



环 仪 仪 器 科 技 有 限 公 司  
HUANYI INSTRUMENTS CO.,LTD

## **HY-SST-120 Salt Spray Test Chamber**

# **Operating Manual**

**Survival by quality,**

**Development with integrity,**

**Efficiency by management.**

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## Method of Salt Spray (Fog) Test for Surface Finishing

1. **Scope of application:** This standard specifies the salt water spray touch resistance test method for various surface treatments of metal substrates after electroplating, organic or inorganic coating, etc.
2. **Test method:** This method is a corrosion test method that uses a salt water spray testing machine to spray sodium chloride solution on the electroplating coating in a mist form. The main conditions of the test are shown in Table 1.

## 3. Table 1 Main test conditions

Project	When preparing	Under test	Remark
Sodium chloride solution concentration (g/L)	50	40~60	It is best to calibrate the concentration once a day
PH	6.5	6.5-7.2	Determination of pH in the test after collection
Compressed air pressure (kgf/cm <sup>2</sup> )	.....	1.00±0.01	Continuous without interruption
Spray volume (ml/80cm <sup>2</sup> /h)	.....	1.0~2.0	It should be collected for at least 16 hours and the average value
Pressure barrel temperature (°C)	.....	47±1	
Salt water barrel temperature (°C)	.....	35±1	
Test room temperature (°C)	.....	35±1	Test at least twice a day, separated by at least
Laboratory relative humidity	.....	≥85%	7 hours
Test time			Other humidity requirements shall be agreed between the buyer and seller.

4. **Preparation of test solution:** Dissolve test grade sodium chloride in distilled water (or water with total dissolved solids less than 200 ppm), and prepare a test solution with a concentration of 5±1%. After this test solution is sprayed at 35°C, the pH value of the collected solution should be 6.5~7.3. And before spraying, the test liquid must not contain floating matter.

Note (1): Sodium chloride cannot contain impurities such as copper and nickel, and the sodium iodide content in the solid is less than 0.1%. Because impurities may contain corrosion inhibitors, the total impurity content must be less than 0.3%.

(2): The specific gravity of the test liquid when measured at 33~35°C should be 1.0258~1.0402, and the specific gravity when measured at 25°C is 1.0292~1.0443. The concentration of this test solution can also be calibrated using silver nitrate solution titration or other methods.

(3): The pH value of the test solution must be adjusted with reagent-grade dilute hydrochloric acid or sodium hydroxide solution, and measured with a pH meter or other reliable methods. Since the water used to prepare the test solution contains carbon dioxide, the solubility of carbon dioxide in water varies with the test solution. Temperature changes affect the pH value of the solution, so the pH value must be carefully controlled. The pH value can be adjusted by any of the following methods:

① Prepare the test solution at room temperature and spray it at 35°C. As the temperature increases, part of the carbon dioxide escapes from the solution and the pH value increases. Therefore, when preparing the test solution at room temperature, the pH value should be adjusted within 6.5 so that the pH value of the collected solution can be between 6.5 and 7.2.

② Before adjusting the pH value, boil the test solution first and then cool it to 35°C, or maintain it at 35°C for 48 hours. The pH value thus adjusted will not change much when sprayed at 35°C.

③ First heat the water to above 35°C to remove dissolved carbon dioxide, then prepare the test solution and adjust the pH value so

that the adjusted pH value will not change much when spraying at 35°C.

4.. In order to avoid clogging of the spray nozzle, the test solution must be filtered or carefully tilted into the salt water bucket, or a glass sieve should be installed at the front end of the spray suction pipe for filtration.

**4. Equipment:** The equipment required for this test is composed of spray nozzles, salt water barrels, test piece holders, spray liquid collection containers, test chambers, salt water [supply barrels, pressure barrels, compressed air supply equipment and exhaust equipment, etc. The device is shown in Figure 1 and tested according to the following conditions.

4.1 The salt water spray testing machine and its required pipelines should be made of blunt materials that cannot affect the spray corrosion test or be corroded.

4.2 The spray nozzle cannot spray the test liquid directly onto the sample, and the solution accumulated at the top of the spray chamber must not drip onto the test piece.

4.3 The test liquid dropped from the test piece cannot flow back into the salt water bucket and be used for testing again.

4.4 Compressed air cannot contain grease and dust, so an air purifier is required. The air pressure must be maintained at  $1.00 \pm 0.01 \text{ kgf/cm}^2$ . Because compressed air absorbs heat when it expands, it must be preheated in advance (6), as shown in Appendix 1, to obtain a uniform temperature spray.

Note (6): Preheat to increase the temperature and humidity of compressed air.

4.5 The spray collector has a horizontal collection area of  $80 \text{ cm}^2$  and a diameter of about 10 cm. It is placed near the test piece (nearest and farthest from the nozzle).

4.6 The amount of spray liquid is calculated based on the entire time. On the collection container, an average of 1.0 to 2.0ml of saline solution should be collected per hour. The spray liquid should be collected for at least 16 hours, and the average value represents the spray volume.

4.7 In the test, the sodium chloride solution concentration of the salt water bucket should be maintained at 40~60g/L.

4.8 The temperature of the pressure barrel must be maintained at  $47 \pm 1^\circ\text{C}$ , and the temperature of the brine barrel must be maintained at  $35 \pm 1^\circ\text{C}$ .

4.9 The relative humidity in the laboratory must be maintained above 85%. Higher relative humidity requirements can be agreed upon by the seller and buyer.

## 5. Sample

5.1 Collection location: The sample can be taken from the main surface of the product or the product itself can be used as the sample. However, if it is impossible to test or judge with the product, the parties can agree to use a test piece instead. This test piece must be representative of the product. .

5.2 Size: The standard size of the test piece is  $150 \times 70 \text{ mm}$ , or  $100 \times 65 \text{ mm}$ .

5.3 Quantity: The number of samples shall be agreed upon by the seller and buyer.

5.4 Pre-test treatment

5.4.1 The sample must be properly cleaned according to the nature and cleanliness of the coating. Abrasives and solvents with corrosive or inhibitory effects must not be used for cleaning, and the cleaning method must not damage

the surface. As for stainless steel samples, nitric acid can be used for cleaning by agreement between the seller and the buyer. and passivation. After the sample has been cleaned (passed the water-extractability test), wipe it dry with a clean cloth or absorbent water, or blow it dry with oil-free dry air. When necessary, magnesium oxide paste can be used. This paste The substance is 10g of pharmaceutical grade magnesium oxide added to 100mL of distilled water.

5.4.2 Unless otherwise specified, the sample incisions and exposed parts of the substrate due to staining, or coating defects caused by identification marks. They should be covered with a suitable protective layer during testing. Such as hard wax (ceresin wax), vinyl tape and other insulation materials.

5.4.3 Handprint contamination will cause serious adverse test results. The sample must not be contaminated by any handprint after cleaning.

**6. Placement of specimens: During the test, the location of the specimens in the test room shall meet the following conditions:**

6.1 The main surface of the sample should have an inclination of 15 to 30 degrees from the plumb line, and should be parallel to the main flow direction of the spray when viewed from above the test chamber. Special parts have main surfaces in many directions. When testing at the same time is required, multiple samples can be placed, and each main surface must be able to receive salt water spray at the same time.

6.2 The specimens should be arranged so that the spray can fall freely onto all test pieces and should not hinder the free fall of the spray.

6.3 The specimens must not come into contact with each other, metallic conductors, substances with capillary action, or other objects other than the support frame.

6.4 Do not drip salt water solution from one sample to other samples.

6.5 The specimen identification mark or assembly hole should be covered underneath.

**7. Operation: Adjust the temperature of the test chamber and the brine barrel to 35 degrees Celsius, and the temperature of the pressure barrel to 47 degrees Celsius. When the spray pressure is maintained at  $1.00 \pm 0.01 \text{ kgf/cm}^2$ , the spray can be started.**

7.1 Test conditions: The test conditions are shown in Table 1.

7.2 Test time: It is the continuous time from the beginning to the end of spraying. The test time is an important quality data of the electroplated layer, and the required time can be agreed upon by the buyer and seller.

7.3 Post-test treatment: After the spray test is completed, when opening the upper cover of the test chamber, take out the sample carefully without letting the solution drip. Do not damage the main surface, and quickly clean it at a temperature below 38°C.

Wash off the adhering salt particles with water, use a brush or sponge to remove corrosion products outside the corrosion points, and dry them immediately with clean compressed air.

**8. Records: Unless the seller and buyer agree otherwise, this test should have the following records: (Appendix 2 is a reference record sheet)**

8.1 When preparing brine, the quality of salt and water used.

8.2 Test temperature record.

8.3 The installation of the spray collector should be recorded as follows every day:

8.3.1 Spray volume

8.3.2 Collect the specific gravity or concentration of the solution at room temperature

8.3.3 PH value of collected solution

8.4 Type, shape, size and number of specimens.

8.5 Pre-treatment and cleaning methods for specimens.

8.6 Placement method of specimens in the test room.

8.7 Covering method used in accordance with Section 5.4.2.

8.8 Spray time.

8.9 If the test time is interrupted, the reason and time of the interruption must be recorded.

8.10 All results of other inspections.

**9. Judgment method:** To determine the corrosion status of the measured surface, it can be carried out according to the chart of the relevant grade number standard. Blisters, cracks, etc. that are difficult to determine using standard charts can be determined using a magnifying glass with a ruler, or by a method agreed in advance between the seller and buyer.

**10. Appendix Table 1: Compressed air pressure and required preheating temperature during 35°C spray test**

Compressed air pressure	(k P a )	84	98	111	126
	( kgf/cm <sup>2</sup> )	0. 86	1. 00	1. 14	1. 29
Required preheating temperature (°C).		46	47	48	49

Note: 1kpa-0.4 psi

**Appendix 2: Salt water spray test record form**

Test date : _____		Test number: _____	
Test time: From _____ To _____ : Total: _____ Hour			
If the (spray time) test is interrupted, the reason is:			
1. Sodium chloride quality			
2. Distilled water quality			
3. Spray collector:		mL /80cm/h	
3.1 Spray volume			
3.2 Collect the specific gravity or concentration of the solution at room temperature			
3.3PH			
4. Sample:			
4.1 Category			
4.2 Shape			
4.3 Scale			
4.4 Number			
5. compressed air pressure		Kgf/cm	
6. Laboratory relative humidity			
7. Test room temperature		° C	
8. Pressure barrel temperature		° C	
9. Salt water barrel temperature		° C	
10. other		° C	
Determination:	1. Determine according to the standard chart:		
	2. Determine according to other methods:		
Tester:			

## II、Basic parameter of equipment

1. Studio size: 1200×800×600cm (L\*W\*H)
2. Overall dimensions: 2080×1150×1305cm (L\*W\*H)
3. Volume (L): 480L
4. Power supply: AC220V
5. Equipment power: 1.5KW
6. Opening method: Automatic opening
7. Normal saline spray test :**NSS, ACSS**  
Test room temperature: 35°C±1°C  
Pressurized air drum: 47°C±1°C
8. Corrosion resistance test :**CASS**  
Test room temperature: 50°C ± 1°C  
Pressurized air drum: 63°C ± 1°C
9. Temperature uniformity: ≤±2°C
10. Temperature fluctuation: ≤±0.5°C
11. Salt spray deposition: 1~2ml/h.80cm<sup>2</sup>
12. Spray pressure: 1.00±0.01kgf/cm<sup>2</sup>
13. Spray method: Continuous spray + alternating spray

## III、Structure introduction

### Inside the laboratory:

1. Spray tower: The built-in glass nozzle is placed inside the nozzle, and the spray is dispersed into the test chamber through the tower tube guide and then through the conical diffuser.
2. Spray regulator: The cone-shaped spray tower can adjust the spray volume. Turn it up to increase the spray volume, and turn it down to decrease the spray volume.
3. Salt water tank: Located at the bottom of the tower, the salt water is injected through the reagent inlet and slowly flows into the salt water tank at the bottom of the spray tower through the pipeline. The water level of the salt water tank is controlled by a floating ball, which can automatically control the water level. The cleaning drain port at the bottom of the tank is equipped with a silicone plug. Control, unplug the rubber plug during cleaning, open the laboratory drain ball valve on the back of the test chamber, and discharge the salt water.
4. Collector: The amount of mist sprayed from the nozzle settles in a funnel cup of 80cm<sup>2</sup> in a free fall manner, and

then flows from the pipe to the measuring cup. The average spray volume is 1~2ml per hour, and the average value is taken for 16 hours.

5. Storage rack: The V-shaped storage rack is made of PVC material, so the weight of the concentrated point is limited to no more than 2kg. If it is placed dispersedly, it can bear less than 10kg. There are two rows of round holes on the V-shaped storage rack, which are equipped with rods for placement. The angle is an inclined plane of 15° to 30°. If the test workpiece is large, a hole-shaped fog platform needs to be installed at the bottom to place the large test workpiece.

6. Heating water tank: The heating water tank is attached to the bottom of the test chamber and is used to fill water and heat it to keep the temperature of the test room stable. Its functions are heating and heat preservation. The water level of the heating water tank is controlled by a float switch. When the water level is low, it will alarm and the equipment will automatically shut down.

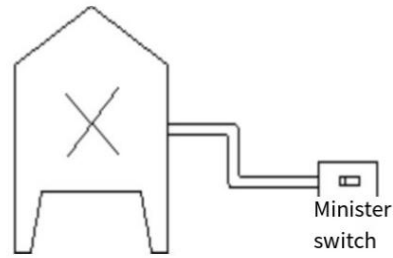
#### **Outside of the laboratory:**

1. Measuring bucket: Collect the spray volume for each test, with a scale of 50ml.
2. Seal the water tank: Use the water sealing principle to prevent salt spray from leaking out.
3. Saturated air barrel: Placed at the bottom of the control box, it is sealed and made of pp high-pressure barrel. Its function is to heat and humidify the air through this barrel, so that the air reaches the temperature and then sprayed, thereby increasing the stability of the temperature in the laboratory.
4. Test drug entrance: After preparing the test drug, inject it from the test drug entrance.
5. Sealing cover: The sealing cover is designed with an optimal top angle of 106 degrees so that the condensed water generated during the test will not drip onto the sample and affect the test results.
6. Regulating valve: This valve is adjusted by the pressure gauge display when the air pressure is too high or too low (test condition is 1kg/cm<sup>2</sup>)
7. Pressure gauge: The pressure displayed by the pressure gauge is the pressure reached when the air is heated through the saturated air barrel and transmitted to the nozzle (test condition is 1kg/cm<sup>2</sup>).
8. Exhaust pipe: 54.5mm diameter pipe. This pipe is used to discharge mist to the outdoors. There should be no accumulation of water to allow the mist to be discharged.
9. Laboratory drainage valve: 1/2 diameter pipeline, through which waste water is discharged.



## IV、 Installation instructions and precautions

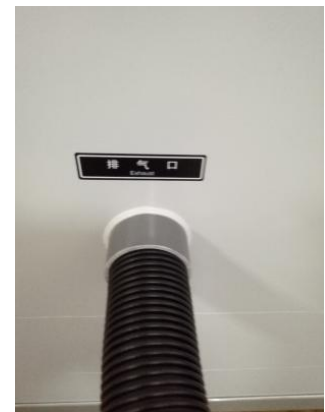
1. Power supply single phase 220V
2. The back of the machine is placed about 100 CM away from the wall, leaving space for maintenance on both sides.
3. The external line of the machine is the main power line. Please install a wireless switch or a knife switch (about 20A) as shown in the figure.



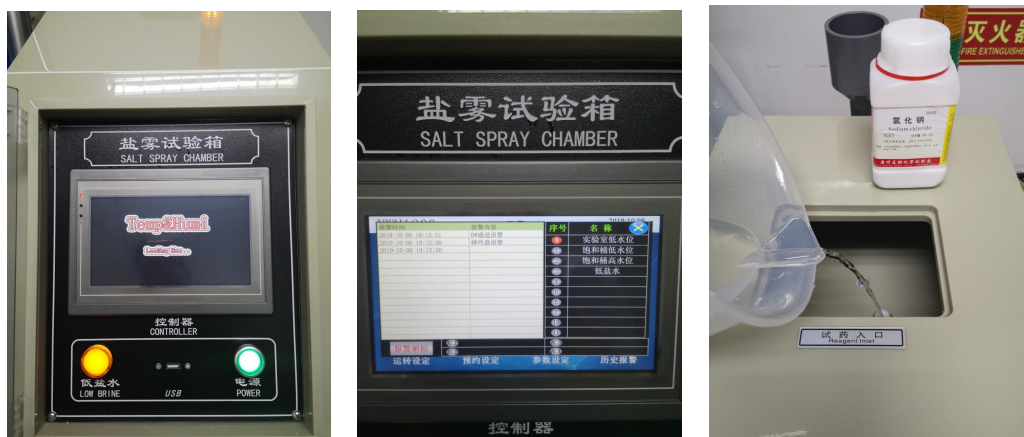
1. The drainage pipe can be discharged with a PVC 1/2" hard pipe. Please note that the water pipe should be directed downward. The exhaust pipe can be extended to the outside with a PVC 2" hard pipe for discharge. Pay attention to the installation of the discharge pipe. It can be parallel to the machine and downward.
2. Please avoid direct sunlight when installing the machine to avoid affecting the test conditions.
3. The installation location of the machine should be as close as possible to other electrical equipment or flammable items to avoid danger.
4. This machine is made of PVC plastic. Please do not hit it hard to avoid rupture. Do not use the temperature beyond the test standard range to avoid deformation due to overheating.

## V、 OI (operating instructions)

1. First plug in the power plug (power 220V), insert the gas pipe in the compressed air port, the rear air intake pressure is 2KG, connect the water pipe in the automatic water intake port (automatic water supply in the laboratory and pressure bucket), install a fog exhaust pipe in the exhaust port to discharge the salt spray to the outside.



2. Turn on the leakage switch on the back of the equipment, turn on the power switch on the operation panel, the control screen will light up, the low salt water indicator light will light up, the control screen will display the low water level in the laboratory, the low water level in the saturated barrel, and the low salt water alarm will prompt the laboratory, saturated barrel, and salt water tank. To add water, you can add water by yourself after the laboratory and saturated barrel are connected to automatic water replenishment (tap water can be injected into these two places); after the laboratory and pressure barrel are filled with water, the low water level in the laboratory and the low water level in the saturated barrel are automatically released, and then the salt water is prepared, the neutral salt spray reagent preparation method is to prepare 5% salt water, 250g sodium chloride to prepare 5000ml of salt water (purified water or distilled water is required to prepare the salt water), and then pour it from the entrance of the reagent, after adding enough salt water The low salt water lamp will not light up.



3. Press the lid switch and the sealing lid will open automatically. Add clean water to the lid sealing groove to seal the lid. Then place the tested product (standard part) on the V-shaped groove and lean it against the round rod. The placement angle is required to be 15 degrees or more. Large work piece products with an angle of 30 degrees and exceeding 10KG are placed on the bottom mesh storage platform. After the products are placed, press the lid switch and the lid will automatically close.



4. Click on the monitoring screen on the control screen to set the temperature conditions for the test, neutral and acidic salt spray, laboratory temperature setting of 35 degrees, saturated barrel temperature setting of 47 degrees, then return to the directory, click fixed value setting, and set the product After setting the time to be tested, return to the monitoring screen, click Start in the small right corner, a pop-up pops up to confirm the start, click Rerun, and the device will start spray timing. When the time is up, the spray will automatically stop. Check whether the spray volume is normal at the metering cylinder. The average amount is 1~2ml per hour, and the average value is taken over 16 hours.



4. If there is any abnormality during the test, you can press the red emergency stop button under the operation panel and handle it according to the abnormal function judgment.

## VI、Function abnormal judgment and processing

Condition	Cause	Handling Method
The test chamber cannot rise to the required temperature	<ol style="list-style-type: none"> <li>1. The temperature setting of the test room temperature controller is too low</li> <li>2. Laboratory safety protection switch is set too low</li> <li>3. Heating system failure</li> <li>4. Controller failure</li> </ol>	<ol style="list-style-type: none"> <li>1. Set temperature to desired temperature</li> <li>2. Set the safety switch to the desired</li> <li>3. Notify our company</li> <li>4. Notify our company</li> <li>5. Notify our company</li> </ol>
The saturated barrel temperature cannot rise to the required temperature	<ol style="list-style-type: none"> <li>1. The temperature setting of the saturated barrel temperature controller is too low</li> <li>2. Saturated barrel safety protection switch is set too low</li> <li>3. Heating system failure</li> <li>4. Solenoid valve failure</li> <li>5. Controller failure</li> </ol>	<ol style="list-style-type: none"> <li>1. Set temperature to desired temperature</li> <li>2. Set the safety switch to the desired</li> <li>3. Notify our company</li> <li>4. Notify our company</li> <li>5. Notify our company</li> </ol>
Insufficient spray volume	<ol style="list-style-type: none"> <li>1. Spray regulating valve placed too low</li> <li>2. The glass screen of the brine tank is clogged</li> <li>3. Pressure set too low</li> </ol>	<ol style="list-style-type: none"> <li>1. Raise the spray regulator valve</li> <li>2. Clean the glass sieve</li> <li>3. Adjust the regulating valve to a pressure of 1kg/cm<sup>2</sup></li> </ol>
When spraying is not possible PS: Air tube of nozzle outlet is not turned on How to install the suction pipe (the straight pipe is the suction pipe, the L-shaped pipe is the air pipe)	<ol style="list-style-type: none"> <li>1. Air compressor is not running</li> <li>2. The main switch of the air compressor outlet is not turned on</li> <li>3. Solenoid valve failure</li> <li>4. Pressure gauge failure or pressure too low</li> <li>5. Electromagnetic contactor failure</li> <li>6. Nozzle clogged</li> </ol>	<ol style="list-style-type: none"> <li>1. Turn on the air compressor button</li> <li>2. Turn on the main switch of the air compressor</li> <li>3. Notify our company</li> <li>4. Notify our company</li> <li>5. Notify our company</li> <li>6. Remove the nozzle for cleaning (please disassemble and assemble carefully)</li> </ol>
Low water level warning light comes on	<ol style="list-style-type: none"> <li>1. Indicates the water level is too low</li> </ol>	<ol style="list-style-type: none"> <li>1. Check whether there is water entering the water inlet</li> </ol>
Cannot operate after turning on the power	<ol style="list-style-type: none"> <li>1. When the water level in the heated water tank is too low, the operating power will be cut off.</li> </ol>	<ol style="list-style-type: none"> <li>1. Add the water level of the heating water tank to the normal state.</li> </ol>
When the spray volume is too high	<ol style="list-style-type: none"> <li>1. Spray regulator placed too high</li> <li>2. The glass nozzle has been used for a long time and the diameter of the nozzle is too large.</li> </ol>	<ol style="list-style-type: none"> <li>1. Turn spray regulator down</li> <li>2. Replace with new nozzle</li> </ol>

## **VII、 Maintenance matters**

1. If the test period exceeds 1 month, please replace the water in the heating tank and clean and maintain the equipment.
2. If the salt solution used in the test has not been used for more than a week, please do not use it again to avoid affecting the test quality.
3. If the test time exceeds 72 hours, please drain the water accumulated in the air compressor every 24 hours.
4. If there is a long interval between the next test, please clean the inside of the test chamber and drain the water in the sink after the test:

Drainage of water in the heating tank -----Open the laboratory drainage valve on the back of the equipment;

Sealing the water discharge in the sink-----Pull up the middle silicone;

Drain the water in the salt water tank-----Pull up the internal silica gel;

Drainage of water in the saturated barrel ----- Open the drainage ball valve at the bottom of the saturated barrel.

5. To ensure the standard of testing quality, please replace the glass nozzle regularly within 4000 hours.

## Factory inspection

Product Name: Salt Spray Test Chamber

Model: HY-SST-120

Factory No.: 240525-1

Delivery Date: May, 21<sup>th</sup>, 2024

Inspection result: Qualified

Inspector: Fu Deng

Auditor: Deng Hongyan

Welcome to use our company's products, our company will bring convenience to your work with excellent quality and efficient service. Your satisfaction is our greatest wish!

Dongguan Huanyi Instrument Technology Co., Ltd.

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