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

GB/T 2893.4-2013

**Graphical symbols -- Safety colours and safety signs -- Part 4:
Colorimetric and photometric properties of safety sign
materials**

(English Translation)

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Table of Contents

Foreword...	3
Introduction...	4
1 Scope...	5
2 Normative references...	5
3 Terms and definitions...	6
4 Requirements...	8
4.1 General...	8
4.2 Object color under external illumination...	9
4.3 Object color of energized internally illuminated safety signs...	10
5 Test methods...	14
5.1 General...	14
5.2 Object color under external lighting...	15
5.3 Object color of energized internally illuminated safety signs...	16

1 Scope

This Part of GB/T 2893 specifies the relevant requirements and test methods for the colorimetric and photometric attributes of the colors of safety signs, which are used in workplaces and public places. It provides colorimetric and photometric specifications, for the safety colors and contrast colors, which are specified in GB/T 2893.1-2013..

The physical requirements, as met by safety signs, are mainly related to daylight color and normal lighting environment. This Part also includes colorimetric requirements and test methods, for safety signs and phosphorescent materials, which are used in unilluminated environments.

This Part applies to all locations, where personal safety concerns are an issue. This Part does not apply to the transmission of guidance signals, for rail, road, inland shipping, sea, air traffic. In short, it does not apply to the fields otherwise specified in the laws and regulations.

The colorimetric and photometric properties of retroreflective safety signs, retroreflective materials combined with fluorescent or phosphorescent materials, or luminescent safety signs activated by a radioactive source, are not specified in this Part.

2 Normative references

The following documents are essential for the application of this document. For dated references, only the dated version applies to this document. For undated references, the latest edition (including all amendments) applies to this document.

GB/T 2893.1-2013 Graphical symbols - Safety colours and safety signs - Part 1:

Design principles for safety signs and safety markings (ISO 3864-1:2011, MOD)

GB/T 15565 (all parts) Graphical symbols - Terms

CIE 15 Colorimetry

CIE 69 Methods of characterizing illuminance meters and luminance meters:

Performance, characteristics and specifications

3.12

Phosphorescent material

Materials containing phosphors, that store energy when excited by ultraviolet or visible light. This energy is emitted as light, for a certain period of time.

3.13

Safety colour

Colors with special properties, that are assigned a safety meaning.

[GB/T 15565.2-2008, definition 2.2.5]

4.1 General

4.1.1

All colorimetric and photometric requirements apply to materials, which are used in finished signs.

4.1.2

See GB/T 2893.1-2013 for the provisions on the safety colors and contrast colors of the geometric shapes of safety signs, as well as the graphic symbols of specific types of safety signs.

4.1.3

The requirements of this Part are based on the CIE 2° standard colorimetric observer, which is specified in CIE 15.

4.1.4

If the requirements of this Part relate to the color of the sign material, under external illumination, the colorimetric and photometric requirements are based on the CIE standard illuminator D65. D65 is at an angle of 45° to the surface normal AND observed along the normal direction (geometric conditions 45/0) OR viewed perpendicular to and at 45° to the surface (geometric conditions 0/45).

4.1.5

The requirements and test methods of this Part are for both illuminated and unilluminated safety signs. See Appendix A, for information on the color characteristics of external lighting, internal lighting, phosphorescent materials.

To function as intended, safety signs without internal light sources shall be illuminated externally.

Internally illuminated safety signs are classified as "maintained" (the internal light source is energized) or "non-maintained" safety signs (signs are illuminated externally when the internal light source is not energized, BUT the internal light source is energized in an emergency). If the safety sign is designed as a dimmed sign, it also needs to meet the requirements, under this condition.

Phosphorescent safety signs can be used, in both illuminated and unilluminated environments. For example, in an emergency, the excited phosphorescent material emits light, for a period of time.

4.1.6

The color regime for each specified color is specified in this Part.

4.1.7

See 4.2.1 for the colorimetric and photometric requirements for safety signs, which are made of ordinary materials. See 4.2.2 (if the internal light source is not energized) and 4.3 (if the internal light source is energized), for colorimetric and photometric requirements for non-maintained internally illuminated safety signs. See

4.3, for colorimetric and photometric requirements for maintained internally illuminated safety signs. See 4.2.3, for colorimetric and photometric requirements for externally illuminated phosphorescent safety signs.

If, at the time of use, the colorimetric coordinates and/or the luminance factor are outside the color regime, which is specified in Table 1, for the corresponding safety sign material type, OR the colorimetric coordinates and/or luminance or luminance contrast are beyond the scope of the corresponding safety sign type, which is specified in Tables

2 and 3, THEN, the material is no longer considered suitable for safety purposes.

In order to facilitate the classification of manufacturers, the performance requirements and test methods for the emission color of phosphorescent materials are as shown in

Appendix B.

4.2.1 Safety signs made of ordinary materials

If the color of the object is tested, in accordance with the provisions of 5.2.1, the colorimetric coordinates of each color shall be within the corresponding color regime, which is specified in Table 1, as shown in Figure 1. The luminance factor of each color shall comply with the provisions in Table 1.

4.2.2 Unpowered internally illuminated safety signs under external lighting

If the unpowered internally illuminated safety sign is tested, in accordance with the provisions of 5.2.2, the colorimetric coordinates of each color shall be within the corresponding color regime, which is specified in Table 1, as shown in Figure 1. The luminance factor of each color shall comply with the provisions in Table 1.

4.2.3 Phosphorescent safety signs under external lighting

If the phosphorescent material at the bottom of the phosphorescent material OR the phosphorescent material printed with color on the surface is tested, in accordance with

5.2.1 Safety signs made of ordinary materials

The front of the sign shall be measured by a spectrophotometer, which complies with the specifications in C.1.1.

Three measurements shall be made at the same location. The average of x , y , Y shall be calculated.

All safety colors and contrast colors, that make up the sign, shall be measured.

5.2.2 De-energized internally illuminated safety signs under exterior lighting

Black material shall be lined behind the front of the sign. The front of the sign shall be measured, by a spectrophotometer, which complies with the specifications in C.1.1.

Three measurements shall be made at the same location. The average of x , y , Y shall be calculated.

All safety colors and contrast colors, that make up the sign, shall be measured.