
**Cycles — Lighting and retro-reflective
devices —**

**Part 1:
Lighting and light signalling devices**

*Cycles — Éclairage et dispositifs rétroréfléchissants —
Partie 1: Équipements de signalisation et d'éclairage*

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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This document was prepared by Technical Committee ISO/TC 149, *Cycles*, Subcommittee SC 1, *Cycles and major sub-assemblies*.

This fourth edition cancels and replaces the third edition (ISO 6742-1:2015), which has been technically revised.

The main changes are as follows:

- terms and definitions: “continuous light” and “light emitting surface” were added;
- some terms and definitions were reviewed;
- improvement of [Clause 4](#);
- addition of [Table 3](#) in [4.4.2](#);
- addition of [4.9](#) “Daytime running lamp”;
- addition of [6.4](#);
- addition of [Annex C](#).

A list of all parts in the ISO 6742 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Cycles — Lighting and retro-reflective devices —

Part 1: Lighting and light signalling devices

1 Scope

This document is applicable to lighting devices used on cycles intended to be used on public roads and, especially, bicycles complying with ISO 4210^[1] and ISO 8098^[2].

This document specifies the functions, safety requirements, photometric performance and test methods of lighting and signalling devices that can be used on cycles.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 6742-4, *Cycles — Lighting and retro-reflective devices — Part 4: Lighting systems powered by the cycle's movement*

ISO 6742-5, *Cycles — Lighting and retro-reflective devices — Part 5: Lighting systems not powered by the cycle's movement*

ISO/CIE 19476, *Characterization of the performance of illuminance meters and luminance meters*

CIE 1931, *XYZ colour space of the International Commission on Illumination*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <https://www.electropedia.org/>

3.1 front position lamp

lamp emitting a white or an amber light to the front of the cycle, so as to indicate its presence on the road

3.2 headlamp

lamp to light the road to the front of the cycle that has either low beam, high beam or both

3.3 rear lamp

lamp emitting a red light to the rear of the cycle and used to indicate its presence on the road

3.4

stop lamp

lamp used to indicate to other road users that the cycle brakes or significantly decelerates

3.5

low beam

light that illuminates the road in front of the cycle without dazzling other road users from the opposite direction

3.6

high beam

light that illuminates the road for a long distance ahead of the cycles

3.7

direction indicator

lamp used to indicate to other road users that the cyclist intends to change direction to the right or left

3.8

stand light

light emitted by a lamp for a time after the cycle has stopped

3.9

daytime running lamp

lamp facing in forward direction used to make the cycle more easily visible when driving during daytime

3.10

reference axis

characteristic horizontal axis of the lamp, as determined by the manufacturer or by the direction light is emitted with greatest intensity, to serve as a direction of reference during use in service and during test measurements

3.11

H-H line

horizontal line parallel to the ground plane passing through the *reference axis* ([3.10](#))

3.12

V-V line

vertical line perpendicular to the ground plane through the *reference axis* ([3.10](#))

3.13

public road

any designated and adopted road, pavement, path, or track on which a cycle is legally permitted to travel and, on most through not all such public roads, cycles will share use with other forms of transport including motorized traffic

[SOURCE: ISO 4210-1:2023, 3.3.3, modified — "bicycle" has been changed to "cycle".]

3.14

short pulse

light flash shorter than 0,2 s

3.15

light source

source of illumination

Note 1 to entry: For example, light bulbs, LEDs and OLEDs.

3.16

continuous light

light with a frequency above 50 Hz

3.17**light emitting surface**

all or part of the exterior surface of the transparent lens that encloses the lighting and light signalling devices and conforms to certain defined photometric and colourimetric conditions

Note 1 to entry: UN/ECE Regulation No.48^[4] shows examples.

[SOURCE: ISO 12509:2023^[3], 3.1.12, modified —Note 1 to entry added.]

4 Photometrical requirements**4.1 General**

If the reference axis is not mentioned by manufacturer, this direction shall be determined by that in which light is emitted with greatest intensity.

Within the field of light distribution, schematically shown as a grid, the light intensity in each direction of a part of the field formed by the grid lines shall meet at least the lowest minimum percentage value being shown on the grid lines surrounding the questioned direction.

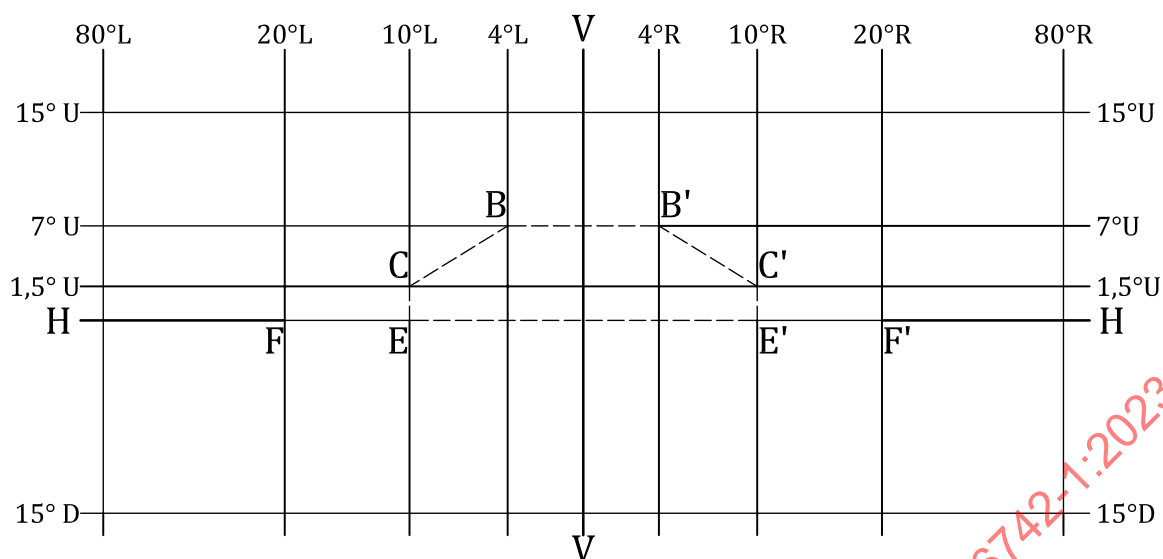
Illuminance and luminance meters shall be calibrated in accordance with ISO/CIE 19476 or equivalent standard.

4.2 Front position lamp**4.2.1 Photometric requirements**

The requirements of the front position lamp contained below in [Table 1](#) shall correspond to the illustrative dimensions as shown further below in [Figure 1](#).

Table 1 — Light distribution for front position lamp

Position	Luminous intensity cd
In area bound by straight lines connecting dots E, C, B, B', C', E' and E	≥4
From E to F and E' to F'	≥2
In rectangular area bounded by lines 15°U, 15°D, 80°L and 80°R	≥0,05
Upper limit on the H-H line and above H-H line	≤140

**Key**

B, B', C, C', dots indicating areas in [Table 1](#)

E, E', F and F'

H-H H-H line (See [3.11](#))

V-V V-V line (See [3.12](#))

U and D represent the degrees of arc, respectively, above and below the horizontal plane

L and R represent the degrees of arc, respectively, to the left and right of the vertical plane

Figure 1 — Measuring and aiming screen for front position lamp

4.2.2 Mode of illumination

A front position lamp could either emit a continuous light or flash at a frequency from 1 Hz to 4 Hz. Such a lamp may be capable of only one mode or be switched between modes.

NOTE Some national or regional regulations do not permit the use of flashing lights on pedal cycles, apart from direction indicators.

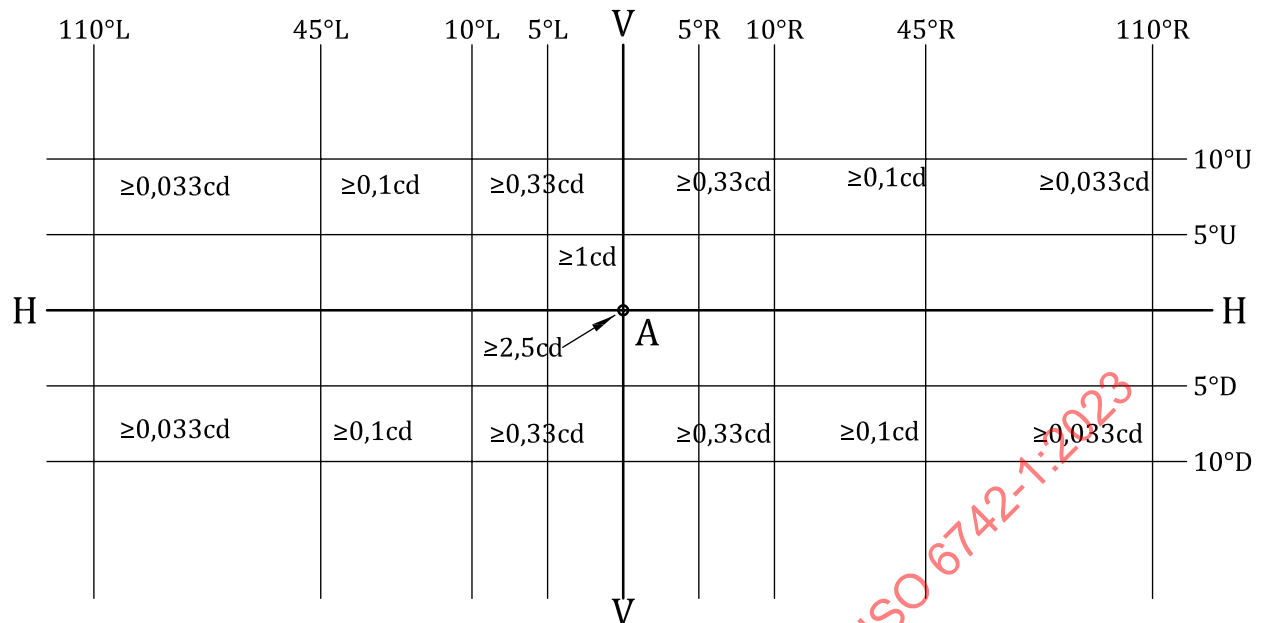
4.3 Rear lamp

4.3.1 Photometric requirements

The requirements of the rear lamp contained in [Table 2](#) shall correspond to the illustrative dimensions as shown further below in [Figure 2](#). Rear lamps with a function of the stand light shall correspond with the requirement of [4.8](#).

Table 2 — Light distribution for rear lamp

Position	Luminous intensity cd
A on intersection of horizontal plane and vertical plane	$\geq 2,5$
In rectangular area bounded by lines 5°U, 5°D, 5°L and 5°R	≥ 1
In rectangular area bounded by lines 10°U, 10°D, 10°L and 10°R	$\geq 0,33$
In rectangular area bounded by lines 10°U, 10°D, 45°L and 45°R	$\geq 0,1$
In rectangular area bounded by lines 10°U, 10°D, 110°L and 110°R	$\geq 0,033$
Upper limit on the H-H line and above H-H line	≤ 12

**Key**

- A intersection of horizontal plane and vertical plane (See Table 2)
- H-H H-H line (See 3.11)
- V-V V-V line (See 3.12)
- U and D represent the degrees of arc, respectively, above and below the horizontal plane
- L and R represent the degrees of arc, respectively, to the left and right of the vertical plane

Figure 2 — Measuring and aiming screen for rear lamp**4.3.2 Mode of illumination**

A rear lamp could either emit a continuous light or flash at a frequency from 1 Hz to 4 Hz. Such a lamp may be capable of only one mode or be switched between modes.

NOTE Some national or regional regulations do not permit the use of flashing lights on pedal cycles, apart from direction indicators.

4.4 Stop lamp**4.4.1 Photometric requirements**

The minimum intensity measured on the reference axis at point $H = V = 0^\circ$ of a stop lamp shall be the highest of the following two values, as appropriate:

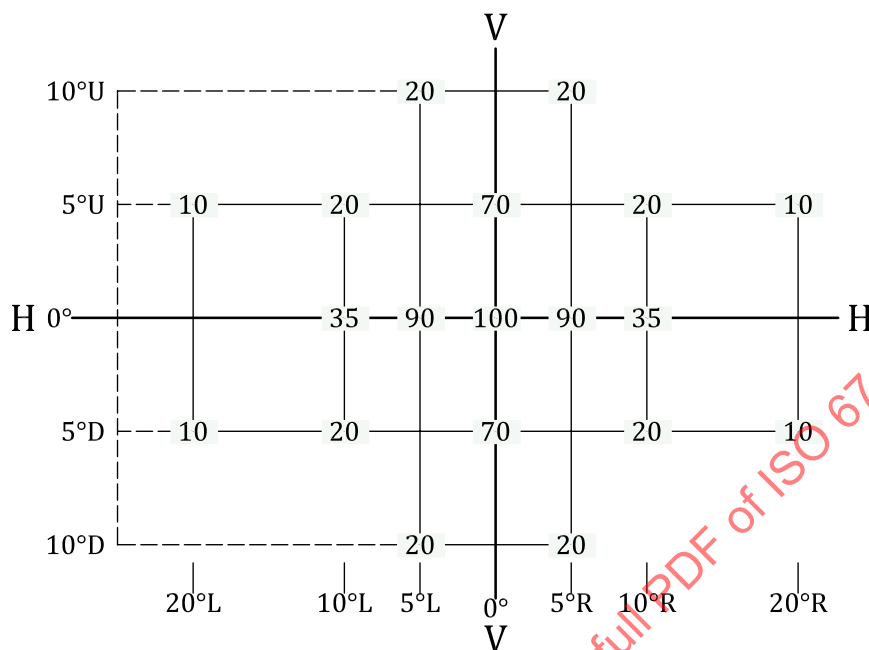
- 40 cd min;
- where a stop lamp function is provided by a rear lamp, at least five times the greatest measurable intensity of the rear lamp.

The greatest measurable intensity of the stop lamp shall not exceed 185 cd.

Light shall be emitted from a stop lamp throughout a zone defined as follows with respect to direction point $H = V = 0^\circ$: $\pm 45^\circ$ horizontally and $\pm 15^\circ$ vertically. Throughout the field of emission the intensity shall not be less than 0,3 cd.

The intensity in specified directions within the grid according to [Figure 3](#) shall be not less than specified percentages of the minimum point $H = V = 0^\circ$ intensity. The angles and percentages relative to the point $H = V = 0^\circ$ direction and value (100 %) are specified in [Figure 3](#).

Values in percent



Key

H-H H-H line (See [3.11](#))

V-V V-V line (See [3.12](#))

U and D represent the degrees of arc, respectively, above and below the horizontal plane

L and R represent the degrees of arc, respectively, to the left and right of the vertical plane

Figure 3 — Light distribution for stop lamp

4.4.2 Mode of illumination

A stop lamp (while stopping) shall emit a continuous light.

The stop lamp shall be operated either by electrical switches incorporated within or attached to the cycles braking system or systems, or shall incorporate a device that operates the stop lamp when the cycle decelerates more rapidly than $(0,6 \pm 0,4) \text{ m/s}^2$ (See [Table 3](#)).

Table 3 — Conditions for activation and deactivation of stop lamps incorporated a device that operates the stop lamp when the cycle decelerates

Deceleration	Activate condition	Activation or deactivation time
During acceleration	Not activated	
Deceleration less than $0,2 \text{ m/s}^2$	Not activated or deactivated	Deactivation time between $0,5 \text{ s}$ and 1 s
Deceleration between $0,2 \text{ m/s}^2$ and 1 m/s^2	At the discretion of the manufacturer	Recommended activation time $0,5 \text{ s}$ or less
Deceleration 1 m/s^2	Activated	Activation time $0,5 \text{ s}$ or less
Deceleration 1 m/s^2 or more	Keep activated	

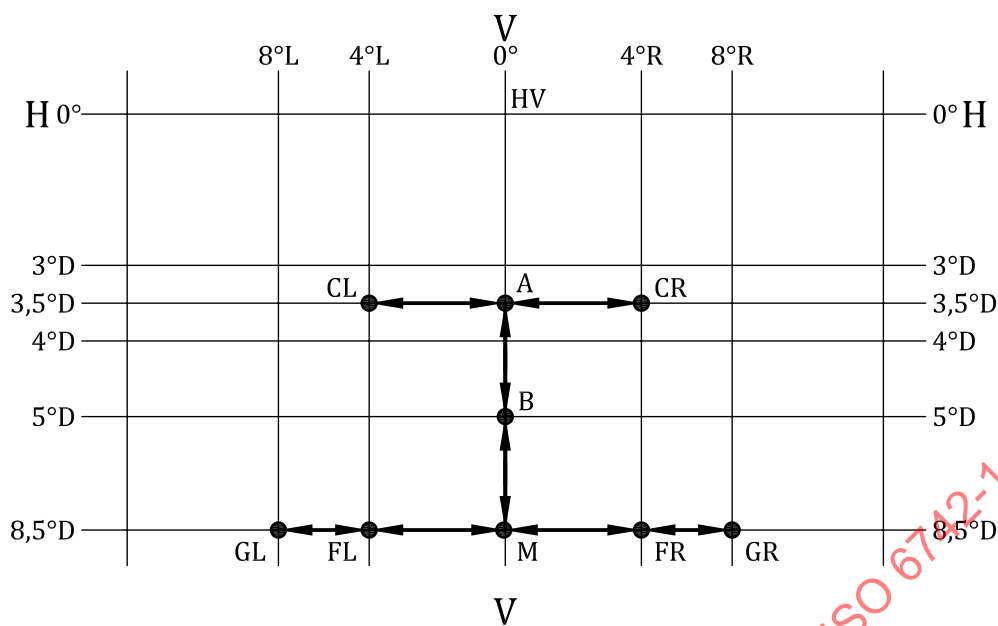
4.5 Low beam

4.5.1 Photometric requirements

The requirements of the low beam contained in [Table 4](#) shall correspond to the illustrative dimensions as shown further in [Figure 4](#).

Table 4 — Light distribution for low beam

Position	Illumination values ^{abc} lx
On the H-H line and above H-H line	≤ 2
A	$E_A^c \geq 10$
From CL to CR	$E \geq E_A/2$
Vertical line between A to B (included)	If $E_A \leq 20$, $E \geq E_{\max}/2$ If $E_A > 20$, $E \geq 10$
From B to M	If $E_A \leq 20$, $E > 1,5$ If $E_A > 20$, $E > 3$
From FL to FR	If $E_A \leq 20$, $E > 1$ If $E_A > 20$, $E > 2$
From GL to FL and from FR to GR	If $E_A \leq 20$, no requirement If $E_A > 20$, $E > 2$
Area between line 3° down and 4° down And between vertical lines at 4° left and right	$E \leq 1,2 E_A$
Area below line 4° down and between vertical lines at 4° left and right	$E \leq E_A$
^a Values in lux measured on a vertical wall at 10 m ahead from headlamp. ^b To make measurements, the cycle light shall be fit in accordance with cycle light manufacturer. If mounting instruction are not clearly defined, there are two possible alternatives: — H-H line is the line where the maximum of the illumination is 2 lx; — H-H line is the line 3,5° above the line including $E_{\max}$ ($E_{\max}$ is the maximum illumination). ^c E_A is the illumination in point A.	



- Key**
- A point on the V-V line, 3,5° below the H-H line
 - CR/CL points on a horizontal line 3,5° below the H-H line, 4° left and right
 - B point 5° below H-H on the V-V line
 - M point 8,5° below H-H on the V-V line
 - FL/FR points on a horizontal line 8,5° below the H-H line, 4° left and right
 - GL/GR points on a horizontal line 8,5° below the H-H line, 8° left and right
 - H-H H-H line (See 3.11)
 - V-V V-V line (See 3.12)
 - D represent the degrees of arc, respectively, below the horizontal plane
 - L and R represent the degrees of arc, respectively, to the left and right of the vertical plane

Figure 4 — Measuring and aiming screen for low beam

4.5.2 Mode of illumination

A headlamp that provides a low beam shall emit a continuous light.

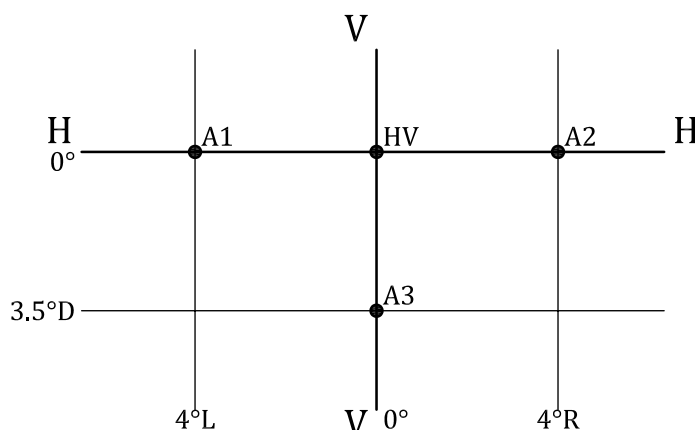
4.6 High beam

4.6.1 Photometric requirements

The requirements of the high beam contained in Table 5 shall correspond to the illustrative dimensions as shown further in Figure 5.

Table 5 — Light distribution for high beam

HV	A1	A2	A3
$E_{HV} \geq 50^a$	$E_{A1} \geq E_{HV}/2$	$E_{A2} \geq E_{HV}/2$	$E_{A3} \geq 10^a$
^a Values in lux measured on a vertical wall at 10 m ahead from headlamp.			

**Key**

H-H	H-H line (See 3.11)
V-V	V-V line (See 3.12)
HV	intersection of H-H line and V-V line
A1 / A2	on line H-H at 4° left and right
A3	on line V-V at 3,5° down below H-H
D	represent the degrees of arc, respectively, below the horizontal plane
L and R	represent the degrees of arc, respectively, to the left and right of the vertical plane

Figure 5 — Measuring and aiming screen for high beam**4.6.2 Mode of illumination**

Headlamp shall emit a continuous light.

4.6.3 Additional requirements

The lamp shall be equipped with a device which ensures that the user can modify the light distribution from high beam to low beam and vice versa with just one movement so that it meets the relevant requirements. An appropriate triggering mechanism/device can be installed separately from the lamp itself.

If the light source of the low beam lamp is different from the light source of the high beam lamp but incorporated into the same casing, the point HV of both light sources shall be identical.

4.7 Direction indicators**4.7.1 Photometric requirements**

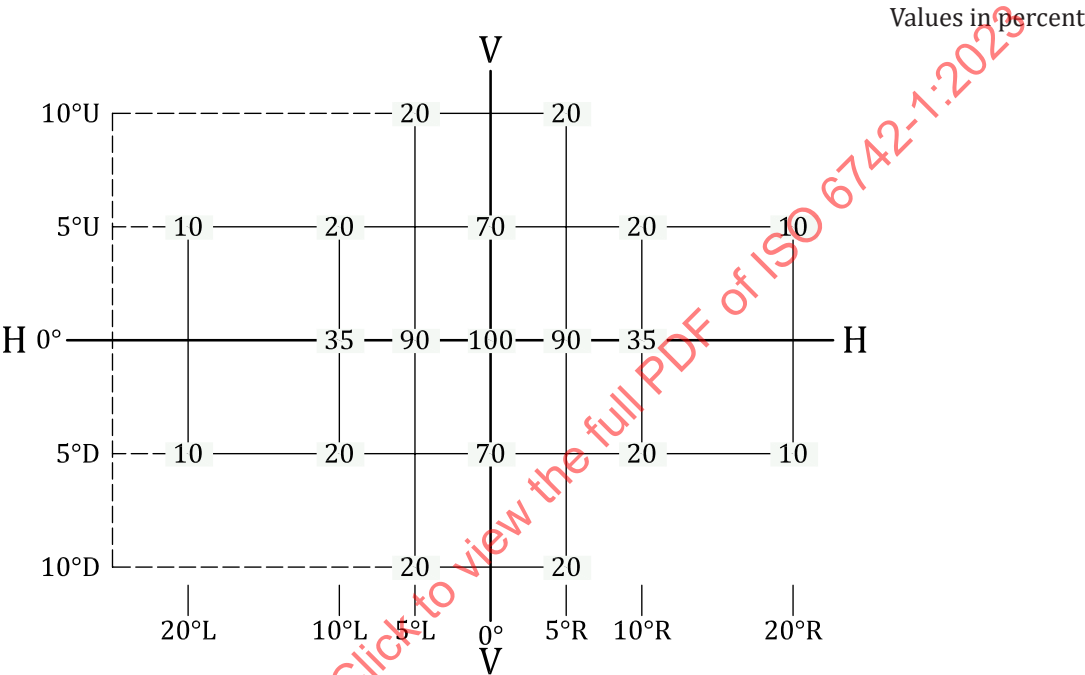
Light shall be emitted throughout a zone defined as follows with respect to direction HV: 80° outwards (for example to the right for a right-hand indicator) and 20° inwards. The vertical field shall generally be from +15° (upwards) to -15° (downwards).

The intensity measured on the reference axis of a front or rear direction indicator shall be at least the minimum values of Table 6. The greatest measurable intensity shall not exceed the Maximum value in Table 6. Throughout the field of emission the intensity shall not be less than 0,3 cd.

Table 6 — Luminous intensities for direction indicators

	Minimum	Maximum
	cd	cd
Front indicator	50	350
Rear indicator	50	350

The luminous intensity in specified directions within the measurement grid shall be not less than specified percentages in [Figure 6](#) of the minimum intensity. The angles and percentages relative to the reference axis (100 %) are specified in [Figure 6](#).



Key

H-H H-H line (See [3.11](#))

V-V V-V line (See [3.12](#))

U and D represent the degrees of arc, respectively, above and below the horizontal plane

L and R represent the degrees of arc, respectively, to the left and right of the vertical plane

Figure 6 — Light distribution for direction indicator

4.7.2 Mode of illumination

The lights shall flash at frequency from 1 Hz to 2 Hz with a duty cycle of 45 % to 55 %. The intensity during the on-cycle shall be visually constant.

4.8 Stand light

4.8.1 Photometric requirements

This requirement applies to the rear lamp with a function of the stand light. When tested according to [Clause 6](#), the luminous intensity, measured on point A (see [Figure 2](#)), at the commencement of the test the luminous intensity of the light shall not be lower than 200 mcd and shall fulfil the following values:

- after 1 min at least 140 mcd;

- after 2 min at least 100 mcd;
- after 3 min at least 70 mcd;
- after 4 min at least 50 mcd.

4.8.2 Mode of illumination

A stand light could either emit a continuous light or flash at a frequency from 1 Hz to 4 Hz. Such a lamp may be capable of only one mode or be switched between modes.

NOTE Some national or regional regulations do not permit the use of flashing lights on pedal cycles, apart from direction indicators.

4.9 Daytime running lamp

4.9.1 Photometric requirements

The luminous intensity measured on the reference axis at point $H = V = 0^\circ$ of a daytime running lamp shall not be less than 400 cd.

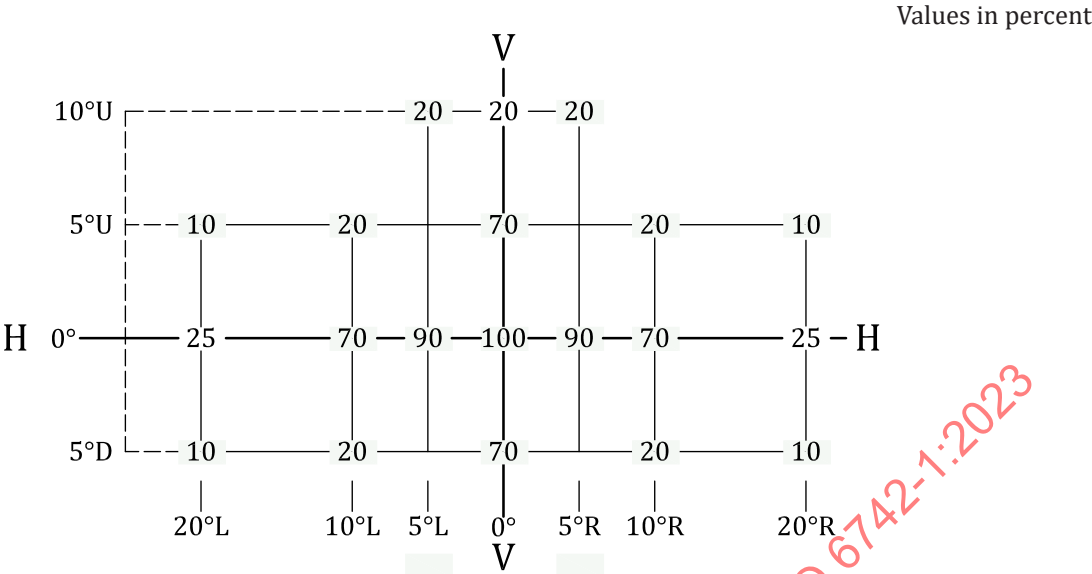
The intensity in specified directions within the grid according to [Figure 7](#) shall be not less than specified percentages of the minimum point $H = V = 0^\circ$ intensity. The angles and percentages relative to the point $H = V = 0^\circ$ direction and value (100 %) are specified in [Figure 7](#).

The luminous intensity shall not exceed 1 200 cd in any direction.

The luminance, the luminous intensity divided by the light emitting surface, in the $H = V = 0^\circ$ direction should be less than 480 000 cd/m².

Moreover, throughout the field $\pm 20^\circ$ horizontally and $+10^\circ/-5^\circ$ vertically, the intensity of the light emitted shall not be less than 1,0 cd.

Note A small light emitting surface can cause glare to other road users. Recommended “less than 480 000 cd/m²” is in line with allowed glare values prescribed for a daylight running lamp for motor vehicles according to UN/ECE Regulation No. 148 [\[5\]](#).



Key
H-H H-H line (See 3.11)
V-V V-V line (See 3.12)

Figure 7 — Light distribution for daytime running lamp

4.9.2 Mode of illumination

A daytime running lamp shall emit a continuous light.

4.9.3 Additional requirements

The lamp shall incorporate a device which ensures that the daytime running light can only be on during daylight with an ambient illumination of at least 1 000 lx.

If the light source of the low beam lamp is different from the light source of the daytime running lamp but incorporated into the same casing, the point HV of both light sources must be identical.

5 Colour requirements

The colour shall be in accordance with Table 7.

Table 7 — Colour requirements

Function	Colour	Trichromatic coordinates
Front position lamp	White or Amber	Specified in Annex B
Rear lamp	Red	
Stop lamp	Red	
Low beam	White	
High beam	White	
Direction indicator	Amber	
Daytime running lamp	White	

6 Test methods

6.1 General

During photometric measurements, stray reflections shall be prevented by appropriate masking.

In all cases, the distance of measurements shall be such that the law of the inverse of the square of the distance is applicable.

For all values expressed in lux, the measurements shall be performed on a vertical screen fitted 10 m in front of the lamp. If the distance of measurement is different than 10 m, the result of measurements shall be expressed at 10 m following the law of the inverse of the square of the distance. The measuring equipment shall be such that the angular aperture of the receiver viewed from the reference centre of the lamp is between $0,17^\circ$ and 1° .

The intensity requirement for a particular direction of observation shall be deemed to be satisfied if that requirement is met in a direction deviating by not more than $15'$ from the direction of observation.

For any lamps, except those equipped with filament lamps, the luminous intensities and colour measured after 1 min and after 30 min of operation shall comply with the requirements. The luminous intensity distribution after one minute of operation can be calculated from the luminous intensity distribution after 30 min of operation by applying at each test point the ratio of luminous intensities measured at $H = V = 0^\circ$ after 1 min and after 30 min of operation.

In case of short pulses, the effective intensity of flashing light shall be measured in accordance with [Annex A](#).

If a lamp has flashing and continuous modes provided by the same light source(s), its performance shall be measured mainly in continuous mode. The intensity in flashing mode shall be measured only in reference axis, with flashing intensities in other directions calculated in proportion to the continuous intensity in those directions compared to reference axis.

The LED colour shall be measured in accordance with the test method described in CIE 1931.

6.2 Power supply and light source to test photometrical performances

The lamp shall be equipped with the light sources specified by the manufacturer and operated at its reference luminous flux, for the voltage specified by the manufacturer in accordance with ISO 6742-4 and ISO 6742-5.

For lighting devices working with power supplied by cycle's movement defined in ISO 6742-4:—, Clause 4, DC or AC power supply as described below may be used:

a) Lighting devices with LED, test voltage 6 V; the current shall not exceed:

- 1) for 2,4 W headlamps (for 3 W / 2,4 W – systems): 440 mA;
- 2) for 1,2 W headlamps (for 1,5 W – system): 220 mA;
- 3) for 0,6 W rear lamps (for 3 W – system): 110 mA;
- 4) for 0,3 W rear lamps (for 1,5 W – system): 55 mA.

b) Alternatively, the devices can be measured with test current:

- 1) for 2,4 W headlamps (for 3 W / 2,4 W systems): 400 mA;
- 2) for 1,2 W headlamps (for 1,5 W – system): 200 mA;
- 3) for 0,6 W rear lamps (for 3 W – system): 100 mA;
- 4) for 0,3 W rear lamps (for 1,5 W – system): 50 mA.

The voltage at the device shall not exceed 6,7 V DC or 6,7 V_{rms} AC. In case of an AC-Power supply the internal resistance of the current source shall be at least 100 Ω (See [Annex C](#)).

c) Lighting devices with filament bulbs:

- 1) changeable filament lamp: luminous flux according to lamp data sheet;
- 2) non-changeable lamp: 6 V.

6.3 Installation on test bench

The lamp shall be installed on the test bench according to the recommendations of the cycle manufacturer or, those of the constructor of the lamp.

During the measurements the light shall be fit in accordance with the manufacturer.

If this is not clearly defined in the instruction manual there are two possibilities:

- H-H is the line where the illumination on this line and above is not higher than 2 lx;
- H-H is the line 3,5° above $E_{\max}$.

NOTE Values in lux measured on a vertical wall at 10 m ahead from headlamp.

6.4 Measuring of stop lamp activation and deactivation time

6.4.1 Test preparation and test conditions

The test shall be performed on a test track or test bench under the following conditions:

- a) The gradient of the test track or test bench shall not exceed 0,5 %;
- b) The gradient of the test track or test bench shall have at least 10 % (uphill and downhill).

6.4.2 Activation time

To measure the activation time, a deceleration of 1 m/s² or more shall be applied for at least 0,5 s.

From this point of activation, the stop lamp shall light up latest after 0,5 s.

6.4.3 Deactivation time

To measure the deactivation time, the deceleration of less than 0,2 m/s² shall be applied for at least 1 s when the stop lamp is activated. From this point of deactivation until the stop lamp stops emitting light, shall be not less than 0,5 s and not more than 1 s.

Annex A (normative)

Measurement of flashing light

A.1 General

This function of flashing light is only allowed for front position lamp, rear lamp and stand light.

The frequency of flashing shall be higher than 1 Hz, the luminous intensity shall be measured according to the following test method.

The following methods for evaluating the characteristics of flashing lights are derived from UN/ECE Regulation No. 65^[6].

A.2 Effective intensity

The effective intensity (J_{eff} measured in candela) of a flashing light is given by the [Formula \(A.1\)](#):

$$J_{\text{eff}} = \frac{J_{\text{max}}}{1 + \frac{C}{F \cdot t_f}} \quad (\text{A.1})$$

where

- J_{max} is peak intensity, expressed in candela;
- t_f is duration of flash, expressed in seconds;
- C is time constant, expressed in seconds (= 0,2 s);
- F is form factor.

The form factor (F) is given by the [Formula \(A.2\)](#):

$$F = \frac{\int_0^{t_f} J \cdot dt}{J_{\text{max}} \cdot t_f} \quad (\text{A.2})$$

where J is instantaneous intensity, expressed in candela.

NOTE When intensity, J , is charted against time, t , F is the area under the curve expressed as a fraction of the bounding rectangle, e.g. F equals 1 for square wave, 0,637 for a half sine wave, or 0,5 for a triangular spike.

A.3 Grouped flashes

If the emitted light consists of groups of two or more closely consecutive flashes, any group of flashes shall be evaluated as one flash depending upon the relationship between three factors:

- the ratio of peak intensity between the brightest, J_h , and least bright, J_l , flash in the group;
- the overall flash frequency, f , i.e. the number of flash groups per second assuming all probable groups may be regarded as such;
- the time interval, t_g , between consecutive flashes in the group.