

ICS 27.010
CCS F 01



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

GB 32028-2015

**Minimum Allowable Values of Energy Efficiency and Energy
Efficiency Grades for Projectors
(English Translation)**

Issued on: September 18, 2015

Implemented on: October 1, 2016

**Issued by: General Administration of Quality Supervision, Inspection and
Quarantine**

Table of Contents

Foreword...	3
1 Scope...	4
2 Normative references...	4
3 Terms and definitions...	4
4 Technical requirements...	5
5 Projection light efficiency calculation...	6
6 Test method...	7
7 Inspection rules...	7
Appendix A (Normative) Test method of projection efficiency for projectors...	8

1 Scope

This Standard specifies the minimum allowable values of energy efficiency, energy-conservation evaluation values, energy efficiency grades, test methods and inspection rules for projectors.

This Standard applies to liquid crystal display (LCD) and digital light processing (DLP) projectors that use projection as the main function, and high-pressure mercury lamp or metal halide lamp as the light source. Solid-state light source projectors and projectors that use the liquid crystal on silicon (LCOS) as the display device can be executed by reference to this Standard.

This Standard does not apply to the integrated projection unit that consists of a projection screen and a projector, and the professional projector for cinema projection.

2 Normative references

The following documents are indispensable 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 8170, Rules of rounding off for numerical values & expression and judgment of limiting values

GB 20943, Minimum allowable values of energy efficiency and evaluating values of energy conservation for single voltage external AC-DC and AC-AC power supplies

SJ/T 11332, Specification of interfaces for digital television receiving equipment. Part 6:

Analog video interface of RGB

SJ/T 11346, Methods of measurement for electronic projectors

3 Terms and definitions

Terms and definitions determined by SJ/T 11346 and the following ones are applicable to this document.

Grade 1 Grade 2 Grade 3

Ordinary projector 12.0 8.0 6.0

High color gamut projector of which the color gamut coverage is $\geq 33.0\%$ 12.0 8.0 4.2

4.2 Minimum allowable values of passive standby power for projectors

The passive standby power of projectors shall be less than or equal to 0.50 W.

The passive standby power is rounded according to GB/T 8170, retaining two digits after the decimal point.

4.3 Minimum allowable values of energy efficiency for projectors

The minimum projection efficiency that is required by the minimum allowable values of energy efficiency for projectors is grade-3 of energy efficiency grades in Table 1, which shall meet the requirements of minimum allowable values of passive standby power at the same time.

For projectors that use an external power supply, the external power supply that is used shall meet the requirements of minimum allowable values in GB 20943.

4.4 Evaluating values of energy conservation for projectors

The minimum projection efficiency that is required by the evaluating values of energy conservation for projectors is grade-2 of energy efficiency grades in

Table 1, which shall meet the requirements of minimum allowable values of passive standby power at the same time.

For projectors that use an external power supply, the external power supply that is used shall meet the requirements of evaluating values of energy conservation in GB 20943.

5 Projection light efficiency calculation

The projection light efficiency of the projector is calculated according to Formula (1):

Where:

Eff -- projection light efficiency of the projector, in lumens per watt (lm/W);

L -- light output of the projector, in lumens (lm);

Pk -- power of the projector, in watts (W).

Appendix A (Normative)

Test method of projection efficiency for projectors

A.1.1 Environmental conditions

Measurements shall be performed under the following conditions of temperature, humidity and pressure:

- Temperature: 15°C ~ 25°C;
- Relative humidity: 25% ~ 75%;
- Atmospheric pressure: 86 kPa ~ 106 kPa.

A.1.2 Power supply

- Power supply voltage: AC 220 V $\pm$ 4 V;
- Power supply frequency: 50 Hz $\pm$ 1 Hz;
- Total harmonic distortion: $\leq$ 2%.

A.1.3 Test site

Measurements shall be performed in a dark room with a stray illuminance less than or equal to 1 lx.

A.2 Measurement instruments

A.2.1 Illuminance meter:

- Illuminance measurement range: 1 lx ~ 30 000 lx;
- Illuminance measurement accuracy: $\pm$ 4%;
- Chromaticity measurement resolution: $\pm$ 0.002.

A.2.2 Colorimeter:

The colorimeter measurement accuracy is $\pm$ 0.002.

A.2.3 Power meter:

signal can be clearly distinguished. The adjustment method of the limit eight gray signal is as follows:

By adjusting the "brightness" and "contrast" settings of the projector, adjust the display to a state that the difference between the gray scale patches of limit black and white can be just distinguished by human eyes.

First, adjust the "brightness" setting, so that the two extreme black gray scales of 0% and 5% in the first row can be just distinguished. Then, gradually reduce the "contrast" from the maximum value, until the two extreme white gray scales of 100% and 95% of gray scales in the second row can be just distinguished from each other.

Repeat the above processes, until the requirements that the two types of limit gray scales are exactly distinguished can be achieved simultaneously.

If the limit black gray scale can be just distinguished, and the 100% and 95% white gray scales are always indistinguishable when adjusting the "contrast";

then, adjust the "contrast" until the two white gray scales of 95% and 90% gray can be just distinguished.

If the limit white gray scale can be just distinguished, and the 0% and 5% black gray scales are always indistinguishable when adjusting the "brightness"; then, adjust the "brightness" until the two black gray scales of 5% and 10% gray can be just distinguished.

If the 0%, 5% black gray scales, and the 95%, 100% white gray scales cannot reach the limit resolution; then, in the case of ensuring the largest number of gray scales, adjust to the largest number of white gray scales, and indicate in the report.

If the 100% and 95% white gray scales are always legible, set the "contrast" to the middle.

If the 0% and 5% black gray scales are always legible, set the "brightness" to the middle.

Throughout the adjustment process, the difference between the four blocks of

10%, 15%, 85% and 90% can be distinguished to avoid dizziness and be used as the reference of brightness difference (when adjusting the difference between the limit black and white blocks, the difference of other gray blocks may not be uniform).

A.4.2.5 Record product parameters such as the projector's light source type, working mode, number of bulbs, display device type, used lens specifications;

and record the set states of parameters such as image mode, brightness, contrast and color temperature.

Appendix B (Normative)

Test method of passive standby power for projectors