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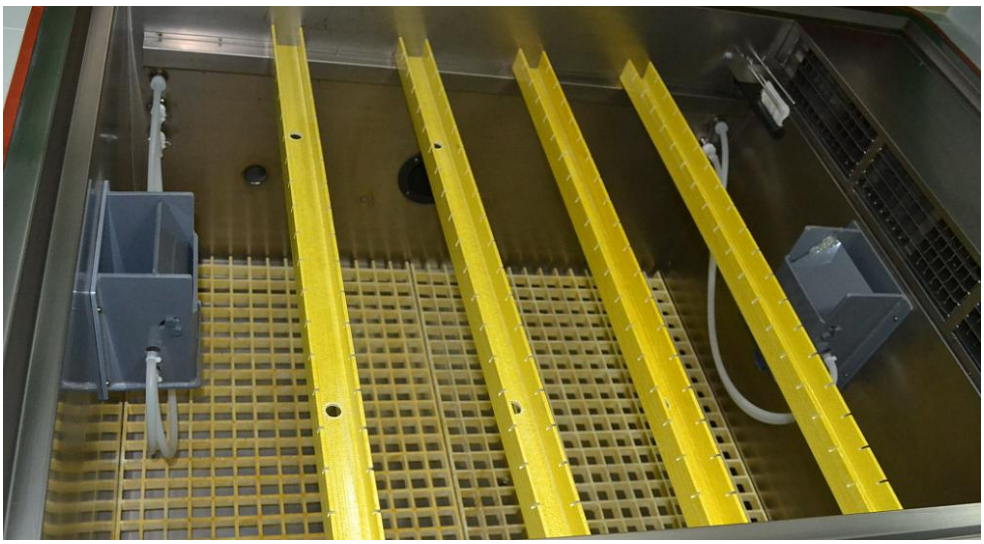
Salt Spray Test Chamber

Technical Specifications



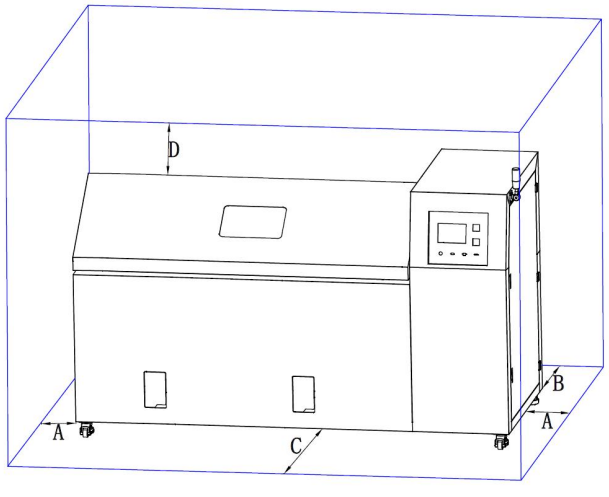
The pictures are for reference only, the actual machine shall prevail

1. Overview

1. The corrosion of protected and unprotected metal materials is affected by many environmental factors, which mainly depends on the type of metal material and the type of environment. It is impossible to design a laboratory accelerated corrosion test room that includes all environmental factors that affect corrosion resistance. Therefore, the laboratory test is designed to simulate the factors that play a major role in the corrosion of metal materials. This equipment is designed to simulate and increase the impact of the environment on metal materials exposed to outdoor atmospheres with salt pollution and accelerated corrosion. The equipment includes test methods for cyclically exposing specimens to salt spray, dry, and hot and humid environments. This equipment test is a comparative test, and the test results cannot predict the long-term results of the corrosion resistance of the same metal material used under these environmental conditions. However, this method can still provide valuable information on the relevant performance of materials exposed to salt pollution environments similar to the test conditions. Compared with traditional accelerated corrosion tests such as neutral salt spray test (NSS), acetic acid salt spray test (AASS), and copper accelerated acetic acid salt spray test (CASS), the biggest advantage of this equipment test is that it can better reproduce the corrosion occurring in outdoor salt pollution environments.

2. The accelerated corrosion test of this equipment is applicable to: metals and their alloys, metal coatings (anodic and cathodic), conversion coatings, anodized coatings, organic coatings on metal materials, etc.

2. Equipment installation site and operating environment conditions

1. Site Requirements	**Equipment installation site size requirements** **A : not less than 800mm** **B : Not less than 1000mm** **C : Not less than 1200mm** **D: Not less than 1500mm** **Flat ground, good ventilation** **No strong vibration** 

	around the equipment There is no strong electromagnetic field around the device There are no flammable, explosive, corrosive substances and dust around the equipment. Leave appropriate space for use and maintenance around the equipment
2. Environmental conditions	Temperature: 5 ~ 30 ℃, relative humidity ≤ 85 % RH Air pressure: 86kPa～106kPa Note: The equipment installation site needs to be air-conditioned to ensure the ambient temperature
3. Equipment power supply and capacity	AC 380V±10% V three-phase four-wire + protective grounding, 50Hz; set up the electric cabinet within 2 to 3 meters from the equipment , the maximum operating power of the equipment: 20.6 KW, the maximum current: 31 A
4. Equipment humidification and saturated barrel water supply	The water supply pressure is 0.2～0.4Mpa, the water supply pipe diameter is 20mm, and the water quality must meet the third-level water use standard specified in GB/T 6682-2008 analytical laboratory water specifications and test methods. The equipment has a reserved water supply interface with 1/2" internal thread, and the water consumption is about 80L /24h
5. Prepare brine water	The water quality must meet the second-level or higher water quality standards specified in GB/T 6682-2008 Water Specifications and Test Methods for Analytical Laboratories. The water consumption is about 40 to 60 L/24h under continuous spraying conditions.
6. Compressed air	Air supply pressure 0.4 ~ 0.8Mpa , air volume 2m3 / h in continuous spray state
7. Equipment exhaust	The fully automatic pressure-balanced demisting device only needs to be connected to the demisting pipe to automatically demist according to the pressure in the box. The test room is equipped with one demisting hole with a diameter of 50mm . The demisting pipe is extended to the outdoors during installation. A 50mm hole is reserved on site . The demisting position is specified by the customer. The extension pipe is not more than 3

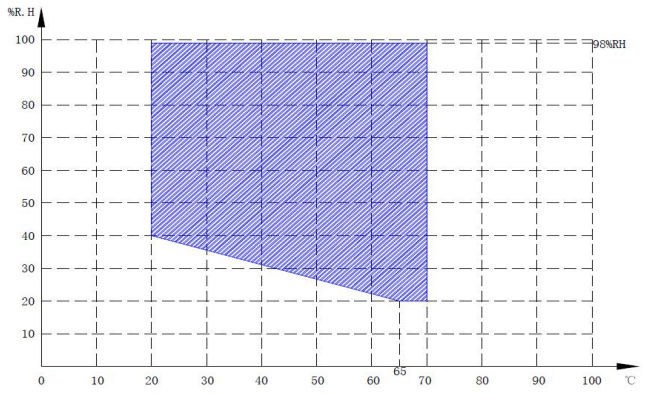
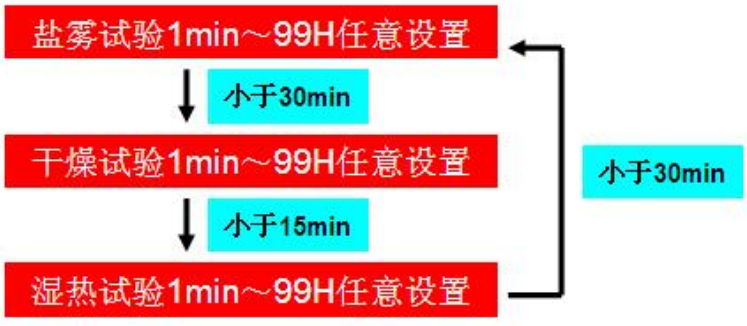
	meters to ensure that the gas will not be affected by the reverse pressure of the atmosphere. Strong exhaust should be avoided at the end of the exhaust hole to avoid strong airflow in the test box.
8. Equipment drainage	The equipment drainage pipe must be extended to the outside and ensure that the drainage pipe is unobstructed. The drainage outlet must be lower than the equipment drainage outlet, and the drainage pipe diameter is 1/2 "

3. Equipment composition and performance parameters

1. Volume, weight, dimensions and specifications	
1.1. Product Name	Composite salt dry and wet testing machine
1.2. Product Model	CZ-1600D
1.3. Nominal content	1280L Note : The volume of the top sloping roof is not included
1.4. Inner box effective size (mm)	1600×800×1000 W×H×D Note : Top inclined height 535 mm
1.5. Appearance space (mm)	Approximately 2900×1650×1220 W×H×D, excluding salt water tank dimensions
1.6. Brine tank size (mm)	Φ 700 × H930, capacity 300L
1.7. weight	About 700 kg
2. Device power, current and power supply	
2.1. Total power of machine	Total installed power 28.6KW , maximum operating power 20.6KW
2.2. Maximum current	31 A

2.3. Power supply conditions and power supply	AC 380V three-phase four-wire + protective grounding; voltage fluctuation range allowed is ±10%V; The frequency fluctuation range is 50±0.5Hz; TN-S power supply or TT power supply The grounding resistance of the protective ground wire is less than 4Ω The user is required to configure an air or power switch of corresponding capacity for the equipment at the installation site, and this switch must independently control the use of this equipment. When placing powered samples in the chamber, the sample power supply must use an external power supply, and the power supply of this machine must not be used directly;
3. Main technical parameters of the equipment	
3.1. Device Function	Salt spray test mode and damp heat mode (including dry and damp heat) can be switched arbitrarily, and program combination test or single function test can be performed
3.2. Control accuracy	Temperature resolution: 0.01 ℃ Humidity resolution: 0.1%RH Temperature deviation: ≤± 2.0 ℃ Humidity deviation: ≤±3%RH when ≥75%RH; Humidity deviation: ≤±5%RH when <75%RH; Temperature uniformity: ≤2℃ Humidity uniformity: ≤3%RH when ≥75%RH; Humidity deviation: ≤5%RH when <75%RH Temperature fluctuation: ±0.5℃ Humidity fluctuation: ±2%RH Note: Temperature uniformity and deviation are values measured at an ambient temperature of +25°C, relative humidity ≤85%RH, and without a sample.
3.3. noise	Less than 75 db (measured 1m from the front of the cabinet and 1.2m from the ground)

3.4. Salt spray test functions and parameters	Temperature range	Ambient temperature ~ 55℃ adjustable
	Salt spray deposition	1 ~ 2 ml/(h·80㎝^{2}) adjustable (collect for more than 16 hours and take the average value)
	Salt spray deposition uniformity	±0.5ml/ (h·80cm ^{2}) (collected for more than 16 hours);
	Spray method	Can set continuous / interval program and has quantitative control function;
	Spray system	The filter installed in the salt water tank can be cleaned and reused repeatedly; each nozzle can be fine-tuned in angle, and can be disassembled and cleaned;
	Salt water concentration	5 % ± 1% or specified value
	pH value of salt water	Neutral 6.5 ~ 7.2, acidic 3.0 ~ 3.2
	Saturator temperature range	Ambient temperature ~ 70℃ adjustable;
	Spray pressure	70 ～170 Kpa
3.5. Wet heat/dry mode	Temperature range	15 ～ 70℃ adjustable

	Humidity range	 **Humidity cycle 20%RH～98%RH (as shown in the figure)**
	Heating rate	**15→70 ℃≥ 3 ℃ /min (under average no-load conditions throughout the process)**
	Cooling rate	**7 0℃→ 15 ℃≥ 1.2 ℃/min (under average no-load condition throughout the process)**
3.6. Typical test conditions		
3.6.1. Commonly used alternating salt spray	**At 35℃ ambient temperature, 47℃ saturated barrel temperature, 5% salt water concentration spray test time 1min~999h can be set**	
3.6.2. Dry and wet combined salt spray test conditions	**At an ambient temperature of 35°C, a saturated barrel temperature of 47°C, and a 5% salt water concentration, the spray test time can be set arbitrarily from 1min to 999h; then switch to an ambient temperature of 60°C within 30min, and conduct a drying test under the condition that the relative humidity is lower than 30%RH, and the test time can be set arbitrarily from 1min to 999h; then switch to a temperature of 50°C±2°C within 15min, and a humid and hot environment with a** 	

3.6.3. Salt spray and dry alternating test	At 35℃ ambient temperature, 47℃ saturated barrel temperature, 5% salt water concentration, spray test time 1min~999h can be set arbitrarily, then switch to 15 ~ 30 ℃ temperature, relative humidity
3.7. Meet the test method	DO160 E/F/G salt spray test requirements GB/T 20854-2007/ISO14993-2001 Corrosion of metals and alloys - Accelerated test for cyclic exposure to salt spray, "dry" and "wet" conditions; GB/T24195-2009/ISO 16151:2005 Cyclic accelerated corrosion test under acid salt spray, dry and wet conditions; GJB 150.11A-2009 Military Equipment Laboratory Environmental Test Method Salt Spray Test; GB/T2423.18-2021/IEC60068-2-52:2017 Basic Regulations for Testing of Electrical and Electronic Products Kb: Salt Spray Alternating (Sodium Chloride Solution) GB/T2423.17-2008/IEC 60068-2-11-1981 Environmental testing for electrical and electronic products Part 2: Test method Test Ka Salt spray GB⁄T10125-2021/ISO9227:2017 Artificial atmosphere corrosion test Salt spray test GB/T 2423.3-2016/IEC60068-2-78:2012 Environmental testing Part 2: Test methods Test Cab: Steady state damp heat test GB/T 2423.4-2008/IEC60068-2-30:2005 Environmental testing for electric and electronic products Part 2: Test method Test Db: Cyclic damp heat (12h + 12h cycle) GB/T 31467.3-2015 Lithium-ion power battery packs and systems for electric vehicles Part 3: Safety requirements and test methods: Salt spray test;

3.8. Equipment meets the test method	**GB / T5170.5-2008 Test methods for wet heat test equipment** **GB/T 10587-2006 Technical requirements for salt spray test chambers** **GB/T 10586-2006 Technical requirements for humidity and heat test chambers** **GB/T 5170.8-2008 Test methods for environmental testing equipment for electrical and electronic products Salt spray test equipment**
3.9. Sample limit	**This test equipment is prohibited from:** **Testing or storage of samples of flammable, explosive or volatile substances** **Testing or storage of samples of corrosive substances** **Testing or storage of biological samples** **Testing or storage of samples with strong electromagnetic radiation sources** **Testing and storage of radioactive material samples** **Testing and storage of samples of highly toxic substances** **Testing and storage of samples that may produce highly toxic substances during testing or storage**
4. Air conditioning system	
4.1. Circulation fan	**The motor shaft is made of 316L stainless steel and the bearing of the front cover of the motor is made of imported waterproof and high temperature resistant bearing. Silicone sealing pads are added to the motor installation holes to prevent corrosive gases from invading the motor. At the same time, the motor is installed outside the working space of the equipment, the shaft extends into the room, and the stirring impeller is installed at the tail end of the shaft; special insulation measures and heat dissipation system improve the safety of the motor.**
4.2. Circulation fan	**The circulating impeller is made of S US316L stainless steel by stamping and is installed inside the centrifugal volute.**

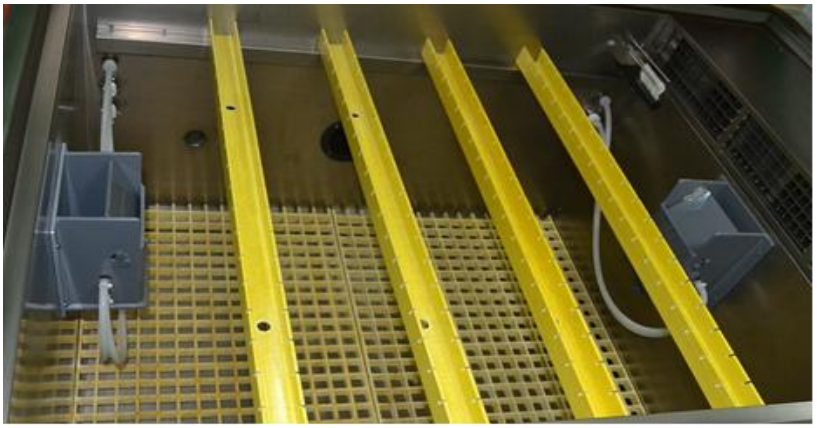
4.3. Air supply method	**The circulating fan forces air circulation. The equipment is equipped with a temperature adjustment chamber behind the inner box. The circulating air duct, evaporator, humidification steam outlet, and fin heating tube are installed in the adjustment chamber. The shutter outlet is installed on the top of the adjustment chamber, and the return air outlet is installed at the bottom. The circulating air is blown out from the top shutter, passes through the test space, and then is recycled from the bottom.**
5. Heating system	
5.1. Salt spray cycle heating	**Independently developed patented dry heat salt spray heating system; titanium tube armored heating devices are installed on both sides of the bottom of the inner box, using heat radiation to heat, and PID to control the heating amount; thus achieving long-term stable temperature operation**
5.2. Wet Heat Cycle Heating	**Titanium tube armored fin heater is used, circulating fan is used to send strong air circulation, and PID controls the heating amount to achieve temperature balance**
5.3. Saturated barrel heating system	**Titanium tube armored heating tube, water heating method, compressed air enters hot water and overflows in the form of bubbles, PID controls the heating amount to achieve constant temperature and pure spray gas**
6. Humidification and dehumidification system	
6.1. Humidification method	**Adopt external boiler humidification method, the humidification tube adopts pure titanium tube armored heating tube, PID output controls SSR action to control heating output**
6.2. Humidity measurement method	**Wet-Dry Bulb Comparison Method, PT100 Grade A precision platinum resistor**

6.3. Humidification tank	**P VC water tank, install high and low magnetic reed switches in the water tank to monitor the water level, install solenoid valves in the water supply pipes, automatically replenish water according to the water level in the water tank, and install mechanical float valves in the water tank to prevent the liquid level magnetic reed switch from losing control to provide safety protection for water supply. An overflow pipe for over-water level is installed on the top of the water tank for multiple protections**
6.4. Humidification water supply	**Water is replenished through water level difference, and a water level control device is installed next to the humidifier to automatically control the humidification water level**
6.5. Dehumidification method	**Compressor dehumidification**
7. Spray and spray system	
7.1. Spray Principle	**The Benoit principle is used to absorb salt water and then atomize it. The atomization degree is uniform and there is no blocking crystallization phenomenon, which can ensure the standard of continuous testing.** **Air compressor → primary oil-water separator → air storage tank → pressure reducing valve → main solenoid valve → secondary oil-water separator → saturator → pressure regulating valve → spray solenoid valve → nozzle;**
7.2. nozzle	**Independently developed patented anti-clogging spray nozzle, made of pure titanium corrosion-resistant material, can control the size and angle of the spray**

7.3. Saturation Bucket	**It is welded with SUS304# stainless steel. In order to ensure that the compressed air for spraying is pure and constant temperature compressed air, a special air filtering and heating pressure barrel is designed. A water level control device, a heating device and a temperature control system are set in the pressure barrel. At the same time, a circle of compressed air overflow holes are evenly installed at the bottom of the pressure barrel. The compressed air source oil-water separator and the air source pressure regulating valve are connected externally. After the compressed air is adjusted to the required pressure value, it enters the heating pressure barrel, passes through the holes at the bottom and enters the water in the pressure barrel, and then overflows in the form of bubbles, and then supplies the spray nozzle from the top of the heating pressure barrel; at the same time, water level sensing probes are set near the bottom and the top of the pressure barrel to realize automatic water supply; the water level in the heating pressure barrel is constant at the specified water level, so as to obtain pure saturated steam and ensure that the temperature of the saturated compressed air is kept within the set range for a long time, and it has liquid level monitoring and liquid level limit alarm functions.**
7.4. Salt water supply system	**The prepared salt solution is stored in the salt water tank, and the peristaltic pump is driven by a stepper motor to suck the salt water in the salt water tank and supply it to the nozzle. Each nozzle has an independent channel to control the salt water supply, thus avoiding the problem of nozzle crystallization in the traditional siphon spray method. At the same time, the water supply flow of the peristaltic pump is adjustable and controllable, effectively ensuring the spray volume.**
7.5. Salt water tank	**The salt water tank is divided into a salt water preparation tank and a salt water supply tank, which are made of PE material and have a capacity of about 300L ;**

7.6. Spray control	**Can run manual spray or set automatic spray according to program;**
7.7. Spray volume adjustment method	**a) Independently developed and manufactured patented fine atomization spray adjustment system;** **b) A mist volume adjustment baffle is installed above the spray nozzle to adjust the opening of the baffle to control the amount of mist output;** **c) The high-precision stepper motor drives the brine water supply peristaltic pump to adjust the brine water supply according to the amount of mist, achieving constant spray volume control and water conservation;** **The two-stage pressure regulation controls the spray pressure to achieve fine atomization and spray salt mist into the test space, achieving uniform spray deposition**
7.8. Spray volume monitoring	**Two Φ100mm collecting funnels are installed on the left and right sides of the box at a distance of 170mm from the box wall and 1/3 of the height of the inner box bottom . The end of the funnel is extended to the outdoors with a hose. A collecting measuring cylinder installation port is set on the outdoor box wall, and a 50ml measuring cylinder is installed inside to monitor the spray volume.**
7.9. Pressure regulation	**The spray pressure is 0.07-0.17Mpa, which can be adjusted in two stages . The first stage is equipped with an air filter pressure regulating valve to adjust the compressed air to 0.2-0.3MPa. The second stage is adjusted to 0.07-0.17Mpa spray pressure so that the spray pressure sprayed from the nozzle is within the specified range.**
7.10. Defogging control	**Manual defogger can be operated or programmed to automatically defog; compressed air is filled into the room and then the indoor fog is discharged for quick defogger**
8. Equipment structure	

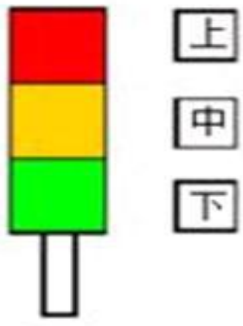
8.1. Box structure layout	**The test chamber box is welded from pure titanium plates with a thickness of 1 mm;** **The test chamber is made of stainless steel plate with thick surface paint treatment, the plate thickness is 1.2 mm; (paint color R AL7035)** **The control box and the test box are an integral left-right structure, with the test box on the left and the dry and wet heat control box on the right. The water-electricity separation structure effectively prevents water from entering the electrical control box and damaging the accessories. It has a beautiful appearance and is safe and reliable to use.** **The whole equipment is a table-top structure . The bottom of the equipment is welded with stainless steel square tubes into a frame structure . Fomar casters are installed at the bottom to facilitate the relocation and positioning of the equipment .** **The box body is sealed with high temperature resistant and corrosion resistant silicone strips to ensure that the corrosive gas in the box does not leak;** **The thermal insulation material is made of polyurethane rigid foam;** **Salt water replenishment tank: external, easy to clean.** **The air supply port is installed at the back of the equipment , and a control solenoid valve is set on the air supply pipeline**

8.2. Box cover	**The inner layer of the test chamber sealing cover is welded with pure titanium plates, and the outer layer is made of stainless steel plate with paint treatment. The paint color is grass green, color number RAL6018 or user-specified color number. (If no specification is made when placing an order, RAL 6018 is assumed by default). The top is made into a ^{1100} angle sealing cover to effectively prevent condensed water from dripping onto the sample surface during the test and affecting the test results.** **The box cover is equipped with a transparent tempered glass observation window, the window size is: width 400mm * height 280mm**
8.3. Lid lifting operation	**The air cylinder is used to control the lifting of the box cover. The lifting speed can be adjusted by air pressure, which is easy to operate.**
8.4. Upper standard sample fixture	**The inner box is placed on the top and can be disassembled. The standard test piece is placed on the fixture. The sample installation angle is 20°±5° and tilted from the vertical plane. The sample holder is made of corrosion-resistant and insulating resin material, which has a series of excellent characteristics such as high temperature resistance, corrosion resistance, high strength, low specific gravity, low moisture absorption, small elongation and good insulation, as shown in the figure:** 

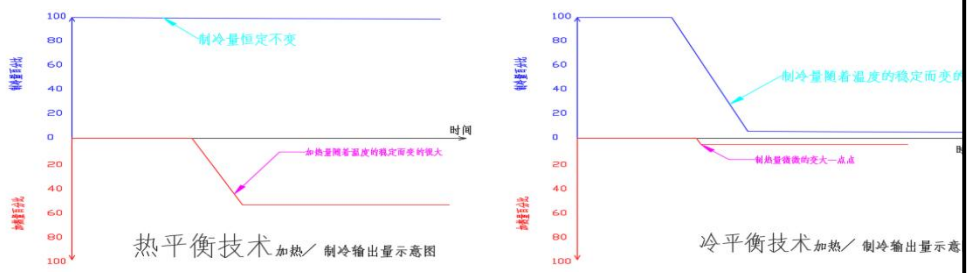
8.5. Lower load-bearing sample rack	Placement of large samples on the lower layer: A mesh sample placement platform is set at the bottom of the test chamber. The platform is placed above the heating layer at the bottom of the chamber, about 150mm above the bottom plate of the inner chamber. The surface of the platform is evenly perforated to prevent the accumulation of solution after fogging, and is also conducive to air circulation in the chamber. The mesh plate is detachable. The mesh material is made of reinforced fiberglass, with a load-bearing capacity of ≥ 600kg/m2 and evenly distributed. 
8.6. Drainage pipe	Use acid and alkali resistant pipes as drainage pipes;
8.7. Power distribution control cabinet	Distribution board, distribution board, cooling fan, over-temperature protector, main power leakage circuit breaker (with protective cover), distribution control cabinet and valve room are isolated
8.8. Valve chamber	Water adding solenoid valve, spray solenoid valve, defogger solenoid valve, air saturation pressure barrel, spray regulating valve, brine water supply pump device
8.9. Control interface	Over-temperature protection setter, power start switch, program controller, working time counter, RS -232 communication interface, USB interface, R J45 network interface
8.10. Power cord	Located on the back of the control box
8.11. Drainage holes	The test chamber drain hole is located at the lower left of the back of the test chamber, with a drainage hole diameter of 1/2 " ; the saturated barrel drain hole is located at the back of the box, with a drainage hole diameter of 1/4"
8.12. Exhaust Hole	A Φ48mm mist exhaust hole is set at the back of the test chamber , which extends to the outdoors during installation

8.13. Test hole	A Φ50mm test hole is installed at the center of the back of the equipment, with a sealing cover and a sealing plug attached.
8.14. Automatic water supply hole	Located at the lower left of the back of the test room
9. Electrical control system	
9.1. Controller	 7-inch true color, 800×480 dot matrix LCD display Composite salt spray dedicated programmable controller , supports constant temperature salt spray, salt spray, high temperature drying, constant humidity and heat, alternating humidity and heat, salt spray humidity and heat cycle and other functions
9.2. How it works	Program mode, set value mode, timed start and stop
9.3. language	Language Chinese/English/Russian can be switched freely
9.4. Setting method	Human-computer dialogue touch screen input
9.5. Data recording method	Battery-protected RAM, 8-10 years, can save the device's set value, sampling value and sampling time; curve recording cycle can be set to 30-180 seconds, the maximum memory time can continuously store 90 days of historical curves and historical data (when the sampling time is 1 minute), without continuous use, the data can be saved for more than 10 years
9.6. Display resolution	Temperature: 0.01 ℃ , humidity 0.1% RH, time: 1min

9.7. Program Features	Spray cycle: The maximum test time for continuous spray is 9999 hours, and the maximum spray time for intermittent spray is The maximum spraying stop time is 99 hours and 59 minutes. Available program quantity: Maximum 120 groups One program can be composed of 1 to 99 segments. Available memory capacity: 1 2 00 segments Repeatable commands: Each command can be executed up to 999 times Programs can be linked together TS1~TS3 three sets of time signals The program time can be set from 1 minute to 999 hours per section
9.8. Setting range	Temperature: Adjust according to the temperature operating range of the device (upper limit +5℃, lower limit -5℃)
9.9. Temperature and humidity input	PT100 platinum resistance
9.10. Communication function	Can be connected to a computer to display curves and collect data; Can be used as a monitoring and remote control system; Can do synchronous control of multiple machines; RS-485/RS-232 RJ45 Ethernet port USB interface.
9.11. USB storage	Plug in 1G- 16G USB disk to download historical curves, historical data, control system parameters, hot-swappable function
9.12. Power off memory function	The power failure recovery mode can be set as: hot start/cold start/stop.
9.13. Scheduled startup function	The start time can be set at will. After turning on the power, the machine will automatically run when the time is up.
9.14. Software usage environment	Simplified Chinese Windows XP or Simplified Chinese Windows 7/ Windows 10 operating system.

9.15. Network connection	It can be connected to Ethernet through professional software, and remote control and remote assistance can be performed through the network. Test data can also be collected through the network, and multiple machines can be controlled at the same time.
9.16. Smart Features	Intelligent interconnection, intelligent fuzzy function and ARW start-up-overtravel inhibition, intelligent power saving, intelligent function to extend equipment life, intelligent output modes (built-in timer) up to 28 types, intelligent humanized control, etc.
9.17. Open software functions	Support third-party host sending code to control the device start, stop, and record data functions Note: The controller provides function codes , and users can edit the host computer software program to achieve unified monitoring and control
9.18. Output control method	Anti-integral windup PID BTC balanced temperature control method (temperature test equipment) Spray time and cycle can be set according to user's standard needs
9.19. Additional functions	Fault alarm, cause and processing prompt function Power failure protection function Upper limit temperature protection function Calendar timing function (automatic start and automatic stop) Self-diagnosis function.
9.20. Status display	A cylindrical three-color sound and light alarm (with LED lamp beads) is installed on the top of the equipment; the yellow light is on when waiting to start or the operation is completed; the green light is on during normal operation; the red light is on for emergency stop or equipment failure alarm, and the buzzer sounds intermittently; 

9.21. Circulation fan	It uses a high temperature resistant, long shaft motor, which is installed in the outdoor space, with the shaft extending into the room, and a stirring impeller installed at the tail end of the shaft; special insulation measures and heat dissipation system improve the safety of the motor.
9.22. Heating control method	The temperature controller sends instructions according to the set temperature and the signal transmitted by the temperature sensor in the test chamber, and controls the output of the heater through the logic circuit to adjust and control the SSR control module. It has reliable operation, no contact, no spark, long life, no noise, no electromagnetic interference, fast switching speed, strong anti-interference ability, small size, vibration resistance, impact resistance, explosion-proof, moisture-proof, and corrosion-resistant, and can directly drive high-current loads with tiny control signals.
10. Refrigeration and dehumidification system	
10.1. Refrigeration method	In order to ensure the cooling rate and minimum temperature requirements of the test room, this test room adopts a compressor refrigeration system, which consists of a compressor, a radiator, an evaporator and a throttling device. Heat exchange is achieved through an evaporative condenser.
10.2. Refrigeration compressor	Adopt low temperature compressor imported from Europe
10.3. Cooling method	Air- cooled scale condenser , fan heat dissipation
10.4. Evaporator	The evaporator is made of pure titanium tubes and titanium radiators, which has good corrosion resistance.
10.5. Throttling device	Capillary
10.6. Oil separator	Separate the refrigeration oil droplets mixed with the high-temperature and high-pressure refrigerant gas discharged from the compressor and return them to the compressor curved track cavity for compressor lubrication and cooling

10.7. Filter drier	**It absorbs the residual moisture and acidic substances in the refrigerant of the refrigeration system, and filters out the solid impurities, copper chips, etc. in the system, protecting the normal operation of the expansion valve and capillary tube, and preventing the occurrence of Raw ice blockage and dirty blockage**
10.8. Nitrogen Filled Welding Process	**It is recommended to use high-quality oxygen-free copper tubes for low-temperature connecting pipelines. The pipeline production, nitrogen filling welding, and 48-hour high pressure leakage prevention process are used to ensure the welding quality.**
10.9. refrigerant	**Environmentally friendly refrigerant R404a is used as the refrigeration medium of this refrigeration system**
10.10. Energy saving control	 **The refrigeration system uses the cold balance technology to save about 30% of electricity and effectively reduce the cost of use. As shown in the figure above, thermal balance is achieved by changing the size of the heating output to achieve constant temperature. In this way, when the cooling capacity of the compressor is constant, the heating will become higher and higher, thereby increasing energy waste and causing unnecessary expenses to the user. The cold balance technology achieves constant temperature by changing the compression cooling capacity. When the temperature approaches our set value, the cooling capacity is gradually reduced through PID adjustment to achieve constant temperature (theoretically, 0 heating output can be achieved, but there will be a small amount of heating output in actual production), achieving the purpose of energy saving.**

10.11. Refrigeration system features	A、 All system pipelines are subjected to ventilation and pressurization 22kg leak detection test. B、The heating and cooling systems are completely independent. C、Equipped with our company's professional technical features, it can prevent high temperature and high pressure airflow from damaging the system when the refrigerator is turned on at the same time. D、 All refrigeration system operation procedures are completely controlled by a microcomputer controller. E、There is a water tray at the bottom of the compressor to collect the condensed water produced by frost. F、The compressor is equipped with a PTC temperature sensor, which provides over-temperature protection when the compressor is over-temperature. G、 The high and low pressure protection device monitors the refrigerant pressure during the operation of the equipment. Once the refrigerant pressure is higher than the system's limit pressure or lower than the system's set minimum pressure, an alarm will be immediately issued and the power will be cut off until the fault is eliminated. H、 The refrigeration system uses all imported brand accessories with reliable quality to ensure the stability of the system.
11. Safety protection system	
11.1. Refrigeration system	Compressor overheat, overload , overpressure, overtemperature protection
11.2. Test Chamber	Extreme over-temperature, automatic pressure balance protection
11.3. Humidification system	Humidifier heat pipe dry burning, water shortage abnormality , heating pipe short circuit protection
11.4. Heating system	Heating tube extreme over-temperature , heating tube short-circuit protection

11.5. power supply	**Main power supply phase loss, reverse phase, high voltage, low voltage, overload and short circuit protection, control circuit short circuit and overload protection**
11.6. Circulation fan	**Fan overload , fan short circuit , fan reverse protection**

12. Factory-provided equipment and information

12.1. 1 copy of the equipment factory packing list

12.2. 1 copy of equipment electrical schematic diagram

12.3. 1 piece device instruction manual

12.4. 1 piece equipment certificate

12.5. 1 piece equipment warranty card

12.6. 1 copy of equipment factory inspection report

12.7. 1 piece controller monitoring CD

12.8. 2 pieces mist collecting cylinders

12.9. 2 pieces mist collector

12.10. 1 set air atomizing nozzle

12.11. 2 bottles sodium chloride (500g/bottle)

12.12. 1 pack PH test paper

12.13. 1 set connecting pipe

12.14. 1 piece plastic bucket (13L)

12.15. 1 piece measuring cup

12.16. 1 meter imported peristaltic pump tube

12.17. 1 set of test sample rack

13. Main spare parts list

No.	Product Name	Brand	QTY	Remark
13.1.	Program Controller	Zhongzhi	1 set	
13.2.	Laboratory over-temperature protector	TEMI, Korea	1 unit	
13.3.	Spray adjustment device	Zhongzhi	1 set	
13.4.	Peristaltic Pumps	Hengjie,China	1 unit	

13.5.	Laboratory box	Zhongzhi	1 unit	
13.6.	Evaporator	Kejian/Luoke, China	1 unit	
13.7.	Condenser	Xingyue/Yongqiang,China	1 unit	
13.8.	Refrigerant	R404a	5kg	
13.9.	Refrigerant solenoid valve	Saginomiya,Japan/ Castel, Italy	2	
13.10.	Pressure protection switch	Saginomiya,Japan	2	
13.11.	Filter drier	Emerson, USA	1	
13.12.	compressor	TECUMSEH, France	1 unit	
13.13.	Power circuit breaker	Schneider, France	1	
13.14.	Heater over temperature protector	Rainbow,Korea	4	
13.15.	Blending room motor	Yutian, China	3 units	
13.16.	Blending chamber wind wheel	Feng Yu,China	3	
13.17.	Test chamber heater	Zhongzhi	1 batch	
13.18.	Flake heating tube	Weide,China	1 group	
13.19.	Humidification heating tube	Weide,China	1 group	
13.20.	Solid State Relays	Carlo Gavazzi,Swiss	4 sets	
13.21.	AC contactor	Schneider, France	6	
13.22.	Thermal overload relay	Schneider, France	2	
13.23.	Intermediate relay	OMRON,Japan	6	
13.24.	Self-locking switch with light	Siemens,Germany	1	
13.25.	Temperature measuring body	Omega,USA	4	

13.26.	Liquid Level Reed Switch	China Brand	4	
13.27.	Phase sequence failure protector	Swiss Carlo Gavazzi	1	
13.28.	Water supply / spray solenoid valve	Delixi,China	3	
13.29.	Pressure regulating valve	AirTac,Taiwan China	1	
13.30.	cylinder	AirTac, Taiwan China	2	
13.31.	Other supporting materials	China Brand	1 batch	

14. Equipment overall structure layout diagram