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NATIONAL STANDARD OF THE PEOPLE'S REPUBLIC OF CHINA

GB/T 4797.3-2014

Replacing GB/T 4797.3-1986

Environmental conditions appearing in nature for electric and electronic products - Living organisms

电工电子产品自然环境条件 生物

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1 Scope

This part of GB/T 4797 lays down the biological environmental conditions that are harmful to electric and electronic products under natural environmental conditions, and divides the country into zones on that basis.

The part describes the biological influences that a product may undergo during storage, transport and use.

The purpose of the part is to provide background information for choosing a suitable severity for the application of a product. When a suitable severity is chosen for the application of a product, the classification of GB/T 4796 shall be taken into account.

The harmful organisms dealt with in this part are chiefly moulds, insects, birds and rodents.

2 Normative references

The following document is indispensable for the application of this document. For a dated reference, only the edition cited applies; for an undated reference, the latest edition, including all amendments, applies.

GB/T 4796, Classification of environmental conditions for electric and electronic products-Part 1: Environmental parameters and their severities (GB/T 4796-2008, IEC 60721-1:2002, IDT).

3 Main effects of living organisms on electric and electronic products

3.1.1 Under attack by the physical action of living organisms, products are damaged for the

following reasons. Fauna, and rodents and insects in particular, may damage the material of a product by taking the material as food, by biting and gnawing it, by boring into it, by chewing it and by making holes in it. A note adds that particular attention is to be paid to the severe damage caused to product materials by termites in this way. Timber, paper, leather, fibre and plastics, synthetic rubber included, and even certain metals such as tin and lead are materials easily attacked. Another way in which the material of a product is attacked by various animals is by knocking or striking and by piercing. Flora, and the growth of moulds and of plant branches in particular, may damage the material of a product by excessive growth, by piercing and by striking.

3.1.2 Under attack by the physical action of living organisms, the kinds of damage suffered by a product are: physical damage to the materials, parts, units and devices of the product; mechanical deformation or compression; mechanical failure, for example of parts in operation; surface degradation; and electrical failure caused by the mechanical damage above.

3.2.1 The function of a product may be affected by deposits originating from fauna and flora. These deposits on the surface affect the product by chemical and by mechanical action.

3.2.2 Under the action of deposits, products are damaged for the following reasons. Deposits caused by animals, and by insects, rodents and birds in particular, may consist of the animals themselves, of nests or burrows, of feeding material, and of metabolic products such as excreta and enzymes. Deposits from the various plants may consist of branch parts of the plant, such as leaves, flowers, seeds and fruit, and of growth layers of moulds or bacteria and of their metabolic products.

3.2.3 Under the action of deposits, the kinds of damage suffered by a product are: degradation and corrosion of the materials; mechanical failure of parts in operation; electrical failure caused by the increase of the conductivity of insulating bodies, by the failure of insulation and by the increase of contact resistance; electrolytic action and ageing caused by damp or by chemical substances; absorption and adsorption of moisture; and degradation of heat dissipation. A note gives two examples of these damaging effects: interruption of a circuit, and clouding of optical surfaces, glass included.

4 Occurrence of fauna and flora

Apart from a few cases, fauna and flora occur in all the places where a product is stored, transported or used.

Fauna may cause damage outdoors and inside buildings, whereas flora causes damage chiefly under outdoor conditions. Moulds and bacteria may occur outdoors and inside buildings.

The frequency of occurrence of the fauna and flora that may damage a product depends on

the temperature and humidity conditions. In geographical positions with a warm and humid climate, fauna and flora, and in particular micro-organisms such as insects, moulds and bacteria, find a good environment in which to live and grow. Nevertheless, damp or humid rooms inside buildings, and rooms that produce moisture, are also suitable places for rodents, insects and micro-organisms to live and grow.

For example, the growth temperature range of moulds is 0 °C to 40 °C, while for the great majority of organisms the optimum growth temperature range is 22 °C to 28 °C.

If the surface of a product carries a coating of organic matter, such as grease, oil or dust, or deposits originating from animals and plants, those surfaces will be an ideal environment for the growth of moulds and bacteria.

A note states that fauna and flora are rewritten according to IEC 60721-2-7:1987.

5 Types and distribution of harmful organisms

5.1.1 Moulds may cause damage to electric and electronic products under environmental conditions of a temperature of 18 °C to 37 °C and a relative humidity of 60 % or above.

5.1.2 The main harmful fungal species listed are: Aspergillus amstelodami, Aspergillus niger, Aspergillus flavus, Aspergillus oryzae, Aspergillus versicolor, Aspergillus sydowii, Aspergillus ustus, Aspergillus terreus, Penicillium ochraceum, Penicillium frequentans, Penicillium citrinum, Penicillium chrysogenum, Penicillium corymbiferum, Penicillium cyclopium, Penicillium funiculosum, Penicillium brevicompactum, Paecilomyces varioti, Aureobasidium pullulans, Cladosporium herbarum, Trichoderma viride, Alternaria alternata, Chaetomium globosum and Rhizopus nigricans. The document gives these names in Chinese only; the Latin equivalents above are given as a reading aid and the Chinese names are the ones printed in the standard.

5.1.3 The regions and cities named as damaged by moulds are the regions of Shandong, Jiangsu, Zhejiang, Anhui, Hubei, Sichuan, Yunnan, Guizhou, Hunan, Jiangxi, Guangdong, Hainan, Guangxi, Fujian, Hong Kong, Macao and Taiwan, and the cities of Beijing, Tianjin, Shanghai, Chongqing, Harbin, Changchun, Shenyang, Shijiazhuang, Zhengzhou, Xian and Lanzhou.

5.2.1 The harmful insects dealt with in this part gnaw electric and electronic products during their life activity and so cause damage to the product.

5.2.2 The main harmful insects listed are termites, ants, cockroaches, carpenter bees, wood-boring beetles, longhorn beetle larvae, scarab beetle larvae and clothes moths.

5.2.3 The regions named as damaged by insects are Guangdong, Hainan, Guangxi, Fujian, Yunnan, Sichuan, Chongqing, Guizhou, Hunan, Hubei, Zhejiang, Shanghai, Jiangsu, Shandong, Hong Kong, Macao and Taiwan.

5.3.1 The harmful birds dealt with in this part cause damage to electric and electronic products during their life activity.

5.3.2 The main harmful birds listed are the crow, the magpie and the sparrow.

5.3.3 The regions named as damaged by harmful birds are Hunan, Jiangxi, Henan and Heilongjiang.

5.4.1 The harmful rodents dealt with in this part cause damage to electric and electronic products during their life activity.

5.4.2 The main harmful rodents listed are the striped field mouse, the greater bandicoot rat, the Daurian ground squirrel, the striped hamster, the Mongolian gerbil, Brandt's vole, the house mouse, the Chinese zokor, the plateau pika, the yellow-breasted rat, the yellow-breasted field mouse, the brown rat and the Chinese bamboo rat. The document gives these names in Chinese only; the English equivalents above are given as a reading aid and the Chinese names are the ones printed in the standard.

5.4.3 The damage caused by harmful rodents extends over the whole country.

6 Principles for the division of biological environmental conditions

6.1 The division into zones is made according to the atmospheric temperature and humidity conditions.

6.2 The division into zones is made according to the degree of damage caused by living organisms to electric and electronic products.

6.3 The division into zones is made according to the ground environmental conditions and the distribution of harmful organisms.

7 Division of the zones of biological environmental conditions

The whole country is divided into four zones according to the principles of clause 6, as shown in Figure 1.

7.1.1 Zone B one covers the region north of a line running from Ergun River, Hailar, Xilinhot, Hohhot, Yulin, Wuzhong, Lanzhou, Xining, Qamdo, Nyingchi and the Yarlung Zangbo River.

7.1.2 The environmental conditions of zone B one are as follows. The climatic conditions of the zone are complex: although it is a southern temperate, mid-temperate or plateau climatic zone, most of it is arid. The zone has damage from rodents only.

7.2.1 Zone B two covers the region south of zone B one and west of a line running from Fujin, Harbin, Changchun, Shenyang, Liaoyang, Qinhuangdao, Beijing, Shijiazhuang, Zhengzhou, Xian, Baoji, Tianshui, Wudu, Barkam, Kangding and Deqin.