

Research on safety detection technology of household appliances

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Abstract: with the improvement of China's scientific and technological manufacturing and economic development, the home appliance market has shown a scene of flowers blooming. Many new household appliances have become the favorite of the household appliance industry, such as floor washers, dishwashers, integrated stoves, and the number of household appliance brands has also increased. In this context, people pay more and more attention to the use quality and experience of household appliances, which requires the relevant departments to attach great importance to the safety testing of household appliances, perform quality management and safety testing duties, eliminate hidden dangers in the safe use of household appliances, ensure the stability of household appliances and the personal safety of consumers, and bring good use experience to consumers. This paper expounds the common safety problems of household appliances, analyzes the main problems and directions of household appliances safety detection, and discusses the specific detection technology and methods.

Key words: household appliances; Safety issues; Detection technology

Introduction

In the era of steady social and economic development, the level of public income has been continuously improved, and the consumption demand in material life has gradually expanded. Whether it is home kitchen, cleaning, entertainment, or summer heating, household appliances have a wide range of application value. Coupled with the development of artificial intelligence technology, the types of emerging household appliances are increasing, such as multi-functional food machines, air fryers, air purifiers, and floor washers, which meet the needs of the public in many aspects. However, while bringing convenient cooking and cleaning services to people, the safety of household appliances has attracted the attention of all sectors of society. Once a safety problem arises, it will not only affect the use experience of consumers, interfere with the normal life order, and even threaten the safety of people's property and life. In this regard, relevant personnel should attach great importance to the safety testing of household appliances, strictly follow the latest testing standards, reasonably use safety testing technology, ensure that household appliances meet national standards, output safe and reliable household appliances, and better serve consumers.

1 Common safety problems of household appliances

1.leakage

Household appliances are directly connected to the power supply. If their internal design is unreasonable, the protection mechanism is not perfect, or some parts and metal surfaces are damaged and touched, electricity leakage is likely to occur after the power consumption conditions are not up to standard or after use for a period of time, threatening the life safety of consumers.

2.Spontaneous combustion

Household appliances are composed of multiple components, which will generate heat during operation, especially household appliances such as TV, refrigerator and air conditioner, which will generate huge heat. However, the heat dissipation capacity of some household appliances is not strong. In addition, the number of people in some families is large, and the frequency of using appliances exceeds the requirements of the manual. After long-term use, a large amount of heat is stored in the interior of appliances, which is easy to melt or soften insulation materials, and even spontaneous combustion occurs, threatening the property and life safety of consumers.

3.electromagnetic radiation

Common household appliances often carry certain radiation, such as computers, microwave ovens and televisions. If household appliances fail to meet the relevant national norms and standards, they will produce electromagnetic radiation exceeding the standard. If such substandard appliances are used for a long time, consumers' cardiovascular and cerebrovascular system, endocrine system, nervous system and cardiovascular and cerebrovascular system will be endangered, affecting their life and health, especially children, pregnant women and the elderly.

4.Volatile hazardous substances

Compared with other daily necessities, household appliances have a complex structure, which contains a large number of chemical devices. In the production and manufacturing of household appliances, if the components used fail to meet the qualified standards and the quality is not high, it will bring hidden dangers to daily use. When using household appliances, due to the increasing internal heat, some components are easy to melt and deform, volatilize some harmful substances, and directly pollute the atmosphere, soil and water.

2 Main problems of household appliances Safety Testing

1.Insulation resistance

Insulation resistance is a barrier to protect consumers from high voltage and high current, and its performance affects electrical insulation. Under the background of increasing competition in the household appliance market, some enterprises pursue economic benefits

too much, lack control over the production quality of electrical products, and even some product assembly materials fail to meet the qualified standards, including low-quality insulation resistance. For such problems, the relevant testing and supervision departments need to do a good job in safety work, put forward targeted management and solutions, and ensure that the products in the household appliance market can meet the national standards, so that the masses can buy at ease.

2.Current safety issues

Before entering the market, household appliances need to go through the processes of production and processing, packaging, transportation and wholesale. Affected by the operation and handling of the staff, some appliances will be damaged to varying degrees, and the common problem is leakage. At this time, if the electrical safety detection cannot be done in time, there will be some potential safety hazards left. However, some enterprises do not pay enough attention to the safety detection of household appliances, fail to detect the safety problems of household appliances in time, and avoid current leakage in time, which is easy to bring losses to the retail service industry and the people. Therefore, whether in production or sales, the staff should comprehensively carry out electricity safety testing to ensure the effectiveness and safety of electrical appliances.

3.Electrical strength problems

Household appliances need to be connected to household electricity, which needs to bear a certain voltage. Therefore, when carrying out safety inspection, personnel should inspect the electrical strength of household appliances, test whether the degree of withstand voltage is up to standard, and whether the function is normal and safe to use. However, in the specific test link, if technicians neglect the safety detection of electrical strength and test the voltage strength supported by household appliances by categories, the voltage of household appliances will be too low or too high to support normal use.

3 Main direction of household appliances Safety Testing

1.Test insulation resistance

In the regulations and standards of household appliances in China, the importance of insulation resistance test in safety detection is clearly emphasized, which is also an important basis to measure whether household appliances meet the standard. For household electrical appliances, enterprises should pursue economic benefits and do a good job in product safety testing on the basis of complying with industry standards and safety production regulations. For the resistance between the live part of household appliances and the external non live metal part, we should adhere to the principle of being responsible for the safety of people's lives and property, and use the equipment specified by the state to detect the insulation resistance of household appliances.

2.Detection current safety

The main current safety problem of household appliances is leakage. In the safety detection link, personnel should apply a certain voltage to household appliances, detect whether there is current in the insulation part, and analyze whether there is current leakage in electrical appliances. In the specific measurement work, the personnel can judge the leakage according to the measured resistance value. At the same time, in the process of producing household appliances, personnel should do a good job of prevention and detection, carefully detect whether the line current is normal, avoid current leakage, ensure the stability and safety of household appliances, and better protect the safety of consumers.

3.Test electrical strength

In order to detect the electrical breakdown strength index of household appliances, personnel need to pay attention to electrical strength detection on the basis of connecting current and voltage. In the specific detection, there are mainly power frequency AC voltage withstand test and DC voltage withstand test. In general, personnel can use the power frequency AC withstand voltage test method to detect the electrical strength of household appliances. In the test process, when the voltage of household appliances reaches a high value, current breakdown will occur, which will directly affect the safety of users. Therefore, in the production testing link, the personnel should do a good job in the withstand voltage safety test to ensure that the electrical strength of household appliances is within the standard range.

4 Household appliances Safety Detection Technology and specific methods

1.Potentiometer detection

When carrying out the safety detection of household appliances, personnel can apply the potentiometer detection technology to analyze the reliability and safety of household appliances in the operation process. There are three main detection methods: first, analyze the connection point between the power socket and the tested appliance, judge the operation of the appliance according to whether the power supply of household appliances is closely connected, and avoid leakage. Second, analyze whether the connection between the movable arm and the resistor is effective. In the specific detection link, personnel can use the universal table to carry out safety detection. If the pointer of the universal meter does not change or the range of change does not open, it indicates that the connection condition is normal; If the pointer of the universal meter changes greatly, which reflects the connection failure between the two, it is necessary to formulate a technical scheme to make the movable arm and the resistor enter the normal operation state. Third, combined with the actual power of household appliances, use the universal meter to carry out the test. In the operation link, the gear should be set in advance. According to the change state of the multimeter pointer, the status of various parts should be analyzed to avoid safety problems.

2.No load current detection

In order to analyze whether household appliances can meet the safe operation standard, personnel should master the no-load current

detection technology and analyze the operation status of household appliances by means of regular detection. This testing technology has two main application methods: first, the method of directly detecting household appliances. Before testing, personnel can keep household appliances in open circuit state to avoid the influence of winding resistance on testing results. Next, the personnel should clarify the actual power consumption of the electrical products according to the instructions of household appliances, adjust the current gear according to the actual situation, connect the primary point winding, and then carry out the safety detection of no-load current. After collecting the test data, if the personnel find that there is a gap between the final no-load current data of household appliances and the normal value, they can determine that there are some faults. At this time, it is necessary to find the fault location in time and carry out maintenance work; If the detection result is similar to the no-load current value, it can be concluded that the household appliances are in a safe operation state, and users can operate with confidence. Second, the indirect measurement method of series connection is adopted. Before the formal safety test, the personnel shall connect the primary winding, the same resistor and the no-load test group in series, and then use a multimeter to measure and record the voltage at both ends of the resistor, analyze and calculate the actual no-load current value of the appliance. If heating and short circuit are found in the electrical apparatus, the tester can judge the fault and further analyze the cause of the fault.

3.Virtual instrument detection technology

In the era of vigorous development of modern science and technology, the detection technology is developing in the direction of intelligence and automation. Virtual instrument shows great advantages in the safety detection of household appliances, and the detection technology of virtual instrument arises at the historic moment. As a derivative of computer science and technology, virtual instrument detection has a strong openness. With the help of this technology, personnel can simplify the detection operation, improve the rapidity and pass rate of detection, solve the disadvantages of previous manual detection, and improve the integrity and accuracy of information. The virtual instrument is composed of hardware equipment and software system. The hardware equipment system supports data display, transmission and transmission. Personnel can be used for information collection and transmission to ensure the accuracy of data detection, collection and analysis and display it on the large screen in time. With the help of computer software system, personnel can simulate the use situation according to the actual application of household appliances, set and adjust parameters according to the actual needs, reduce the impact of test error on the results, and improve the accuracy of test results. The virtual detection instrument includes data information acquisition, data management, data control and detection system modules. Based on the information acquisition module, personnel can design initialization parameters, output hardware information according to the detection system module configuration, and pass operation instructions to the management module. In the use link, the testing personnel can reasonably design the testing time according to the needs of users, and use the data collection, management and processing functions of the system to obtain the final data analysis results. If the results of analysis and calculation differ greatly from the initially set minimum and maximum values, the system interface will mark abnormal data with colors, and alert technicians in the form of alarms, so that they can analyze and find the quality problems of household appliances and improve the scientificity and accuracy of the whole detection process.

4.Daily maintenance and inspection

In the process of daily use of household appliances, daily maintenance and detection work is particularly important. Only when personnel pay attention to daily detection and maintenance, can they use effective safety detection technology to find the fault problems of household appliances at the first time, and investigate and solve them in time, so as to avoid endangering the property and life safety of users due to electrical faults. At the same time, when using household appliances at ordinary times, if there are unconventional sounds and scenes, such as huge shaking, burning smell overflowing from the appliance, and electric sparks from the power supply, the user should immediately stop the operation and turn off the power supply to avoid more serious damage inside the appliance. In addition, in terms of household appliance safety, relevant departments should vigorously carry out popularization and education activities, use new media to publicize safe operation behavior, let users pay attention to daily operation and use behavior, change bad operation habits, and avoid losses. On the package of household appliances, the manufacturer shall indicate the service life and precautions, and make warning signs for safety problems. Therefore, in the process of carrying out electrical safety testing, personnel should not only adopt conventional safety testing methods, but also complete more test indicators according to the latest national standards and requirements, so as to control the use performance and safety of household appliances from all aspects.

5 Concluding remarks

To sum up, household appliances are playing a more and more important role in daily life, learning and entertainment in an era of expanding material needs of residents. However, the safety of household appliances is a key concern of all sectors of society. Whether the appliances are safe and applicable directly affects people's quality of life, life and property safety. Therefore, relevant departments should not only pay more attention to the safety of household appliances, but also adopt scientific and advanced safety detection technology to judge whether household appliances meet the quality standards, timely find and solve electrical faults and problems, reduce the incidence of accidents, and better safeguard people's consumption rights and interests.

References:

- [1] Zhidong Zhuang Household appliances Safety Detection Technology and case analysis [j]Electronic world, 2021 (20): 14-15
- [2] Yingchao Lou Limitations of current household appliances testing [j]Electronic technology and software engineering, 2020 (24): 221-222
- [3] Liang Su,Li Zhang Strictly abide by the bottom line of quality, adhere to continuous and effective innovation, and support the high-quality development of

- household appliances industry -- an interview with Lu Wei, director of household appliances testing center of China Household Appliances Research Institute [j] Household appliances, 2020 (12): 70-72
- [4] Yingchao Lou Analysis of hot issues in household appliances testing [j]Electronic technology and software engineering, 2020 (22): 207-208
- [5] Li Yin Research on the limitations of after-sales inspection of household appliances in China [j]Light industry standards and quality, 2020 (03): 86-87
- [6] Leiming Li Current situation and measures of quality inspection of household appliances [j]Science and technology wind, 2020 (11): 8
- [7] Qingyuan Chen,Ximing Chen,Jianhua Zou Analysis of the limitations of current household appliances testing [j]Science and technology wind, 2020 (04): 198
- [8] Zhengting Li The series of standards for safe service life of household appliances have been issued, and the “life” of household appliances can be based on the standards [j]Electric appliance, 2020 (02): 10-11
- [9] Tengfei Li Analysis of household appliances Safety Detection Technology [j]Technology and innovation, 2019 (19): 85-86
- [10] Guoxin Liu Common sense of safe use of household appliances [j]Rural electrician, 2019,27 (09): 61
- [11] Liedi Song Analysis of safe use and leakage protection of household appliances [j]Science and technology style, 2019 (19): 188+194
- [12] Xiangze Zhao Research on the application of virtual instrument technology in the detection of household appliances [j]Electronic world, 2019 (11): 205
- [13] Anping Mao Analysis of the application of virtual instrument technology in household appliances detection [j]Electronic production, 2019 (08): 98-100
- [14] Xiaopeng Ji,Feihao Ding,Jiaofu Yang Discussion on the limitations of household appliances testing [j]China new technology and new products, 2019 (04): 45-46
- [15] Xiaowei Weng,Huayue Xu Research and analysis of factors affecting the quality and safety of household appliances [j]Light industry technology, 2018,34 (09): 58-59

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