

JIS

JAPANESE INDUSTRIAL STANDARD

Shutters for still cameras

JIS B 7091—1992

Translated and Published

by

Japanese Standards Association

Printed in Japan

In the event of any doubt arising,
the original Standard in Japanese is to be final authority.

JAPANESE INDUSTRIAL STANDARD

J I S

Shutters for still cameras

B 7091-1992

1. Scope This Japanese Industrial Standard specifies the shutter mechanism (hereafter referred to as the "shutters") of all types to be used for cameras for photographing.

- Remarks 1. This Standard applies to shutters in actual using condition equipped with camera together with lens.
2. The shutter performance is closely related to the price of a camera, and in specifying the tolerance, it should preferably be applied according to the characteristics, the performance and the price. Thus, the tolerance specified in this Standard is not for specification of general inspection standards of the shutter performance, but for establishment of target values for the shutter performance in order to provide favorable photographing results to photographers.
 3. As to the shutters in the condition not attached to cameras, applicable items of this Standard shall apply.
 4. The following standards are cited in this Standard:
 - JIS B 7115 Picture sizes for still cameras
 - JIS C 1302 Insulation resistance testers (battery operated)
 - JIS C 7520 Photoflash lamps
 - JIS K 7604 Determination of ISO speed of black-and-white continuous-tone negative films for still photography
 5. The corresponding International standard to this Standard is as follows.
 - ISO 516 : 1986 Photography—Camera shutters—Timing

2. Definitions For the purpose of this Standard, the following definitions apply.

- (1) lens shutter The shutter of the style to expose simultaneously or approximately simultaneously the whole picture area of camera. Usually, the shutter existing near⁽¹⁾ the lens belongs to this, and the exposure is carried out by a rotary disc, a slide vane or the like.

Note ⁽¹⁾ It means front part, rear part, or intermediate part of the lens system.

- (2) focal plane shutter The shutter of the style to expose successively the picture area of camera. Usually, the shutter existing near the focal plane belongs to this, and the exposure is carried out by a slit of rectangular or sector shape or the like.

2
B 7091-1992

- (3) total exposure time (t_0) The period of time since a point on the picture area begins to be exposed till the completion of the closing.

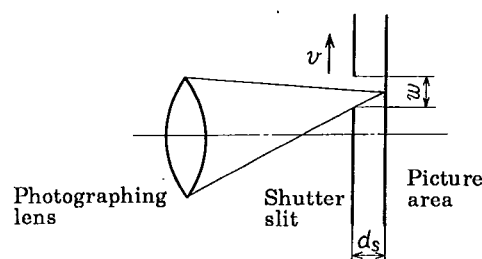
In the case of lens shutter, the period of time since the vane begins to open till it completes closing, and it is equal or approximately equal over the whole picture area.

The total exposure time concerning the focal plane shutter shall be obtained from formula (1) (see Fig. 1):

$$t_0 = \frac{w + \frac{d_s}{A}}{v} \dots\dots\dots (1)$$

where, t_0 : total exposure time (focal plane shutter) (s)
 w : width of shutter slit at the point (mm)
 v : travelling speed of shutter slit at the point (mm/s)
 d_s : average distance from the picture area to the travelling plane of shutter slit (mm)
 A : F number of lens

Fig. 1. Relation between slit and luminous flux of focal plane shutter



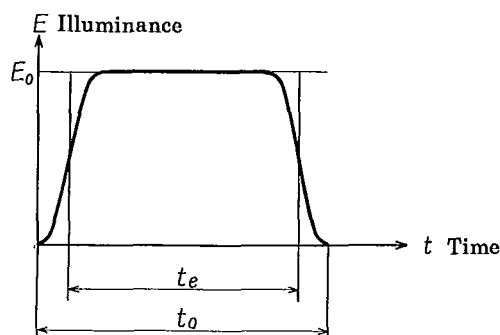
- (4) effective exposure time (t_e) The time required for the ideal shutter⁽²⁾ of the same aperture to give the same optical amount as that to be given at a point of the picture area. It shall be obtained according to formula (2) :

Note ⁽²⁾ The ideal shutter means the shutter which opens and closes without lapse of time.

$$t_e = \frac{1}{E_0} \int_0^{t_0} E(t) dt = \frac{H}{E_0} \dots\dots\dots (2)$$

where, t_e : effective exposure time (s)
 E : illuminance at that point (lx)
 E_0 : maximum illuminance at that point (lx)
 H : area enclosed by illuminance — time curve (lx·s)

Fig. 2. Illuminance—Time curve at a point on picture area



The effective exposure time is equal or approximately equal over the whole picture area in the case of lens shutter, and in the case of focal plane shutter, it is the period of time to travel by the width of shutter slit, and for each position it shall be expressed by formula (3):

$$t_e = \frac{w}{v} \dots\dots\dots (3)$$

where, t_e : effective exposure time (focal plane shutter) (s)
 w : width of shutter slit at that point (mm)
 v : travelling speed of shutter slit at that point (mm/s)

provided that, $w \geq \frac{d_s}{A}$ (3).

Note (3) In case of $w < \frac{d_s}{A}$, it shall be excepted from this Standard.

- (5) Exposure time (t_E) In the case of lens shutter, the effective exposure time at the maximum throttling of aperture of the lens used. In the case of the focal plane shutter, the effective exposure time at the middle of picture area.
- (6) E_v unit The difference (ratio) of two amounts (for example, the actually measured value and the reference value of exposure time) expressed by logarithm to the base 2. The change of only 1 in E_v unit corresponds to change of exposure time of neighboring one stage in the exposure time marking series.
- (7) Synchronization Carry out ignition contact in interlocking with the opening-and-closing of shutter so that the expected light of flash light source may irradiate the whole picture area.
- (8) Delay time (t_d) The period of time for flash light source to actuate since the ignition contact till the specified condition of shutter in order to synchronize with the shutter.

- (9) Contact efficiency (E_c) The ratio of quantity of electricity passing the contact point actually during the specified time since contacting of the contact point relative to the quantity of electricity considered to pass at the ideal condition⁽⁴⁾ during the same time, and shall be obtained from formula (4):

$$E_c = \frac{\text{quantity of electricity passing the contact point actually}}{\text{quantity of electricity passing the contact point at the ideal condition}} \times 100 (\%) \dots\dots\dots (4)$$

Note (4) The case where there is no resistance from the bound of contact point or from terminal for accessories to be connected.

3. Marking of functions

- 3.1 Marking of exposure time The reference value of the exposure time shall be in accordance with the series of formula (5):

$$t_E = \frac{1}{2^n} \dots\dots\dots (5)$$

where, t_E : reference value of exposure time (s)
 n : positive or negative integer or 0

That is, the reference value of exposure time becomes as follows:

..... 64, 32, 16, 8, 4, 2, 1, 1/2, 1/4, 1/8, 1/16, 1/32, 1/64, 1/128, 1/256, 1/512, 1/1024, 1/2048, ...

The scale marking for exposure time shall be marked with the rounded-off numerals as follows (for the numerals less than 1 s, the inverse numbers of the reference values shall be rounded off.).

The scale of exposure time exceeding 1 s should preferably be discriminated by color of letter.

..... 60, 30, 15, 8, 4, 2, 1, 2, 4, 8, 15, 30, 60, 125, 250, 500, 1000, 2000, ...

- Remarks 1. Other than the above-mentioned, symbols such as B (bulb), T (time), etc. are arranged as required.
2. The scale of exposure time exceeding 1 s may be marked as follows with numerals not rounded off but as the reference value sequence. 64, 32, 16, 8, 4, 2, 1
3. The scale mark of the longest and the shortest exposure time may not be necessarily in accordance with this sequence.

- 3.2 Marking of photoflash synchronization mechanism When the type of photoflash synchronization mechanism is required to be marked, it shall be in accordance with Table 1.