Research on salt spray test of power facilities based on standardized laboratory construction

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Abstract. With the continuous development of electric power systems, electric power companies have standardized the requirements for safety testing laboratories for salt spray test of electric power facilities in accordance with relevant national standards and specifications, and combined with the previous work experience of electric power companies, this paper analyses in detail the laboratory-based The characteristics and significance of standardized management of salt spray test of electric power facilities under standardized construction, and also elaborated the new requirements for laboratory construction. At the same time, it strengthened training, performed competence verification and comparison between laboratories, and strict In the aspects of good method confirmation, enhanced management, and enhanced standard dynamic management, relevant suggestions for strengthening the standardized management of safety testing laboratories in power facilities for salt spray testing were put forward. It is hoped that the test results of power facilities salt spray testing laboratories can be effectively improved. And accuracy to achieve sustainable development.

1. Introduction
The salt spray tester is used to test the corrosion resistance of the surface of various materials after electroplating, anodizing, spraying, anti-rust oil and anti-corrosion treatment. It is very important to carry out standardization construction to improve the standardization and intelligence of salt spray test of power facilities. To improve the overall work efficiency and management level, the data management direction of the laboratory management system mainly revolves around the multidimensional management of data and the construction of standard data systems. Aiming at this salt spray corrosion test chamber, it can be used to evaluate the resistance of materials and their protective layers to salt spray corrosion, and to compare the quality of similar protective layers. It can also be used to evaluate the resistance of some products to salt spray corrosion. The equipment can reach any temperature point from normal temperature to 55°C in the test working space and keep it constant [1].

The material used to manufacture this equipment is a first-grade PVC plastic sheet that is resistant to corrosion and high temperature, and does not affect the test results. The internal and external pressures are balanced during the design of this equipment, and the salt spray will not be sprayed directly onto the sample. And the design takes into account that the top of the device, the inner wall and other parts will produce condensed water. Therefore, during the test of this device, the condensed water will not drip on the sample and affect the test results [2].
2. Principle of salt spray test
In order to configure the test solution preparation method stipulated by national standards, a test instrument produced by the salt spray laboratory simulating the salt spray marine environment breaks through the concept of the traditional salt spray box. In addition to the function of a conventional salt spray tester, Combined with the function of alternating salt spray test, it provides test environments such as obsessive corrosion and filiform corrosion, with test environments such as hot air drying, humid heat, forced drying, and salt spray [3].

2.1. Structural design of salt spray test chamber
The base of the chamber body is welded into a mesh frame with 8 # channel steel, so that it can bear the weight of the chamber body and the test piece of the person under horizontal conditions without causing unevenness and cracks on the bottom surface of the chamber body. The bearing capacity of the base is 1 ton. The chamber body is divided into six chambers and a double-opening door. The material of the chamber is a high-quality high-strength PVC board. The inner wall is rusted under the condition. The outer tank is made of high-quality SUS304B stainless steel wire drawing board. The heat preservation medium is polyurethane rigid foam insulation. It is lightweight and resistant to impact. The heat insulation performance is good. The handle is open inside and outside, so that the tester can open the door freely from the closed room [4].

2.2. The necessity of standardized salt spray test laboratory construction
Standardization is an institutionalized form of expression. It is an effective working method applied to production and management [5]. The implementation of standardized management of salt spray tests can not only improve and improve the quality system, standardize internal management procedures, and improve the level of laboratory management, but also improve working procedures, standardize the operating process, improve the effectiveness of testing, avoid waste of resources, and maximize Giving full play to laboratory functions to improve the scientificity, accuracy, and timeliness of laboratory monitoring [6].

2.3. Testing Needs to Provide Services to Electric Power Enterprises
The technical monitoring agency provides technical support for the production management department of electric power enterprises with scientific and accurate data, and provides monitoring technical services for the production units of electric power enterprises [7]. With the continuous improvement of the monitoring technology and monitoring quality requirements and the increasing workload of electric power enterprises, technical monitoring institutions need to improve their management level, technical capabilities, and ensure the accuracy and timeliness of monitoring through standardized management models. The requirements of power enterprises for monitoring work. Standardization laboratory is the laboratory's self-accumulation, self-improvement and self-development on the management system and operating procedures. Not only can problems in laboratory management be discovered in time through standardized management, but also non-conformances can be avoided through standardized operating procedures [8]. Establish and improve the quality system and pass laboratory accreditation or qualification certification. The standardization and standardization of laboratory quality management and operating procedures can provide effective support for salt spray tests for laboratories through accreditation and certification.

3. Data management of standardized salt spray test
The standardized management of laboratory data the multi-dimensional management mode of data formulates corresponding solutions for the processing of different types of laboratory data. Data generated at different types and at different stages can be stored and managed in accordance with this standard. In other words, the experimenters, reviewers, quality supervisors, and management personnel are not unique. The decentralization of personnel will lead to the decentralization of data sources. If everyone updates the data according to their own habits, then the even if the database is stored as
required, it is difficult to analyze and utilize it. All data analysis and management work must rely on high-quality data warehouses, and a standardized data management system needs to be established, which plays an important role in laboratory management. Solve the problems that the data cannot be updated effectively for a long time, the updated data does not meet the unified standards, and traditional data cannot be effectively analyzed and used. Through the standard management system, the degree of standardization of relevant staff can be comprehensively improved, and "standardization of management" can be promoted with "standardization of information systems". The standardized management system sets standards for the development of information systems. All system development and design work is carried out in accordance with this system, so as to achieve intelligence and automation.

3.1. Standard laboratory management system

The following parts should be included in the laboratory data standard management system. 1) Standardization of coding; 2) Standardization of processes; 3) Standardization of forms; 4) Standardization of inspections; 5) Standardization of quality control; 6) Standardization of laboratory resources; 7) Standardization of authority systems; 8) Standardization of technical specifications. This article takes the standardization of inspection as an example to perform the following explanation. The standardization of salt spray test inspection is in the field of power system laboratory inspection. The inspection standard is to control how each test item performs sample processing, how to perform quality control, how to perform data processing, and how to prepare original records Guiding documents for related content. In the management process of inspection standards, each standard is divided into the following four parts for management. See Figure 1.

Figure 1. Framework of standardized laboratory construction
3.2. Standard laboratory operating information

The experimental operation information is mainly used to record the process of the experiment conducted by the laboratory personnel in accordance with the relevant national standards. During the system construction process, this content is divided into three parts for management, including: (1) salt spray test sample processing and relevant experimental operation parts; (2) instrument and equipment debugging process; (3) measurement and analysis process. In accordance with the requirements of relevant standard documents, each physical and chemical test item is split into corresponding text fields and solidified, and temporary adjustments are made each time according to actual operating conditions. Through the construction of inspection standardization, any one of the laboratory personnel must perform data entry, data collection, data processing, result evaluation, and other related work in accordance with unified requirements when conducting experiments. When the system is developed, it only needs to pay attention to how to store and manage data according to this system, and improve the degree of operation automation.

4. System design of standardized salt spray laboratory

4.1. Laboratory air conditioning system

(1) Air conditioning method: forced ventilation internal balance temperature regulation method (btc). This method means that in the case of continuous operation of the refrigeration system, the control system controls the output of the heater through the PID automatic calculation output result according to the set temperature point, and finally achieves a kind of dynamic balance. (2) Air circulation device: Built-in air-conditioning room, circulating air duct and long-axis centrifugal fan, using efficient energy regulation system, and efficient exchange through high-efficiency fan to achieve the purpose of temperature change. The temperature uniformity of the test chamber is greatly improved by improving the air flow, increasing the air flow rate, and the heat exchange capacity with the heater and air meter cooler. The top of the salt spray corrosion test chamber is designed with the best cone-shaped apex angle (120 degrees) to prevent the salt solution formed by condensation on the top from dripping onto the test sample. See Figure 2.

Figure 2. Salt spray corrosion test chamber in a standardized laboratory

(1) Saturation bucket: 3mmSUS # 304 stainless steel plate, with water level indicator. (2) Heater: Use customized titanium corrosion-resistant electric heating tube. The tower spray mechanism is shown in the figure below. The spray rheumatism is a tower sprayer. The atomized saline is stored as a built-in concealed type. The front inlet pressure is 0.3-0.6mpa, and the rear spray pressure is 0.07-0.17mpa. It is forced air-cooled. See Figure 3.
The technical parameters of the salt spray test box are as follows:

1. Working room size: 3m³-116m³
2. Temperature range: +20°C to 80°C
3. Humidity range: 95 to 98% RH
4. Air saturator: RT + 10°C to 90°C
5. Temperature uniformity: ±2°C
6. Temperature fluctuation: ±0.5°C
7. Spray deposition amount: 1 to 2ml / 80cm².h
8. Temperature rise and fall rate: 0.7 to 1°C / min
9. Time setting range: 0 to 999 hours
10. Alternating temperature range: 20°C - 80°C

See Figure 4.

4.2. Salt spray experiment box control system

The temperature control instrument adopts an imported large screen (5.7-inch LED display). The screen is easy to operate and the program is easy to edit. No key input is required. The screen directly touches the options.

1. Accuracy: 0.1°C (display range)
2. Temperature sensor: PT100 platinum resistance temperature measuring body
3. Control method: Thermal balance temperature adjustment method
4. All electrical appliances adopt Schneider series products
5. The temperature control adopts PID + SSR system to coordinate control with the channel
6. With the function of automatic calculation, the temperature change conditions can be corrected immediately, making the temperature control more accurate and stable
7. The operation interface of the controller is set in Chinese and English, and the real-time operation curve graph can be displayed on the screen
8. It has a capacity of 120 groups of programs, 99 sections in each group, and 999 steps can be circulated in each section
9. After the data and test conditions are input, the controller has a screen lock function to avoid human touch and shutdown
10. With RS-232 or RS-485 communication interface, you can design programs on the computer, monitor the test process and
perform functions such as automatic switch on and off, and print curve data. (10) The controller has a screen automatic screen saver function, which can better protect the LCD screen (make it last longer) under long-term operation. See Figure 4.

Figure 4. Salt spray test room protection system

4.3. Salt spray test room protection system
The laboratory construction in this part mainly includes the following aspects: the overall equipment is over temperature (2) the overall equipment is out of phase / reverse phase (3) the overall equipment is timing (4) the overall equipment is overloaded, leaked, and short-circuited. (5) Compressor overpressure, overcurrent (6) Compressor delay protection (7) Circulating motor overheating protection (8) others include operation instructions, sound and light alarm and other protections.

5. Standardization Construction and Management Measures of Safety Facility for Salt Spray Test of Electric Power Facilities

5.1. Strengthen the management of standard dynamics
The laboratory shall carry out inspection items with standards for inspection methods, sampling standards, product quality standards, etc., which must be current valid versions. At the same time, in the actual management, dynamic tracking must be implemented, standards are updated in a timely manner, and the control of standards is strengthened. Regular and strict inspections of relevant standards are performed to ensure the effectiveness of guarantee standards. The laboratory should formulate relevant equipment calibration procedures and plans. For calibration or testing equipment, such as auxiliary measurement equipment that has a great impact on sampling results, calibration results and test results, relevant calibration should be performed before putting it into use. In order to effectively ensure the traceability of the value equipment. See Figure 5.
5.2. Confirmation of proficiency testing methods
The main purpose of implementing standardized management in the safety laboratory for salt spray test of electric power facilities is to obtain more accurate data. In the relevant standards, there are very specific requirements for the seriousness of the ability, and the good results of the ability verification are also an affirmation of the laboratory's inspection ability. The analysis and testing work should always maintain a scientific attitude, and proficiency testing, comparison between laboratories, and method validation are the most effective and basic methods to eliminate deviations, and can also effectively prove or correct the salt of power facilities. The fog test safety laboratory test results can also play a role in reviewing and calibrating the analysis results.

5.3. Strengthening the quality supervision of standardized laboratories
The safety laboratory for salt spray test of electric power facilities should strictly abide by relevant standards, and ensure the professional quality and skills of on-the-spot inspectors, and at the same time, the entire process of laboratory inspection should be strictly monitored. Quality supervision is not only supervised, but also has to deal with the problems found in a timely manner, and should be actively optimized for qualified places, so as to effectively ensure the scientific, reasonable, fair and accurate test results.

5.4. Construction of information laboratory
With the rapid development of China's social economy, China's production technology and scientific research have also continued to develop. The inspection technology has also gradually developed from
manual analysis to the current instrument automation analysis, and the number of inspection items has continued to increase. The requirements for reporting time and accuracy are becoming more stringent, and the amount of data information processing is also increasing rapidly. The use of computers can reasonably combine the current quality management system and information technology of the safety testing laboratory for power facilities with salt spray. , Optimize the business processes in the laboratory, and also connect all the analytical instruments in the experiment through the information network, so as to realize the sharing of monitoring data, paperless office and automation in the salt laboratory of power facilities safety testing laboratory Calculation.

5.5. Improving the training of laboratory personnel
In the power facility salt spray test safety laboratory, testing technicians are the soul. Therefore, it is necessary to strengthen the training of testing technicians. It is not only necessary to strengthen the staff's skills in testing application technology and instrument operation. Training, at the same time complete training of laboratory system, data calculation, data analysis knowledge and error analysis, and also must undergo rigorous assessment before they can be allowed to work.

6. Effectiveness of building a standardized laboratory
Through the standardization of laboratory construction, work procedures have been streamlined, personnel operations have been standardized, and post operation standards have been clarified, and certain results have been achieved in laboratory management. The quality of monitoring is guaranteed. Through the construction of standardized laboratories, the monitoring technical standards, management standards, and working standards are classified and weighted. The focus of each post's monitoring work is clarified, and the monitoring staff's mastery of the standards is improved. The standardized and standardization operation improves the technical quality of personnel and ensures the quality of monitoring work. The timeliness of monitoring has been improved. Through the standardized construction of laboratories, the interface links of various tasks in laboratory management have been streamlined, the standardization and procedure of monitoring work have been achieved, and the timeliness of monitoring work has been improved. Optimized the allocation of resources, optimized the allocation of inspectors through the construction of standardized laboratories, and the dynamic management of the types and quantities of equipment, data, and experimental materials in the laboratory, realizing the optimal allocation of resources in the laboratory.

7. Conclusion
Through exploration and practice, the center has made beneficial attempts in the construction of standardized laboratories and achieved certain results. We guarantee the continuous and effective advancement of standardized laboratory construction, and the theoretical basis for establishing, implementing, and improving laboratory quality management systems is also the basic principle of implementing quality management. Progressively advance the construction of standardized laboratories. Promote the continuous improvement and improvement of standardized laboratories. Supervision and inspection can be carried out by means of internal audit, management review or third-party audit. It inspects the management process and management effect of standardized laboratories, finds problems in a timely manner, revises and improves the management standards of standardized laboratories, adjusts working ideas in a timely manner, and continuously optimizes. 3. Refine working methods, strive to grasp key links such as team building, system construction, and engineering construction, solidly promote the construction of standardized laboratories, and promote the development and improvement of standardized laboratories.

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