



The Deficiencies of Flame Retardant Standard in Chinese Textiles as Viewed from Tent Flame Retardant Standard

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Abstract

In this article, we comparably analyzed domestic and foreign tent flame retardant standards, and the difference between domestic and foreign tent flame retardant standards reflected the gap and problems between Chinese textile flame retardant standard system with foreign standard system, and we also put forward countermeasures and advices for the improvement and perfection of Chinese textile flame retardant standard system.

Keywords: Tent, Flame retardant standard system, Problems

1. Introduction

As a sort of outdoor equipment, tent is more and more popular by tourists. Especially after 5.12 Sichun Earthquake, it more displays the importance of tent. The large-sized earthquake make numbers of house break down in the disaster areas, but it needs long time to rebuild the homes, so tents become into the temporary habitations for people hit by the natural calamity, and the demand quantity is large. At that time, not only the quantity but also the quality should be ensured for tents. But the flame retardant performance of tent is the most easily ignored by production enterprises and consumers, and the ancient "baked wheaten cake joins camp" has indicated the importance of flame retardant performance of tent, especially for makeshift shelter, if we don't consider its flame retardant performance, the tragic of one disaster after another may happen. Based on humanity and harmonious society, to better protect human life and property, in this article, we comparably analyzed domestic and foreign tent flame retardant standards, and the difference between domestic and foreign tent flame retardant standards reflected the gap and problems between Chinese textile flame retardant standard system with foreign standard system, and we also put forward countermeasures and advices for the improvement and perfection of Chinese textile flame retardant standard system.

2. Introduction of domestic and foreign tent flame retardant standards

2.1 Introduction of Chinese tent flame retardant standard

The national standards involving the performance of tent flame retardant include three items.

(1) MZ/T 011-2001 12m² Tent for Disaster Relief (Cui, 2001). The standard definitely regulates the style specification, technical requirement, experiment method, testing rule, symbol, packaging, transpiration and storage of 12m² tent for disaster relief, and regulates that the standard is the same with the protection and testing for the disaster relief tent which is mainly made by waterproof and flame-resistant chemical fiber tarpaulins (seen in "1 range" of the standard). For the performance of flame retardant, the standard only regulates the damaged length $\leq 150\text{mm}$, and the time after flame and the smouldering duration $\leq 15\text{s}$ (seen in "3.8.1 Table 4" of the standard), and adopts vertical burning testing method to test (seen in "4.4.4 the test of material flame retardant performance keeps to GB/T 5455"). Except that, there are not any relative regulations about flame retardant performance in the standard.

(2) BB/T 0037-2006 Flame-resistant and Water-proof Fabrics and Tarpaulins Coated with PVC on Both Sides (Wang, 1997). This standard regulated the product type, specification, technical requirement, experiment method, testing rule, symbol, packaging, transpiration and storage of flame-resistant and water-proof fabric and tarpaulins coated with PVC on both sides. This standard is fit for the cloths and tarpaulins coated with PVC on both sides which take vinylon fiber, nylon fiber, polyester fiber and glass fiber as the foundation (seen in "1 range" of the standard). For the flame resistant performance, the standard only regulates that the flame burning time $\leq 10.0\text{s}$ and the oxygen index $\geq 27.0\%$, (seen in "4.3 Table 4" of the standard), and adopts the limiting oxygen index method to measure (seen in "5.7 the measurement of oxygen index" of the standard).

(3) GA 91-1995 General Technical Conditions for Flame Retardant Tarpaulins (Ma, 1995). This standard regulates the technical requirements and testing method of chemical fiber flame retardant tarpaulins coated with rubber or plastic on

both sides. The standard is the same with tarpaulins coated with natural rubber and synthetic rubber or PPVC on both sides which take vinylon fiber or other chemical fiber canvas which physical and mechanical performance is above vinylon as the foundation (seen in “1 main contents and applied range” in the standard). For the flame retardant performance of tarpaulins, this standard regulates that the oxygen index $\geq 26.0\%$, and the afterflame time and the aftergrow time $\leq 5.0s$, and the damaged length $\leq 80mm$, (seen in “3.2 Table 1”), and the standard respectively adopts limiting oxygen index method and vertical burning method to test (seen in “4.2 the measurement of flame retardant performance”). Except for that, the standard also regulates the performance of accelerated weathering and leaching (breaking strength and water-proof performance) (seen in 3.2 continued Table 1).

2.2 Introduction of foreign tent flame retardant standard

There are many foreign flame retardant standards about tent, and we mainly briefly expatiate on the tent flame retardant standards of US and Canada in this article.

(1) US tent flame retardant standard CPAI-84 (Michael, 1995) “A Specification of Flame-resistant Materials Used in Camping Tentage”. This standard regulates the flame retardant of the fabrics and other materials which are easily influenced in camping tent, and the performance standard and the appraisal rules of supplier, and describes the label program that users look out their harmful behaviors for the flame retardant treatment (seen in “1.1 range of standard”). For the concrete contents, this standard respectively regulates the flame retardant performance and testing method for the flooring material and the wall and top material of tent, and regulates that “no specimen from a sample unit of flooring material shall be damaged within 25mm of the edge of the hole in the flattening frame; no specimen from a sample unit of wall and top material shall have an afterflame time (length of time a specimen continues to flame after removal of the test flame source) of more than 4 seconds; the average after-flame time for all specimens in a sample unit shall not exceed 2 seconds; portions or residues that break or drip from the test specimens shall not continue to flame after they reach the floor of the test cabinet; they should self-extinguish before (or as) they contact the floor of test cabinet; the maximum damaged length for an individual specimen is 255mm” (seen in “3 performance requirement”, “5 flammability test method, flooring material” and “6 flammability test method, wall and top material”), and the standard also regulates that the accelerated weathering and leaching procedure of flooring material and wall and top material (see in “4 conditioning”), and elaborates on the sampling of sample unit (seen in “2.3 sample unit”), the certification materials and label procedure, and regulates the label of camping tent should permanently accrete with the product and include the certification that proves the materials has achieved the flame retardant requirements, the manufacturer’s ID certification, and the warning label of “Warning: keep all flame and heat sources away from this tent fabric. This tent meets the flammability requirements of CPAI-84” (seen in “7 certification and labeling”). Except that, the standard also explains the future work in the appendix (seen in “appendix B future work on CPAI-84”).

(2) Canadian tent flame retardant standard (Canada, 2001) is included in “Hazardous Products Act-Test Method for the Flame resistance of Tents”, and this regulation is basically same with US tent flame retardant stand CPAI-84 for the tent flame retardant performance index requirement and testing method except for accelerated weathering test, and adopts burning tablet method to implement the test (seen in “5 procedure”). Except for that, the standard also regulates the health and safety problem (seen in “6 health and safety”) and the precision and bias (seen in “9 precision and bias”) of test in the testing process, and it also detailedly regulates the label procedure (seen in “appendix I”) as US CPAI-84. At the same time, the appendix also explains some measures adopted to prevent the fire when camping (seen in “schedule I the following precautions should be taken when camping”).

3. Comparably analyzing domestic and foreign tent flame retardant standards

From the introduction of foreign and domestic tent flame retardant standards, we can see that except that the technical indexes with same parameters of Chinese tent flame retardant standard are little lower than foreign standard and part standards possess different testing indexes, there are following differences.

(1) As viewed from the standard layer, most foreign standards are compelling rules of law or standard forms, but Chinese standards are national standards and industrial standards. Difference standards layers decide that the contents of Chinese standards are narrow than foreign standards and lack in humanity. Chinese standards only regulate the performance index and testing method of flame retardant, which generalizes the whole content by part and lacks in people-oriented flame retardant performance to comprehensively evaluate the tent. However, except for performance index and testing method, the tent flame retardant standards of US and Canada all regulate the label which warns users, and US standard also regulates the material certification and manufacturers’ ID certification to meet the standard, which all consider consumers’ feelings and let consumers could favorably purchase the tent fulfilling the requirement of flame retardant standard. Canadian standard also regulates relative measures to prevent the fire when camping, which starts from the safety for consumers and users, fully embodies the humanity and the people-oriented standard constituted strategy.

(2) As viewed from applied range of standard, Chinese tent flame retardant standard mainly aims at the production

standard which doesn't directly aim at consumers, but foreign standards are trading standards which directly aim at consumers, and the applied range of Chinese tent standard is narrower than foreign standards. Foreign trading standards have strong applicability, and they take the market as the orientation, serve for the market and consumers, could effectively adapt the development of market economy, enhance the market competition because of easy operation, and have certain encourage function for the technical advancement for enterprises in the implementation.

Up to now, China has no one standard which is completely aims at the tent flame retardant performance which only is involved in the standard of 12m² Tent for Disaster Relief, and other BB/T 0037-2006 Flame-resistant and Water-proof Fabrics and Tarpaulins Coated with PVC on Both Sides and GA 91-1995 General Technical Conditions for Flame Retardant Tarpaulins regulate the flame retardant standard by the regulations to different raw materials, i.e. the production standard, and most of them are recommended industrial standards. For the tent flame retardant standard, China is almost blank, which could not follow the tendency of harmonious society and humanism development, so the establishment of national tent flame retardant standard is imperative under the situation.

(3) As viewed from contents, foreign standards respectively regulate the flooring material and wall and top material of the tent flame retardant performance, and also regulate the flame retardant performance when materials should meet the standard requirement after accelerated weathering and leaching procedure. Chinese standard doesn't distinguish the flame retardant performances of flooring material and wall and top material. Because the structure of tent decides materials of different parts should have different flame retardant performances, and if we only regulate the flame retardant performance index for the whole tent, the flame retardant performance of the tent could be comprehensively and exactly evaluated. In addition, Chinese standard doesn't consider the change of flame retardant performance induced in practical using environment because of illumination and rain, and the influence of actual use on the flame retardant performance from users' views.

4. Problems existing in Chinese textile flame retardant standard system

The standard of tent flame retardant is a typical example in the flame retardant standard of Chinese textile, and we could see that many problems still exist in the study of the flame retardant performance standard system in Chinese textiles.

(1) For the application range of standard, the applicability of textile flame retardant standard is feeble, and both blank and redundancy exist. For example, for the redundant standards, the tent standard regulates the tent flame retardant performance index for different raw materials, and different standards make regulations for same type of product at the same time, which has certain repetition and brings certain disagreements. With the development of society, science and economy, new products continually come forth, and if the flame retardant standard has weak applicability, it must lag in the development of new products, and corresponding standard will certainly influence the development of new products. The tent flame retardant performance standard is a bright example, and with the continual enhancement of human consumption level and safety consciousness, the standard of tent flame retardant performance should be the order of the day early.

(2) For the requirement of standard performance, Chinese textile flame retardant standard is not exact and comprehensive enough for some regulations. Because Chinese textile flame retardant standard mainly aims at the production standard which doesn't directly sell to consumers, and foreign standards aim at the trading standards which directly sell to consumers, so Chinese standards have not complete, concrete and strong applicability like foreign standards and lack in humanity in some performance requirements. For example, foreign standards explain the product label and glossary, and the warning label describes the standard from human safety. For the glossary, only part Chinese standards come down to the explanation of glossary, which will induce the illegibility of concept and influence the directional function of enterprise on consumers. In addition, for the tent flame retardant standard, Chinese standard doesn't consider the flame retardant performance form the structure and using environment of the tent, which induce the index evaluation is not exact enough.

(3) The flame retardant standard of Chinese textile lacks characters of system, programming and currency. The Chinese textile flame retardant standards are established when the deficiency is found, and as time passes, the standards will be in confusion, which will make manufacturers don't know which sort of standard would be used to test the quality of the product, and make against the production of enterprise and the export of products.

5. Countermeasures and advices

(1) Establishing general flame retardant standard or technical regulation of law. To simplify and compensate the blank of Chinese flame retardant standard and further increase the applicability of Chinese flame retardant standard, we should establish general flame retardant standard or technical regulation of law, and with the development of standard application, we should continually compensate the contents of the standard, but not establish new standard. For example, we can use foreign the mode of law for reference, adopt the citation of certain method standard which should be the up to data method standard for the part of testing method, and regulate the applicability of product when considering the compatibility to adapt new method standard, promote the development of new products, adapt the occurrence of new

products, and make Chinese technical standard more restrictive and compelling, and accordingly enhance domestic flame retardant technology and product performance and improve the export of product.

(2) Transform from production standard to trading standard, and transform from the standard establishment decided by national behavior to civilian behavior. The flame retardant standard of Chinese textile should follow the development tendency of global integration, and transform from production standard to trading standard (Yu, 2006), and the product standard should not be constituted by the product variety but by the final purpose of the product, and the cover range should be increased when the purpose is divided, so the performance requirement will be more comprehensive, strict and practical. For example, we can add the requirements of label, glossary and security direction, and constitute the trading standard as viewed from users. At the same time, new products will meet the standard in time.

(3) Further enhancing and improving the performance index of Chinese textile flame retardant standard. In the standard, proper and reasonable performance index will better improve the continual advancement of flame retardant technology, and in the process, we should consider the structure and using environment influencing the flame retardant performance of textile, and comprehensively and exactly test the flame retardant performance of the products.

6. Conclusions

With the development of the integration of global economy, green trade barrier will occur continually, and the security of textile has been one of bottleneck to restrict the export of Chinese textiles, and it is more and more concerned by insiders. Advanced standards would drive the innovation of technology, and the patent of technology, the standard of patent and the monopolization of standard have been a sort of tendency, and who holds the standard and technology and who will hold the market. With continually mature technology of flame retardant, the flame retardant standard of textiles should form a set of systematic and perfect standard system. At the same time, people-oriented and humanism concept would more and more go deep into human hearts, and the work of standardization should start from that to continually improve and perfect Chinese textile flame retardant standard system and reduce the gap with foreign countries and accordingly promote the export of Chinese textiles.

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