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IS 14620 : 1998

ISO 1230 : 1992

भारतीय मानक  
फोटोग्राफी – फ्लैश मार्गदर्शी संख्याएं  
ज्ञात करना

*Indian Standard*

PHOTOGRAPHY — DETERMINATION OF  
FLASH GUIDE NUMBERS

ICS 37.040.10

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**BUREAU OF INDIAN STANDARDS**  
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NEW DELHI 110002

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Price Group 3

## NATIONAL FOREWORD

This Indian Standard which is identical with ISO 1230 : 1992 'Photography — Determination of flash guide numbers', issued by the International Organization for Standardization (ISO), was adopted by the Bureau of Indian Standards on the recommendations of the Photographic Equipments Sectional Committee and approval of the Light Mechanical Engineering Division Council.

The text of ISO Standard has been approved as suitable for publication as Indian Standard without deviations. Certain conventions are, however, not identical to those used in Indian Standards. Attention is drawn especially to the following:

- a) Wherever the words 'International Standard' appear referring to this standard, they should be read as 'Indian Standard'.
- b) Comma (,) has been used as a decimal marker while in Indian Standards, the current practice is to use a point (.) as the decimal marker.

In this adopted standard, reference appears to ISO 2827. The Indian Standard IS 14621 : 1998 'Photography — Electronic flash equipment — Determination of light output and performance' which is identical to ISO 2827 is to be substituted in its place.

The concerned technical committee has reviewed the provisions of ISO 1229 referred in this adopted standard and has decided that it is acceptable for use in conjunction with this standard.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

## Indian Standard

# PHOTOGRAPHY — DETERMINATION OF FLASH GUIDE NUMBERS

## 1 Scope

This International Standard specifies the definition and determination of the ISO guide numbers of flash light sources for general photographic use, including expendable photoflash lamps with and without integral reflectors and electronic flash equipment. Definitions and measuring methods for the light output of photoflash lamps without integral reflectors are specified in ISO 1229. Definitions and measuring methods for the light output of electronic flash equipment are specified in ISO 2827.

NOTE 1 The same technique may be used for measurement of light output of photoflash lamps with integral reflectors.

## 2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were 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 editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 1229:1989, *Photography — Expendable photoflash lamps — Determination of light output.*

ISO 2827:1988, *Photography — Electronic flash equipment — Determination of light output and performance.*

## 3 Definitions

For the purposes of this International Standard, the following definitions apply.

**3.1 reflector factor:** The amplification of the luminous intensity taking the beam intensity in a solid angle  $2 \times 5^\circ$  around the axis of the reflector of the

flash equipment compared to that from a bare lamp in a direction perpendicular to the axis of the lamp.

**3.2 guide number (GN):** The product of the camera lens  $f$ -number required for a suitable exposure on a film and the distance from the flash light source to the subject, in metres, with respect to the ISO speed of the film to be used.

**3.3 ISO guide number (ISO/GN):** The guide number, expressed in metres, for a film of speed ISO 100/21°, "X" synchronization, an exposure of 1/30 s and, in the case of an expendable photoflash lamp without integral reflector, a reflector factor of 5 (see clause 5).

## 4 Method for measuring reflector factor

**4.1** Measurements of luminous intensity (in candelas) shall be carried out in a room with non-reflecting walls at a distance of at least 2 m or twelve times the reflector diameter, whichever value is the greater. For this purpose, normal photoflash lamps intended for equipment with reflectors shall be used.

**4.2** Sufficient quantities of photoflash lamps shall be measured so as to ensure good average values; starting at the reflector axis, these measurements shall be carried out in all directions of interest so that the reflector factor may be calculated

## 5 Reflector factors for flash lamp equipment

If the reflector factor of any equipment for expendable photoflash lamps otherwise complying with this International Standard differs materially from the value 5, a correction factor shall be published by the manufacturer of the equipment. This shall be marked on the equipment or included as part of the standard instructions supplied with it, enabling the ISO guide number of the photoflash lamp to be transformed to a guide number for the combination of lamp and flash equipment.

## 6 Formulae for calculating ISO guide number (ISO/GN)

6.1 ISO guide numbers in metres shall be obtained from the following formulae:<sup>1)2)</sup>

for photoflash lamps (without integral reflectors):

$$\text{ISO/GN} = \sqrt{0,21 Q}$$

for electronic flash equipment or photoflash lamps (with integral reflectors)

$$\text{ISO/GN} = \sqrt{0,52 \int I dt}$$

where

$Q$  is the light output of a photoflash lamp (without integral reflector) in lumen seconds (see ISO 1229);

$\int I dt$  is the time integral of the luminous intensity of electronic flash equipment or photoflash lamps (with integral reflectors) in candela seconds (see ISO 2827).

6.2 Guide numbers for film of any ISO speed other than 100 may be obtained from the following formula:

$$\text{GN}_{(\text{ISO } S)} = (\text{ISO/GN}) \cdot \sqrt{\frac{S}{100}}$$

where

$S$  is the ISO speed (arithmetic) of the film.

## 7 Designation of guide number

Designation of guide numbers on products or instructions should be rounded to two significant digits and followed by metres.<sup>3)</sup> When a guide number does not express the ISO guide number (i.e. for films other than those of ISO speed 100 [arithmetic]), the ISO speed of the film should follow in parentheses.

### EXAMPLES

ISO/GN: 20 metres

GN: 40 metres (ISO 400)

1) For ISO guide numbers in feet, see annex A.  
2) For explanation of guide number equation, see annex B.  
3) For designation of guide number in feet see A.2.

## **Annex A** (informative)

### **Calculating ISO guide number in feet**

#### **A.1 Conversion factor**

ISO guide numbers in feet can be obtained from the metre guide numbers by multiplying by the factor 3,28.

#### **A.2 Designation of guide number in feet**

Designation of guide numbers on products or instructions should be rounded to two significant digits and followed by feet. When a guide number does not

express the ISO guide number (for films other than those of ISO speed 100 [arithmetic]), the ISO speed of the film should follow in parentheses.

#### **EXAMPLES**

ISO/GN: 20 metres

ISO/GN: 66 feet

GN: 40 metres (ISO 400)

GN: 130 feet (ISO 400)



**Annex B**  
 (informative)

**Explanation of guide number equation**

**B.1 Electronic flash**

In the case of illuminating the object by means of an electronic flash light source, ISO 5763 gives the exposure  $H_F$ , in lux seconds, in the focal plane of a camera as:

$$H_F = \frac{bq\Omega_0}{A^2 d^2} \int Idt \quad \dots (B.1)$$

where

- $b$  is a constant, mainly for radiation attenuation in the camera lens, and is considered to be  $0,65 \text{ lx}\cdot\text{m}^2\cdot\text{cd}^{-1}$  for a representative lens;
- $q$  is the luminance coefficient, in candelas per square metre per lux, of the object, which has a standard value of  $q = 0,08 \text{ cd}\cdot\text{m}^{-2}\cdot\text{lx}^{-1}$ ; this corresponds to a reflectance of about 25 % for a uniform diffuser;
- $\Omega_0$  is the solid angle = 1 sr;
- $A$  is the  $f$ -number of the camera lens;
- $d$  is the distance from the light source to the object, in metres;
- $\int Idt$  is the time integral of the luminous intensity of the light source, in candela seconds.

From the definition of the guide number in this International Standard it follows that:

$$\text{GN} = Ad \quad \dots (B.2)$$

From ISO 2721, the nominal (normal) exposure  $H_F$  in the focal plane for films of ISO speed  $S$  (arithmetic) should be:

$$H_F = \frac{10}{S} \quad \dots (B.3)$$

Equations (B.1), (B.2) and (B.3) may be combined to yield:

$$\frac{10}{S} = \frac{bq}{(\text{GN})^2} \int Idt \quad \dots (B.4)$$

Substituting the values  $b = 0,65$  and  $q = 0,08$ :

$$\text{GN} = \sqrt{5,2 \times 10^{-3} S \int Idt} \quad \dots (B.5)$$

When  $S = 100$ :

$$\text{ISO}/\text{GN} = \sqrt{0,52 \int Idt} \quad \dots (B.6)$$

NOTE 2 In ISO 1230:1973, the constant  $C$  in the formulae for calculating guide numbers was given as  $4,5 \times 10^{-3}$  based on the results of many experiments and experiences. Since then, many related International Standards, such as ISO 2240[4], ISO 2721[5] and ISO 5763[6] have been established. In order to coincide with these International Standards, the constant  $C$  should have been amended to  $4,6 \times 10^{-3}$ . However, in the formulae in ISO 1230:1973, 0,3 was adopted as the metre/foot conversion factor. When  $1/3,28 = 3,048 \times 10^{-1}$  is applied as defined in this second edition of this International Standard (see A.1),  $C$  should remain at  $4,5 \times 10^{-3}$  (precisely  $4,454 \times 10^{-3}$ ). Therefore the formulae given in this edition of this International Standard do not cause any inconvenience in practical applications.

**B.2 Expendable photoflash lamps without integral reflectors**

In the case of expendable photoflash lamps without integral reflectors, the value  $\int Idt$  corresponds to  $MQ/4\pi$ , where  $M$  is the reflector factor (by definition in this International Standard,  $M = 5$ ), and  $Q$  is the light output of the flash lamps in lumen seconds (see ISO 1229).

$$\text{GN} = \sqrt{\frac{5,2 \times 10^{-3} \times 5}{4\pi}} QS \quad \dots (B.7)$$

$$\text{GN} = \sqrt{2,1 \times 10^{-3}} QS \quad \dots (B.8)$$

When  $S = 100$ :

$$\text{ISO}/\text{GN} = \sqrt{0,21} Q \quad \dots (B.9)$$

## Annex C (informative)

### Bibliography

- [1] ISO 6:1974, *Photography — Determination of ISO speed of monochrome (black-and-white), continuous-tone photographic negative materials for still photography.*
- [2] ISO 516:1986, *Photography — Camera shutters — Timing.*
- [3] ISO 517:—<sup>4)</sup>, *Photography — Apertures and related properties pertaining to photographic lenses — Designations and measurements.*
- [4] ISO 2240:—<sup>5)</sup>, *Photography — Colour reversal camera films — Determination of ISO speed.*
- [5] ISO 2721:1982, *Photography — Cameras — Automatic controls of exposure.*
- [6] ISO 5763:1989, *Photography — Electronic flash equipment — Automatic control of exposure.*
- [7] ISO 5800:1987, *Photography — Colour negative films for still photography — Determination of ISO speed.*
- [8] ISO 10503:1991, *Photography — Expendable reflected photoflash lamp arrays — Definitions and requirements for luminous flux/time characteristics.*
- [9] CIE Publication No. 38, *Radiometric and photometric characteristics of materials and their measurement, 1977.*

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4) To be published. (Revision of ISO 517:1973)

5) To be published. (Revision of ISO 2240:1982)

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