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(Photos are for reference only, please in kind prevail）

Technical Specification for Thermal Shock Chamber (Three zone type)

Model: **KTS-500B（Three zone type）**

Manufacturer: **KOMEG Technology Ind Co., Limited**

Issued By: **Engineering Department**

1. Use and sample restrictions

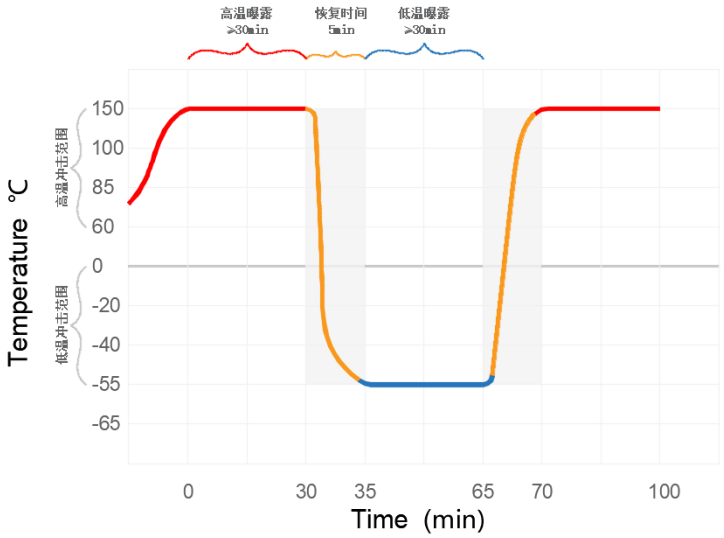
1.1	Product Usage	This equipment is suitable for electrical, electronic, mechanical and other products, parts, materials, etc. for low temperature cold test, high and low temperature test and other products to withstand the rapid temperature change, this temperature impact test can test the sample once or several times due to temperature The impact of drastic changes *Note that other uses may result in personal injury and damage to the equipment!
1.2	Sample limit	Testing and storage of samples of flammable, explosive and volatile substances Testing and storage of corrosive substance samples Testing or storage of biological samples Test and storage of strong electromagnetic emission source samples
1.3	Sample requirements	In order to make your test data more realistic and effective, the test chamber should be used reasonably while satisfying the following principles: The total mass of the load is not more than 80Kg per cubic meter of studio volume The total volume of the load is not more than 1⁄5 of the working chamber volume In any section perpendicular to the dominant wind direction, the sum of the load areas should be no more than 1⁄3 of the cross-sectional area of the working chamber. Do not block the flow of airflow when the load is placed

2. Volume and size

2.1	Volume	About 500L
2.2	Testing size	W800 mm*H770 mm*D815 mm
2.3	External size	W1810 mm*H2290 mm*D2135 mm(Not including the protruding part) Tips: For external dimensions, please confirm the three views according to the final design!
2.4	Floor area	About 2.5m^2； （Confirm after signing the contract）

3. The main technical parameters

3.1 Test Conditions	Equipment cooling method: Water-cooled Measured at room temperature +25 ° C under no load, Temperature and humidity performance measurement comply with related regulation of GB/T2424.5 or IEC60068-3-5 standard; Sensors placed in the air outlet.
3.2 Impact temperature range	Low temperature section -55 °C ~ -10 °C, High temperature section +60 °C ~ +150 °C
3.3 Temperature fluctuation	≤1℃（≤±0.5℃， Expressed in accordance with GB/T5170-1996）
3.4 Temperature uniformity	≦±2.0℃
3.5 Temperature deviation	≤±2.0℃
3.6 Air door conversion time	≤ 5 sec
3.7 Impact transition time	≤ 5 min (or temperature recovery time)
3.8 Temperature shock performance	High temperature exposure +150℃， 30min (Heat 250W) Ambient temperature exposure (ambient temperature)5min Low temperature exposure -55℃， 30min (Heat 250W)



3.9 Temperature shock temperature	Test area air outlet

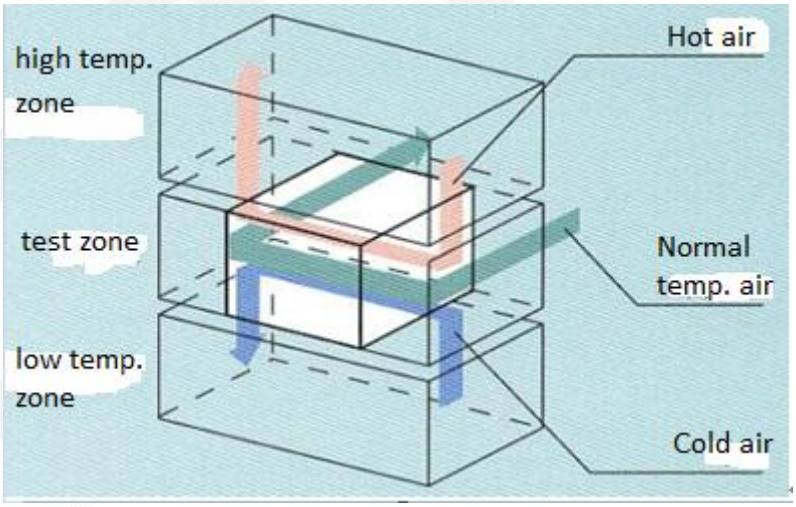
measurement point

3.10 Load situation	Load LED lamps, heat 250W
3.11 High temperature energy storage	+60～+220℃（The preheat limit is +220℃） High temperature storage energy heating time: from normal temperature RT ~ +220 ° C about 30 minutes
3.12 Low temperature energy storage	0～-75℃（The pre-cooling lower limit is -75℃） Low temperature energy storage cooling time: from normal temperature RT ~ -75° C about 70 minutes Note: The lifting time of high-temperature energy storage and low-temperature energy storage is the performance of each energy storage space, not the test area.
3.13Noise	≤75(dB) (The noise detection device is measured 1m away from the door)
3.14 Meet the test standard	GB-2423.1-2008(IEC68-2-1) Test A: Low Temperature Test GB-2423.2-2008(IEC68-2-2) Test B: High Temperature Test GJBl50.3-2009(MIL-STD-810D) High Temperature Test GJBl50.4-2009(MIL-STD-810D) Low Temperature Test GJBl50.5-2009 Temperature shock test method

4. Chamber Structure

4.1 Structural features	Overall chamber structure The test chamber was composed of three parts as below: Independent product test area, high-temperature heat storage area and low-temperature cold storage area. Additional auxiliary refrigeration unit (rear side), electrical control cabinet (right side)
4.2 Thermal insulation structure	Outer anti-corrosion electrolysis plate spray-intermediate insulation layer is temperature-resistant foam insulation material - inner chamber SUS304 stainless steel plate seamless welded liner structure
4.3 Outer chamber material	High-quality anti-corrosion electrolytic board, surface electrostatic powder baking paint, color is Komeg standard color
4.4 Inner chamber material	SUS304 stainless steel plate, thickness = 1.0 mm; the inner liner is fully welded.

4.5 Insulation	Low temperature zone rigid polyurethane foam insulation layer, thickness ≧ 100mm, flame retardant grade B2 Glass fiber cotton insulation layer in high temperature zone, thickness ≧ 100mm, flame retardant grade A1
4.6 Door	Full-size single door, open on the left, effortless to open the door handle Two silicone rubber sealing strips and anti-condensation electric heating device are arranged to prevent external dew condensation;
4.7 Switching damper	Cylinder drive mode Divided into high temperature zone, low temperature zone, test zone. The high and low temperature zone is used as an energy reserve, and the test zone is used for testing by the user. The high and low temperature zone is separated from the test zone by a switchable valve. Automatically open the corresponding valve when impact There is also an independent ventilation valve that introduces ambient air during exhaust (normal temperature recovery)



4.8 Control panel	Temperature (wet) control touch screen display, start switch, emergency stop switch, buzzer
4.9 Unit part	Contain: Refrigeration unit, drain pipe, cooling fan, power distribution control cabinet
4.10 Distribution Cabinet	Switchboard Cooling fan Total power leakage circuit breaker

4.11 Standard configuration	Lead hole: diameter ϕ50mm 1 with silicone plug, 1 on the left (confirm after contract signing) Sample holder: 2 layers (bearing weight 20KG) Moving casters (with foot cups)*4

5. Air conditioning system

5.1 Feature	Adjustment and control: forced convection temperature regulation and humidity adjustment; independent cold end and hot end PID regulation, heat and cooling can be continuously adjusted to avoid energy waste caused by cooling capacity and heating amount
5.2 Air circulation	High-power fan driven by an external motor with a stainless steel shaft, fan motor place external ; The air is driven by the motor and flows through the heater and the refrigerating evaporator. After being fully heated/cooled to the required temperature value, the air circulates inside the chamber and heat exchanges the test piece by convection
5.3 Fan motor	Low-voltage asynchronous high temperature long axis motor

5.4 Centrifugal wind wheel	Multi-blade centrifugal circulation fan, aluminum alloy blade

5.5 Heater	Skid-mounted heater, SSR control, with independent over-temperature protection temperature switch When the heater is energized, the surface temperature will rise. After the convective air passes through the heating wire, the temperature rises, and the heat is extended to the air in the box and the test piece to play the role of heating and heating. The heating power is precisely controlled by the PID algorithm and the output

power is regulated by a solid state relay.

5.6 Cooling method

Direct cooling

The refrigeration system provides sufficient low temperature refrigerant to the heat exchanger such that the temperature of the heat exchanger is lower than the air temperature. The heat in the air is absorbed by the heat exchanger and taken out of the tank, causing the air temperature to drop and cooling.

The cooling power is precisely controlled by the PID algorithm, and the flow rate and cooling capacity of the refrigerant are regulated by a solenoid valve.

6. Cooling System

6.1 Characteristics

This machine is a mechanical compression refrigeration method

Intelligent cooling control: PID control solenoid valve output cooling capacity or PID control heater according to temperature and load demand inside the chamber (cooling is not heated, heating is not cooling).

Traditional refrigeration control method	This machine intelligent energy saving control method
Refrigeration compressor start and stop control temperature (temperature fluctuations, seriously affecting compressor life, technology has been eliminated) refrigeration compressor constant operation + heating output balance control (causing cooling capacity and heating phase offset to achieve temperature dynamic balance, wasting a lot of Electric energy);	According to the temperature demand inside the chamber, PID control solenoid valve switch output cooling capacity or PID control heating beeper (cooling is not heated, heating is not cooling) In the low temperature working state, the heater does not participate in the work, and the refrigerant supply amount is adjusted by PID, and the three-way flow regulation of the refrigeration pipeline, the cold bypass pipeline, and the hot bypass pipeline is realized, and the temperature of the working chamber is automatically constant.

6.2 The refrigerant Environmentally friendly refrigerant R404A & R23

6.3 Cooling method Water-cooled condenser

6.4 Compressor German Bitzer or Copeland compressor

6.6 Condenser Water-cooled high efficiency copper tube fin type forced convection heat exchange condenser

6.7 Evaporator Efficient multi-stage hydrophilic membrane fin evaporator

6.8 Auxiliary device High-precision expansion valves, solenoid valves, oil separators, desiccants and other components are imported from internationally renowned brands.

6.9 Refrigeration process The refrigeration system is designed with fully automatic protection measures. The superheating of the compressor during the high temperature cooling phase is prevented by injecting the liquid refrigerant into the compressor suction line. Fully implement nitrogen protection welding, double-stage rotary vane pump vacuum to ensure clean and reliable inside the refrigeration system.
The bottom of the compressor is designed with a water tray, and the condensed water is discharged to the outside of the tank through the drain pipe at the rear of the tank.

7. Control System

7.1	Feature	Adjustment and control: forced convection temperature regulation and humidity adjustment; independent cold end and hot end PID regulation, heat and cooling can be continuously adjusted to avoid energy waste caused by cooling capacity and heating amount There are two modes of operation: Three-zone impact: high temperature → normal temperature → low temperature (three zone) Low temperature → normal temperature → high temperature (three zone)
7.2	Controller	KOMEG 7 inch color touch screen intelligent fuzzy controller *Operating system: KOMEG KM-5188 Cold-punching system cold output version 
7.3	Display	Temperature and humidity settings (SV) Actual (PV) value can be displayed directly, Execution of the program can display numbers, Paragraphs, remaining time and cycles, running time display, Program editing and graphic curve display, Fixed or program operation status display, 7-inch TFT display screen.
7.4	Resolution	Temperature: + 0.1℃； Time: 1min 。
7.5	Setting range	High Temp. Limit:+220℃ Low Temp. Limit:-80℃ Test chamber （The sample area）:High temperature +60℃ ～ +75℃； Low temperature: -10℃ ～ -65℃ (Note that it is not the scope of device performance)；
7.6	Program capacity	Program capacity that can be used: up to 127 groups; Time setting: 530 hours and 59 minutes per paragraph; Commands can be executed repeatedly: up to 32000 cycles per command.
7.7	Communication	Data collection when connected to a computer

interface	Can be used as monitoring and remote control system, Multiple machines synchronization control available. RS-232、RS-485 and network port LAN
7.8 U disk storage	Pluggable 1G-32G U disk download history curve, historical data, control system parameters, hot swappable function.
7.9 Data recording method	With battery-protected RAM, it can save the set value, sampling value and sampling time of the device; the curve recording period can be set from 30 to 300 sec, the maximum memory time is stored continuously for 90 days history curve, historical data (when sampling The time is 1min), 10 years of data are not used continuously.
7.10 Intelligent humanization function	Stop after defrosting, hold function, interrupt function, parameter automatic error correction function, over temperature multiple protection function, damper not open protection, etc.
7.11 Software Environment	Windows XP or Windows 7/WIN8

8. Security system

8.1 Over temperature protection	The test chamber is independently adjustable electronic over-temperature protection device. 
8.2 Cooling System	Compressors overload overheating, high voltage protection, motor overcurrent protection.
8.3 Circulation fan	Overheat protection relay, overload protection.
8.4 Heater	Air conditioning channel over temperature protection 
8.5 Main power switch	Phase sequence protection, phase loss protection, equipment leakage protection, overload and short circuit protection

8.6 Control circuit	Overload and short circuit protection
8.7 Alarm action	When the above protection occurs, the device stops running and an audible and visual alarm is issued, and the fault location, its cause and solution are displayed on the meter.

9. Use site conditions（Customers need to be aware of and meet the following equipment usage conditions）

9.1 Use environment	1．Ambient temperature: 5℃-35℃; 2．Relative humidity: ≦85%R.H 3．Atmospheric pressure：80kPa~106kPa 4. Flat, vibration-free ground; 5. Choose good ventilation, no direct sunlight or direct radiation from other heat sources; 6. There is no strong airflow around: when the surrounding air needs to flow, the airflow should not be blown directly onto the cabinet.; 7. No strong electromagnetic field around； 8. No high concentration of dust and corrosive substances around
9.2 Power Specifications	1．Power supply 380V AC(±10%) Three-phase + ground wire, grounding resistance≤4Ω ; 2．Power frequency: 50±0.5Hz
9.3 Ground protection	Grounding resistance≦4Ω
9.4 Power wiring	1. This machine comes standard with a power cord of 5 meters; 2. The customer needs to prepare a special fuseless switch for this device;
9.5 Air compression system(Customer own)	This equipment requires the customer to provide clean compressed air. The recommended parameters are as follows: 1. Recommended air pressure: 0.5~0.7Mpa
9.6 Cooling circulating water system(Customer own)	This equipment requires the customer to provide cooling water. The recommended parameters are as follows: 1. Cooling tower **recommended**: 25 cold tons (water tower type: round counter flow fan cooling or better water tower)

2. Water pipe size: DN50*2, the pipe back and forth length is less than 50 meters.
3. Water pressure: 0.2MPa~0.5MPa (about 2~5Kg/cm2)
4. Water quality: meet the design specifications of industrial circulating cooling water treatment GB50050-1995
5. Circulating water volume: about 325 liters / minute (water temperature 25 ° C)
* Water temperature: 20 ° C ≤ water temperature ≤ 28 ° C best, can meet all technical indicators;
28 ° C < water temperature <33 ° C can be used normally (cooling time will vary)

*This quotation does not include cooling tower and piping engineering costs.

10. Main Material List

Compressor	USA Copeland or Bitzer Compressor	Copeland Bitzer
Condenser	Yongqiang or Aotaihua	
Evaporator	Yongqiang or jiangche	江苏制冷
Dry filter	Denmark DANFOSS	Danfoss
Expansion valve	Denmark DANFOSS	Danfoss
Magnetic valve	USA SPORLAN or Denmark DANFOSS	SPORLAN Danfoss
Controller	OMRON	OMRON
Circuit breaker	France Schneider	Schneider Electric
AC contactor	France Schneider	Schneider Electric
Thermal relay	France Schneider	Schneider Electric
Phase sequence relay	Carlo Gavazzi	CARLO GAVAZZI
Intermediate relay	Omron or Carlo Gavazzi	OMRON CARLO GAVAZZI
Solid-state relay	Carlo Gavazzi	CARLO GAVAZZI

11. Equipment outline drawing