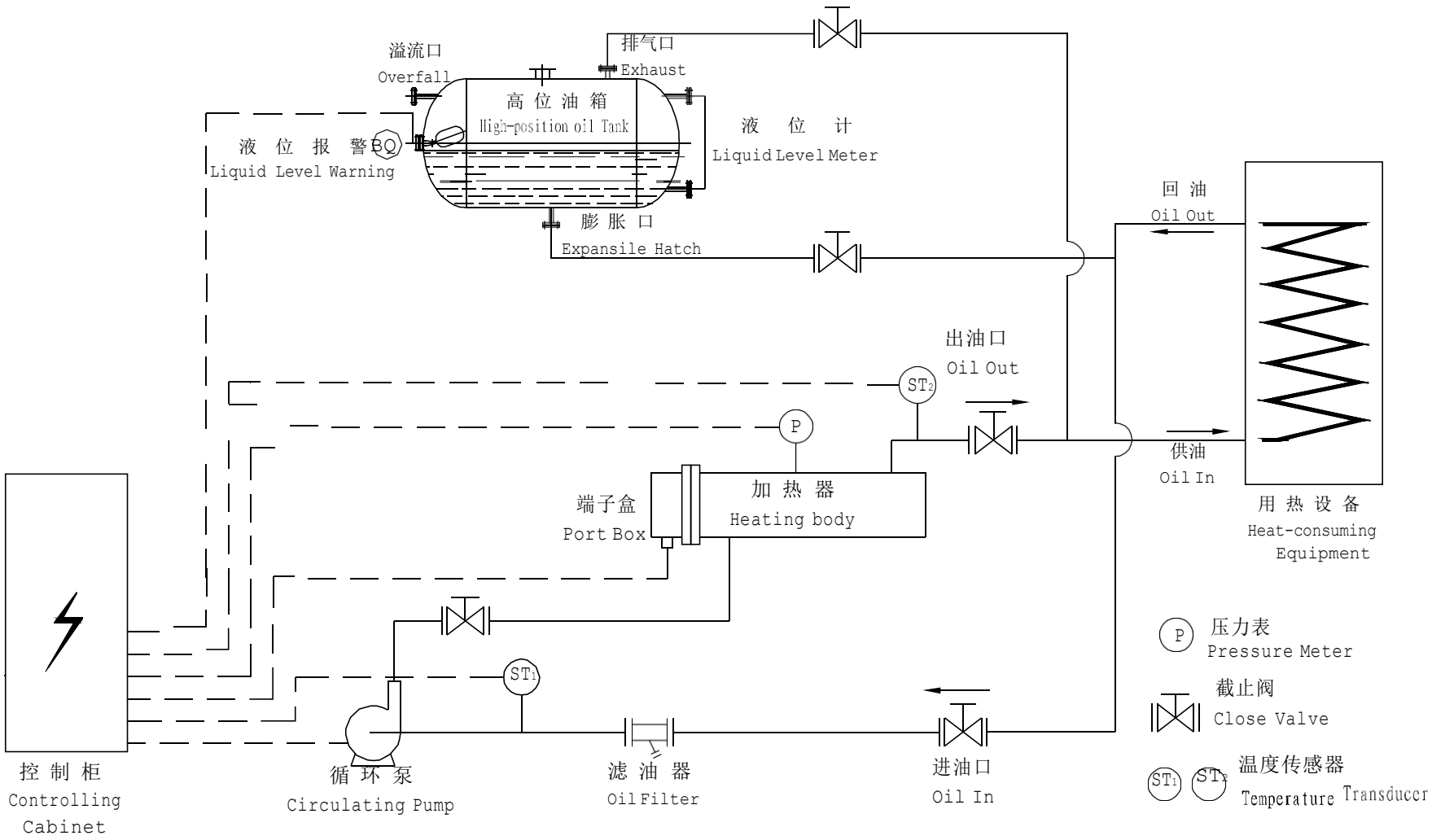

Figure 1. GYD series thermal oil heater example of heating system circulation

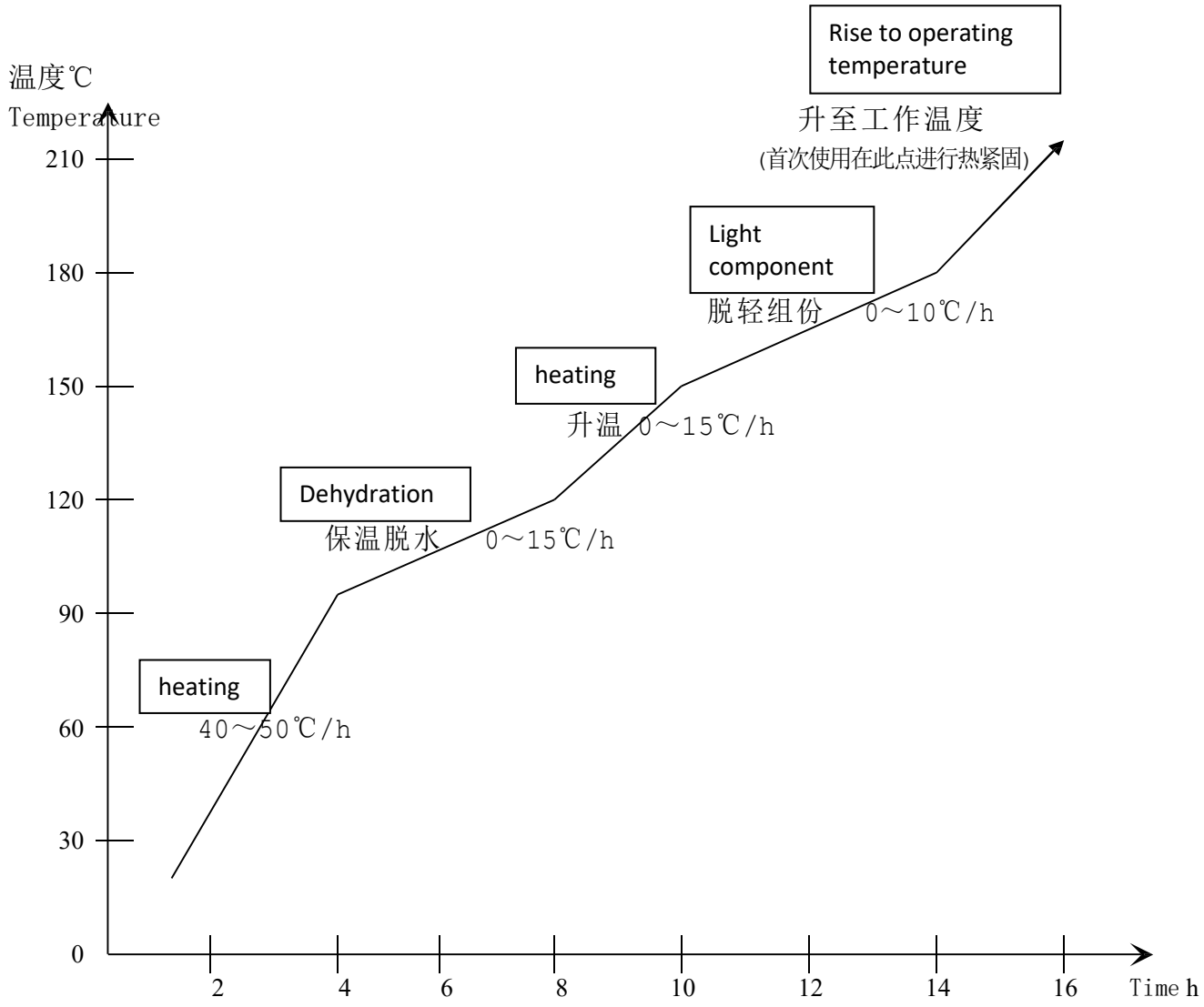

Figure 2. Thermal oil heating, dehydration, and cooling curve