

ICS 31.120
CCS L53



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

GB/T 43979-2024

Evaluation methods for visual comfort of indoor LED displays

室内LED显示屏光舒适度评价方法

Issued on: April 25, 2024

Implemented on: April 25, 2024

**Issued by: State Administration for Market Regulation;
Standardization Administration of the PRC**

Table of Contents

Foreword...	3
1 Scope...	4
2 Normative references...	4
3 Terms and definitions...	4
4 General requirements...	4
4.1 Test conditions...	4
4.2 Test instruments and software...	5
4.3 Test status...	5
5 Evaluation method...	6
5.1 Visual refresh rate...	6
5.2 Display brightness (ambient illumination)...	7
5.3 Bright room contrast...	8
5.4 Display and ambient brightness ratio...	9
5.5 Illuminance of the display at the observer's position...	10
5.6 Chromaticity non-uniformity...	12

1 Scope

GB/T 43979-2024 gives the Chinese methods for evaluating the visual comfort of indoor LED displays. Fine-pitch LED has moved out of stadiums and into meeting rooms, control rooms, classrooms and retail interiors, where people sit close to it for hours, and the qualities that made it good for a stadium, very high brightness and saturated colour, are exactly what make it uncomfortable indoors. The standard sets the evaluation indicators and the methods for each: the luminance and its adaptation to the ambient level, the luminance uniformity and the visibility of the pixel structure at the viewing distance, the flicker measured by the appropriate metrics including short-term and stroboscopic effect, the blue light content, the contrast and glare relative to the surroundings, the colour rendering and colour uniformity, and the viewing angle behaviour, together with the measurement conditions and instruments, the calculation of the comfort indicators and their grading, and the report. It took effect on 25 April 2024.

This document describes the light comfort evaluation method for indoor LED display (hereinafter referred to as "LED displays"). This document is applicable to the evaluation of light comfort of LED displays.

2 Normative references

The contents of the following documents constitute the essential terms of this document through normative references in the text. Among them, for dated references, only the version corresponding to that date applies to this document; for undated references, the latest version (including all amendments) applies to this document.

GB/T 43770-2024 Specification for indoor LED displays

GB/T 43978-2024 Evaluation requirements for visual comfort of indoor LED displays
SJ/T 11141-2017 Generic specification for LED displays
SJ/T 11281-2017 Measure methods of light emitting diode (LED) displays

3 Terms and definitions

The terms and definitions, which are defined in GB/T 43770-2024, GB/T 43978-2024, SJ/T 11141-2017, SJ/T 11281-2017, apply to this document.

4 General requirements

4.1 Test conditions Unless otherwise specified, the test conditions are as follows:

- a) Ambient temperature. 15 °C ~ 35 °C;
- b) Relative humidity. 20% ~ 80%;
- c) Atmospheric pressure. 86 kPa ~ 106 kPa;
- d) AC power supply. (220 ± 22) V, (50 ± 1) Hz;
- e) Test environment. There shall be no mechanical vibration, electromagnetic and photoelectric interference that may affect the test accuracy;
- f) Test distance. All tests are conducted outside the minimum line of sight.

4.2 Test instruments and software Unless otherwise specified, the performance of all test instruments shall meet the following requirements and be calibrated by a third-party organization. During the calibration period, the test shall be conducted in accordance with the relevant operating procedures.

- a) Color luminance meter (similar instruments used to test optical properties such as brightness and chromaticity can also be used). The relative indication error of brightness is within ±5%; the absolute indication error of chromaticity coordinates is within ±0.003 (relative to standard A light source).
- b) Imaging brightness meter. Relative brightness indication error within ±5%.
- c) Illuminance meter. Relative illumination indication error within ±4%.

- d) Thermometer. Absolute temperature indication error within ± 0.5 °C.
- e) Laser rangefinder. Absolute distance indication error within ± 1 mm.
- f) Photoelectric sensor. Frequency response not less than 50 MHz.

5.1 Visual refresh rate

5.1.1 Test conditions The test conditions are as follows:

- a) The ambient illumination changes within $\pm 10\%$; there is no obvious colored light source;
- b) The photoelectric sensor is placed in front of the normal direction of the LED display pixel; the distance between the photoelectric sensor and the pixel point should be such that the pixel light intensity can be radiated to the light receiving target surface of the photoelectric sensor;
- c) During the test, the angle between the observation line and the LED display remains unchanged.

5.1.2 Test steps The test steps are as follows:

- a) According to Figure 1, the LED display is set to the highest grayscale level and the highest brightness level. According to the requirements of B.3.5 of SJ/T 11281-2017, a special test image for visual refresh rate is displayed in the display window;
- b) The LED display shows the standard test image for visual refresh rate;
- c) Connect the signal input end of the oscilloscope to the signal output end of the photoelectric sensor;
- d) Adjust the oscilloscope; select the appropriate range, so that its output presents a stable and regular waveform;
- e) Observe the waveform and measure the period T of a set of waveforms;
- f) Calculate the visual refresh rate FC of the display according to formula (1). Where. pixels;
- c) During the test, the angle between the observation line and the LED display remains unchanged.

5.3.2 Test steps The test steps are as follows:

- a) According to the method in 5.2, measure the brightness L_{max} and background brightness L_d on the normal line of the LED display, respectively;

5.4 Display and ambient brightness ratio

5.4.1 Test conditions The test conditions are as follows:

- a) The ambient illumination changes within $\pm 10\%$; there is no obvious colored light source;

b) The acquisition range of the imaging brightness meter shall not be less than 60° field of view;

c) During the test, the angle between the observation line and the LED display remains unchanged.

5.4.2 Test steps The test steps are as follows:

a) According to Figure 3, at the highest grayscale and highest brightness level, the LED display shows a certain primary color; the average brightness L_{avg} of the LED display is tested by an imaging brightness meter;

b) At the highest grayscale and highest brightness level, the LED display shows a

b) The illuminance meter probe shall be directly facing the center point area of the display; the probe height is the observer's eye height. The eye height of the sitting observer shall be 1.2 m; the eye height of the standing observer shall be

c) During the test, the angle between the observation line and the LED display remains unchanged.

5.5.2 Test steps The test steps are as follows:

a) According to Figure 4, when the LED display is in full black, use an illuminance meter to test the background illumination E_d of the LED display;

b) At the highest grayscale level and the highest brightness level, the LED display shows a certain primary color; use an illuminance meter to test the illumination E_{max} of the LED display;

c) Calculate the maximum illumination of the primary color according to formula (5). Where. E - Maximum illumination, in lux (lx); E_{max} - Illumination of the LED display, in lux (lx); E_d - Background illumination of the LED display, in lux (lx).