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**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 4797.4-2019

**Classification of environmental conditions - Environmental
conditions appearing in nature - Solar radiation and
temperature**

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Foreword

GB/T 4797 includes the following parts.

- GB/T 4797.1 Classification of environmental conditions Natural environmental conditions Temperature and humidity;
- GB/T 4797.2 Classification of environmental conditions Natural atmospheric pressure;
- GB/T 4797.3 Electrical and electronic products in natural environmental conditions;
- GB/T 4797.4 Classification of environmental conditions Natural environmental conditions Solar radiation and temperature;
- GB/T 4797.5 Classification of environmental conditions Natural environment conditions Precipitation and wind;
- GB/T 4797.6 Classification of environmental conditions Natural environmental conditions Dust, sand, salt mist;
- GB/T 4797.7 Classification of environmental conditions for electric and electronic products Natural environmental conditions Earthquake vibration and shock.

This part is Part 4 of GB/T 4797.

This section is drafted in accordance with the rules given in GB/T 1.1-2009.

This section replaces GB/T 4797.4-2006 "Solar Radiation and Temperature of Natural Environmental Conditions for Electrical and Electronic Products".

Compared with GB/T 4797.4-2006, the main changes in this section are as follows.

- Standard name changed to "Environmental Condition Classification Natural Environmental Conditions Solar Radiation and Temperature";
- Informative appendix NA "Monthly Daily Total Irradiance and Annual Total Daily Irradiance in Major Areas of the Country" has been added;
- The original information appendix NA was changed to the information appendix NB.

This section uses the translation method equivalent to IEC 60721-2-4..2002 "Environmental Condition Classification Part 2-4. Natural Environmental Conditions

Sun Radiation and Temperature.

This section has made the following editorial changes.

--- In order to unify with our existing standard series, the name of this section is changed to "Environmental conditions classification Natural environmental conditions Solar radiation and

temperature";

--- Informative appendix NA "Monthly Daily Total Irradiance and Annual Total Daily Irradiance in Major Areas of the Country";

--- Informative appendix NB "China's Solar Radiation Intensity" has been added.

This section is proposed and managed by the National Technical Committee for Environmental Conditions and Environmental Testing of Electrical and Electronic Products (SAC/TC8).

Drafting organization of this section. China Electric Appliance Research Institute Co., Ltd., Sichuan University, Fujian Xinneng Offshore Wind Power R & D Center Limited the company.

1 Scope

This part of GB/T 4797 divides the solar radiation area into several types. It mainly provides the selection of suitable products for product applications.

Part of the background material for the severity of solar radiation.

Except for areas with altitudes above 5000m, this section covers various terrains.

When selecting the severity of solar radiation for a product, the values given in IEC 60721-1 should be used.

2 Purpose

It regulates the severity of solar radiation to which products are subjected during storage, transportation and use.

3 Overview

Solar radiation affects electrical products mainly by heating materials and the environment and causing photochemical degradation reactions of materials. sun

The ultraviolet part of the radiation will cause photochemical degradation of most polymer materials, affecting the elasticity and plasticity of certain rubbers and plastics.

Glass may become blurred.

Solar radiation can fade paint, textiles, paper, etc. In some cases, color may be important, such as the color code of components.

Heating the material is the most important effect of solar radiation exposure. The severity of solar radiation and the radiant power intensity or radiation intensity of the surface

Degree is related, expressed in W/m^2 .

The temperature reached by objects that bear solar radiation depends mainly on the ambient air temperature, solar radiation energy, and the incidence of solar radiation

angle. Other factors, such as wind and thermal conductivity of the mounting parts, may also be important. In addition, the absorption coefficient of the surface to the solar spectrum is also smaller than

More important.

The virtual air temperature t_s has the same temperature as the surface of the object under steady-state conditions.

The shot E combination is defined.

The approximate value can be obtained by the following equation.

$$t_s = t_u$$

$$a_s \cdot E$$

$$h_y$$

The coefficient h_y is the thermal conductivity coefficient of the surface, the unit is $W/(m^2 \cdot \text{degrees C})$, including the surrounding heat radiation, and the heat conduction caused by the wind

And convection. The absorption coefficient a_s depends on the color, reflectance and conductivity of the surface.

The values for clear sky are as follows.

$$a_s = 0.7; h_y = 20W/(m^2 \cdot \text{degrees C}); E = 900W/m^2.$$

The overheating temperature due to solar radiation is about 30°C . It can thus be seen that there is a 10% error in the estimation of solar radiation intensity

The effect on temperature will not exceed 5°C , so there is no need to accurately classify the severity of solar radiation, and other small factors are ignored here

Influence.

Thermal effects are mainly caused by short-term high-intensity solar radiation, such as solar radiation at noon in the clouds. Table 1 gives some values.

In order to determine the low temperature of products exposed at night, it is also necessary to determine the lowest possible value of atmospheric radiation on clear nights.

Figure 1 shows some values.

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