A PF Harmonic Current Detection Method

Huang Shipi

Guangxi Natural Resources Vocational and Technical College, Guangxi, 532199, China

Keywords: EMC, Harmonic Current Emission, Test Instrument, Standard, Multifunctional Equipment

Abstract: To add technical terms to the A PF 61000-3-2: 2014 standard to adapt to the harmonic current emission test of the newly emerging multifunctional equipment. The definition and classification of multi-function equipment are analyzed, and the corresponding definition and classification suggestions are given. According to the technical requirements of the current edition A PF standard, the technical requirements of harmonic current detection for multifunctional equipment are analyzed. The test data and results of 3 kinds of multi-function equipment samples are analyzed, and the possible problems of harmonic current test of multi-function equipment by current standard are discussed. According to the format of A PF 61000-3-2 standard technical clause, form the revised document content of the standard, and provide reference for future standard revision.

1. Introduction

The continuous emergence of new technologies has led to the development of a series of new multifunctional products. Drawing. Such as today's new favorite technology is a new multi-functional system, electronic and electrical equipment terminal market in the rapid development of products and equipment, products. to e.g., exhaustless electrical equipment based on wireless transmission technology, new equipment with wireless transmission functional units, household appliances with fuzzy control or contact sensors; radio station systems with centralized wireless power supply functions that integrate lighting, power parameter adjustment and testing functions some typical multifunctional electronic and electrical equipment [1-3]. Because of its wide range of applications, it is often difficult to distinguish which function is its primary use. In the future, such new equipment will be abundant. In order to avoid the inconsistency in the testing process of harmonic flow, it is necessary to define the multifunctional equipment and analyze and evaluate the corresponding harmonic flue gas.

furthermore, the active power of new multifunctional devices is usually small. when a large number of such devices are used at the same time, the low-order harmonics of the input grid may be more severe metabolic and nutritional disorders due to the islanding effect. for example, some wireless transmission units to wireless communication devices, usually 10 W; or less. And some electric heaters with wireless transmission, the strength will determine the coordination power limit of low power and multi-function equipment more than a few times, need to make a comprehensive evaluation of the active power, visible effect, power factor, temperature and so on of the working environment; input strategy and other factors are conducive to the promotion and development of this kind of new equipment, there is no systematic study on how to test the harmonious flow of this kind of products. This paper discusses this problem in combination with the principle of harmonious emission test. findings can be used as a technical document for future revision APF harmonization standards.

2. Introduction of Multifunctional Electronic and Electrical Equipment

At present, all kinds of new technologies are developing rapidly, especially the wireless transmission system of mobile communication equipment, portable consumer electronic equipment and fuzzy control technology control system. A large number of such new devices have an

  DOI: 10.25236/cseem.2020.103

electromagnetic coupling module integrated with wireless transmission, touch saw assembly module; and so on. Zhonghai Huizhi Energy Co., Ltd., controlled by Haier Group of China, has developed a wireless network cluster of 100-2000 W in China, including LED electronic lighting with wireless transmission module, wireless transmission system, Philips power switch and other contact sensitive equipment; this new type of equipment integrates traditional electric heating function and new microelectronic control technology, and adopts traditional technology for thermal sensitive panels. Call. the capacity index is reduced by increasing the thickness of the insulation head in the sensor module. after about 5mm thick hardened glass, the human finger touch can only cause the capacity change less than 0.5 PF. test such low capacity, environmental humidity and temperature change, electromagnetic interference, etc. will significantly affect the measurement results of the measurement system.

For typical multifunctional devices, such as intelligent hair dryer, LED lamps and lamps integrated with wireless power transmission function have opened up a large market. which will have different effects on the utility grid and may cause serious harmonic interference.

3. Analysis of Test Data and Results of Multifunctional Equipment Samples

At present, three different samples are analyzed to test the harmonic current emission according to the A PF 61000-3-2 standard requirements.

3.1. Test sample A description

According to the above recommendations for the detection process of multi-function equipment, in the following analysis, according to the actual situation, the multi-function equipment with wireless transmission module to be studied is classified for its main purpose.

The experiment selected a LED lamp equipment with wireless transmission function produced by Haier company, whose lighting circuit rated power is 8 W, wireless charging rated power is 10 W, recorded as sample A.. The main purpose of the equipment is to use lighting, but the active power of its ancillary use is larger than that of its main use.

Test operating voltage 230 V, frequency 50 Hz. Because the main purpose of the sample is lighting, but the main function of power consumption is wireless transmission, it is difficult to classify the equipment during the test. limits of the type C equipment used during this report test.

3.2. Test Data A Samples

he harmonic current test waveform of the sample a is shown in figure 1(peak irregular curve in figure), and the histogram of the harmonic component is shown in figure 2. By analyzing the test data of the sample, we can see that the harmonic current test of the sample does not meet the requirements of the current harmonic current literature [4].

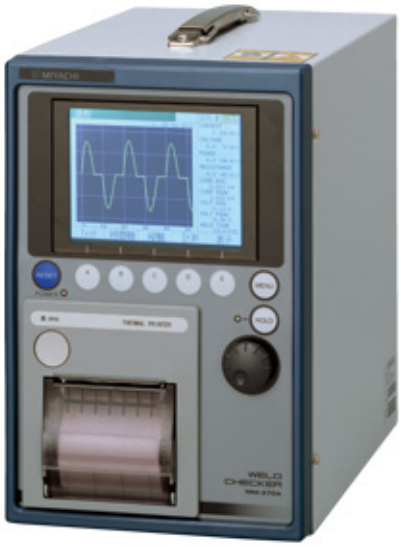

Figure 1 Current detector

during the test sample a, it can be found from the test data that if the harmonic current of the sample meets the limit value of C kind of equipment, it does not meet the requirements of the standard. However, because multifunctional devices have cross-border functions in device functions, it is difficult to classify devices into a certain category according to existing standard terms, and can be divided into multiple categories from device functions, so the test judgment of such devices will be controversial [5]. How to use harmonic current standard for detection in the future needs many experts to demonstrate and discuss.

3.3. Sample B Test Results Description

Select a flat panel device with wireless transmission function, rated power 10 W, as sample B, Test working voltage is 230 V,50Hz.. According to the test data, the corresponding calculation is carried out, and the samples are evaluated according to D kinds of equipment.

After data processing, it is found that the harmonic current test B the sample does not meet the standard requirements. this indicates that more detailed test data are needed when setting harmonic current emission limits for new low-power multifunctional devices.

Figure 2 Current detector

3.4. Sample C Test Result Description

The utility model relates to a combined multifunctional device with a wireless power supply module (a new combination device with LED lighting and wireless communication functions) with a rated power of 15 W.. The portable LED lamp and wireless tablet can be combined to simulate the future multi-function equipment in this test, recorded as a sample C the test working voltage is 230 V,50Hz.. Because the active power and lighting function of the sample is low, the limit value of C kind of equipment is used to evaluate in the test.

The C samples were evaluated according to the C equipment, and it was found that the harmonic current test of the C samples did not meet the standard requirements.

4. Existing Problems in A PF 61000-3-2: 2014 Standards

According to the test data of the above 3 samples, it can be found that for the current multifunctional equipment, it is easy to cause the phenomenon of not meeting the standard requirements when measuring the harmonic current emission. This indicates that there are still some problems with the standard for such equipment products. these problems have attracted attention in harmonic testing research. For newly emerging multifunctional equipment, A PF ISO is in the process of revising and soliciting technical programmes.

4.1. Determination of Equipment Classification

The actual test found that the definition of a level equipment is very rich, and all kinds of equipment not specified as B, C, D level can be regarded as a level equipment. As a result, in the classification of access equipment, all kinds of new electronic and electrical equipment that need to

be connected to the public power grid can be classified into a kinds of equipment.

However, for a variety of new multifunctional equipment, such equipment will provide a variety of uses at the same time, can be divided into a, B, C, D types of equipment. For some equipment belonging to two types of equipment, the description of the equipment needs to be further clarified in the standard to determine which type of equipment it belongs to [6].

4.2. Definition of Multifunctional Devices

With the continuous development of technology and production technology, there are more and more multifunctional cross-border equipment. for example, lighting devices with wireless electromagnetic coupling modules providing wireless transmission are typical multifunctional devices (i.e., cross-border devices). hence, it is necessary to put forward clear terms and technical details on the harmonic current detection process of such multifunctional devices and clarify the relevant provisions in the current APF harmonic standards. At present, there is no clear definition of multifunctional devices in the standard.

4.3. Other Parameters to be Considered in Assessing Harmonic Emission Limits for Multifunctional Equipment

according to a PF/sc77a/wg-1 latest revision on harmonic current emission test, considering that there are a large number of transmission equipment and portable lighting equipment with wireless charging function less than 10 W in the current consumer market, it is recommended that no harmonic current test be carried out for equipment with wireless charging function less than 10 W. In the future, the value will be adjusted according to the actual situation, and the influence of a large number of new devices with wireless charging function on the power supply network will be controlled within the controllable range.

For multifunctional equipment, it can be classified according to its main purpose. when the equipment can be divided into different equipment types at the same time, it is required to select one of the worst equipment types whose harmonic current emission meets the limit requirements of chapter 7 of the literature.

Figure 3 Current detector derivatives

5. Concluding Remarks

considering the actual characteristics of multifunctional equipment, combined with the relevant technical terms in the A PF harmonic current emission standard, the test data and results of 3 multifunctional equipment samples are used for analysis, which indicates that the harmonic current test conditions of multifunctional equipment need to be systematically revised and perfected in the current standard. This paper puts forward some suggestions to modify these problems. and provide a complete harmonic current testing technical clause for multifunctional devices. This clause contains the definition of multifunction equipment, the type description of multifunction equipment classification, and the harmonic current test configuration scheme of multifunction equipment. and the results of this paper can be used to form a revised document for harmonic standards, which can

be submitted to the relevant technical departments of the A PF TC77A as a reference.

References

[1] Cheng, Shijie., Chen, Xiaoliang., Wang, Junhua, et al. A Key Technology and Application of Wireless Transmission. Journal of Electrical Technology, vol. 30, no. 19, pp. 68-84, 2015.

[2] Huang, Huiqun., Dong, Xiulian., Li, Y, et al. Application of Wireless Power Supply Technology in Home Appliances. Electrical Appliances, pp. 644-648, 2012.

[3] Zhang, Yuguang. Design of Multifunctional Electromechanical Transmission Integrated Test System. Coal Mine Electromechanical, no. 1, pp. 55-59, 2016.

[4] Electromagnetic compatibility (EMC)-Part3-2: Limits-Limits for harmonic current emissions (qualification input current ≤16 A per phase): IEC 61000-3-2:2014. Geneva: IEC Press,2014.

[5] Electromagnetic compatibility (EMC)- Part 4-7: Testing and measurement techniques - General guide on agriculture and inter-harmonics measures and instruments, For power supply systems and equipment connected thereo: IEC 61000-4-7:2009. Geneva: IEC Press,2009.

[6] Huluquan. Electromagnetic Compatibility Harmonic Current Emission Testing and Application. Wuhan: Huazhong University of Science and Technology Press, 2015.