

INTERNATIONAL
STANDARD

TC 62
ISO
8341

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**Photography — Slide projectors and filmstrip
projectors — Illumination test**

*Photographie — Projecteurs de diapositives et de bandes d'images fixes — Essais
de luminosité*

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Reference number
ISO 8341 : 1989 (E)

Foreword

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Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

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Photography — Slide projectors and filmstrip projectors — Illumination test

1 Scope

This International Standard specifies a measuring method for determining the useful (effective) light output of the projector and the uniformity of screen illuminance.

2 Normative reference

The following standard contains provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the edition indicated was valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent edition of the standard indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 1755: 1987, *Photography — Projector slides — Dimensions*.

3 General

3.1 Preconditioning

Before the commencement of any test, the projector shall be preconditioned by being kept under the environmental conditions of the testing laboratory for at least 24 h.

3.2 Projector set-up

While making the tests, the projector shall be operated with its normal components (e.g. lamp, heat filter, lens, filled tray).

3.3 Voltage and frequencies

3.3.1 The projector shall be operated from an adjustable power supply adjusted to within $\pm 0,5\%$ of the projector's rated voltage. While adjusting the supply, the voltage shall be measured at the supply socket to which the projector's recommended power supply cord is connected. The frequency of the power supply shall match the manufacturer's rating for the projector.

3.3.2 If the projector is suitable for use at different voltages and/or frequencies, the measurements for determining the light output shall be made either at each adjustable voltage $\pm 0,5\%$ and its related frequency, or at least at a selection of

characteristic voltages and frequencies. When selecting the voltages and frequencies, consideration shall be given to the main usage of the projector in practice, and the conditions under which extreme differences of the test results might be expected. The measurements for determining the uniformity of screen illuminance can be made at any position of the voltage selector with the respective line voltage $\pm 0,5\%$ and the related frequency.

3.3.3 For determining the input voltage of the lamp, the voltage at the lampholder shall be measured with the lamp operating, and after the respective time specified in 3.8 has elapsed.

3.4 Lamp adjustment

The lamp shall be adjusted in the projector according to the operating instructions.

3.5 Cleanliness

The optical elements of the projector shall be free from dust and other contamination.

3.6 Ambient temperature

The ambient temperature in the testing laboratory shall be $23\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$.

3.7 Projector alignment

The projector shall be positioned so that the projection of its optical axis is normal to the plane of the screen.

3.8 Stabilization

If the lamp is fed via a transformer the light measurements shall be started at the earliest 20 min after having switched on the lamp, running it under normal test conditions.

If the lamp is fed directly by the mains voltage the measurements can be started after 5 min.

3.9 Ambient light

The illumination of the screen due to ambient light should not exceed 1 % of the screen illuminance due to illumination projected through the projector lens during the measurement. For the reduction of stray light the use of a black screen is recommended.

3.10 Light measuring equipment

The photometer used shall have a spectral response characteristic corresponding to the CIE 1931 Standard Colorimetric Observer¹⁾. (This response correlates with the colour sensation to the human eye.)

3.11 Use of light meter

The light sensing element of the meter shall be positioned at the plane of the screen with a tolerance of $+20^0$ mm and parallel to it so as to measure directly the incident projected light.

4 Light output

4.1 The useful light output is calculated from the average screen illuminance and the respective projection area.

4.2 The projection area shall be confined by using a suitable mask positioned in the picture area and brought to focus.

4.3 For determining the average screen illuminance the projected light shall be measured at nine positions (1, 2, 3, 4, 5, 6, 7, 8, 9) on the screen as shown in figure 1.

4.4 Calculating the useful light output

4.4.1 The arithmetical average of the nine readings (E_x) of illuminance is given by E_m in lux

$$\text{where } E_m = \frac{\sum_{x=1}^{x=9} E_x}{9}$$

4.4.2 The useful light output of the projector is given by Φ in lumens

$$\text{where } \Phi = E_m \times A$$

A is the projection area on screen $b \times h$ (m^2) (see figure 1).

4.4.3 The projection area A shall be in the range from 1 m^2 to 2 m^2 . In determining the projection area to be used for the test there shall be regard for the normal usage for which the projector is designed.

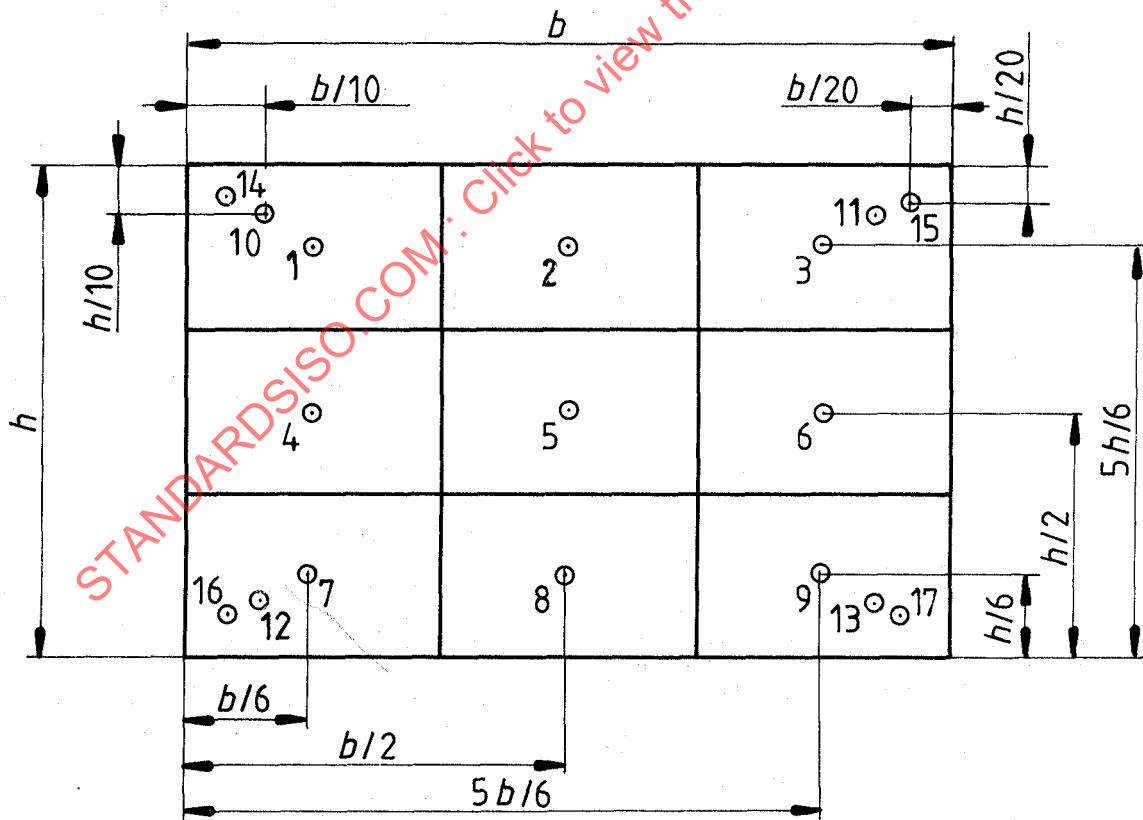


Figure 1 — Screen illuminance measuring points

1) International Commission on Illumination (CIE) Publication 15 (E-1.3.1.): 1971, *Colorimetry*.

5 Uniformity of screen illuminance

5.1 For determining the uniformity of screen illuminance, intensities of illuminance at different corner points are set in proportion to the intensity of illuminance at the centre of the screen.

5.2 Three different types of corner points are defined (see figure 1) and any, or all, of them may be used:

- corner points 1, 3, 7, 9 at $\frac{b}{6}, \frac{h}{6}$;
- corner points 10, 11, 12, 13 at $\frac{b}{10}, \frac{h}{10}$;
- corner points 14, 15, 16, 17 at $\frac{b}{20}, \frac{h}{20}$.

5.3 From each type of corner point, the point with the lowest intensity of illuminance is chosen. The illuminance value at this point is calculated as a proportion of the illuminance value at the centre point (5).

The resulting values U_6 , U_{10} , U_{20} serve as indications of the uniformity of screen illuminance:

$$U_6 = \frac{E_{\min}(1, 3, 7, 9)}{E_5} \times 100\%;$$

$$U_{10} = \frac{E_{\min}(10, 11, 12, 13)}{E_5} \times 100\%;$$

$$U_{20} = \frac{E_{\min}(14, 15, 16, 17)}{E_5} \times 100\%.$$

6 Test results

The results of the tests made according to this International Standard shall be given in the form of the example below.

Example of presentation of results

Test subject		Projector manufacturer/model name and number/serial number			
Rated voltage		120 V, 130 V, 220 V, 240 V			
Frequency		50/60 Hz			
Nominal lamp		24 V/250 W Halogen			
Manufacturer and type number of lamp		MNO Comp. Type No. 1234			
Lens		(name), f 3,5/85 mm			
Picture aperture format		nominal 24 mm × 36 mm		actual 22,5 mm × 34,3 mm	
Voltage selector position V	Projector input V	Hz	Lamp input V	Light output, ϕ in lumens	
110	110	50	22,95	710	
120	120	60	23,00	720	
220/230	220	50	22,95	710	
220/230	230	50	24,00	810	
240/250	240	50	23,05	730	
Uniformity of screen illuminance	$U_6 = 75\%$		$U_{10} = 68\%$	$U_{20} = 62\%$	
The tests were made in accordance with ISO 8341.					

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