ＩＳＯ改正提案に対する意見募集について

＝ＩＳＯ６７４２（ランプ及びリフレクタ）＝

（財）自転車産業振興協会は、「ＩＳＯ／ＴＣ１４９（自転車）／ＳＣ１」の幹事国並びに国内審議団体として、ＩＳＯからの諸提案等について、個別案件については必要に応じてその都度、業界有識者で構成する「ＷＧ対応国内作業部会」を設置して実務的内容を検討するとともに、「ＩＳＯ原案作成委員会」において最終審議を行った上で、ＩＳＯに対して回答をしているところです。

さて、２０１０年１０月にフランスより提案された「ＩＳＯ６７４２（ランプ及びリフレクタ)」は、今般、ＷＤとしてコメントに付されることとなりました。

このＷＤに対しては、広く業界の皆様に周知してご意見をいただくべき、下記の要領によりコメントを募集いたしますので、是非とも忌憚のないご意見をお願いいたします。

なお、改正案は当協会・技術研究所のホームページに原文のまま掲載しております。（http://www.jbtc.or.jp）

意見募集対象規格	ＩＳＯ／ＷＤ６７４２（ランプ及びリフレクタ）
意見募集期　間	平成２３年７月６日（水）～８月５日（金）
意見募集方　法	会社名、担当者名、連絡先等を必ず明記の上、下記宛に文書又はメールでご連絡願います。(様式問わず)
送付及び問合せ先	〒590-0948 大阪府堺市堺区戎之町西１丁３－３ （財）自転車産業振興協会　技術研究所 ＴＥＬ　072-238-8731 ＦＡＸ　072-238-8271 e-mail webmaster@jbtc.or.jp
そ の 他	・コメントには、その根拠やバックデータ等もご提示願います。必要に応じて別途検討いたします。 ・本改正案は、業界内のパブリックコメントを求めるため、ドラフト（規格の草稿）として掲載しています。この規格表の著作権はISO に属しておりますので、無断でダウンロードして使用することは禁じられています。 ・本改正案は ISO の最終版ではありません。したがって、今後の国際会議での検討状況により内容は変更される場合もあります。

« Lighting and retro-reflective devices»	ISO/TC149/SC1/WG10
Date: **2011-05-24**	Doc. Number: **N 041rev**
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Report of the 3rd ISO/TC149/SC1/WG10 meeting Held in Suresnes on the 23rd and 24th May 2011

COMMENTS/ DECISIONS	Brief report of the 3rd WG10 meeting prepared by the Convener and the secretary. Note of the secretariat: Updated attendance list enclosed (participation of Mr Yamada(observer) Japan ISO/TC 149/SC 1 Secretary
FOLLOW UP	For comments by the end of August 2011
SOURCE	Secretariat and Convener

Report of the 3rd WG10

23&24 May 2011 meeting

Suresnes - France

Member	**Country**	**Company**
Mr André (observer)	France	Laboratoire MKniX (Oxylane)
Mr Billard	France	Matra M&S
Mr Bouhours	France	Jost France
Mr Carlin	France	BASTA
Mr Degas (excused)	France	Laboratoire Pourquery
Mr Haze	Japan	SHIMANO
Mr Huré	France - Chairman of ISO/TC149/SC1	CNPC
Mr Juden (excused)	UK	CTC
Mr King	France	Laboratoire MKniX (Oxylane)
Dr Kooβ	Germany	LTIK
Mr Lebeaume	France – Convenor of ISO/TC149/SC1/WG10	BTWIN (Oxylane)
Mr Legrand	France Secretary of ISO/TC149/SC1/WG10	AFNOR BNA
Dr Müller	Germany	Busch & Muller KG
Mr Neuberger (excused)	Germany	ZIV-ZWEIRAD
Mr Prüuwer (excused)	Germany	PAUL LANGE & Co.OHD
Mr Sato	The Netherlands	SHIMANO- Europe
Mr Shinji (excused)	Japan	SHIMANO
Mr Vellinga	The Netherlands	SPANNINGA METAAL
Mr Yamada (observer)	Japan	ISO/TC149/SC1 secretary

1 - Administrative items:

Welcome - The members of Working Group 10 were welcomed to Suresnes by Mr. Lebeaume on behalf of CNPC.

Membership - Roll call of members. Attendance is listed in table above.
14 experts from 4 countries (France, Germany, Japan, The Netherlands) attend the meeting.
Apologizes were received from USA , UK and Italian experts.

Last meeting summary -The meeting summary from February 2011 in Paris, France was accepted (N029).

Agenda -The proposed agenda (N037) was accepted.

2 - Meeting documents

N029	Report of the February WG10 meeting
N030	Dr Kooss contribution on retroreflective devices
N031	Summary of the 2nd ISO/TC149/SC1/WG10 meeting
N039	Regulation ECE R50
N040	Contribution of Mr Billard on board power supply
N041	Report of the 3rd meeting
N042	Contribution from Mr Carlin on Part 5

3 - Structure of the standard from the 2nd meeting

M. Lebeaume reminds the structure agreed during the last meeting:

Updated structure of ISO 6742 series

- Cycles — Lighting and retro-reflective devices — Part 1: Lighting devices
  Scope
  This part of the ISO 6742 applies to lighting and signaling devices used on cycles intended to be used on public roads and, especially, bicycles complying with ISO 4210 and 8098.
  This part of ISO 6742 prescribes the functions, safety requirements, photometric performance, test methods and guidelines for maintenance of lighting and signaling devices that can be used on cycles.
- Cycles — Lighting and retro-reflective devices — Part 2: Retro reflective devices
  Scope
  This part of the ISO 6742 applies to retro-reflective devices used on cycles intended to be used on public roads and, especially, bicycles complying with ISO 4210 and 8098.
  This part of ISO 6742 prescribes photometric and physical requirements of retro-reflective devices.
- Cycles — Lighting and retro-reflective devices — Part 3: Installation and use of retro-reflective devices and lighting devices.
  Scope
  This part of the ISO 6742 applies to lighting and signaling devices used on cycles intended to be used on public roads and, especially, bicycles complying with ISO 4210 and 8098.
  The present part of the ISO 6742 specifies requirements for installation, and use of lights and retro reflective devices that can be used on cycles.
- Cycles — Lighting and retro-reflective devices — Part 4: Lighting systems – Lamps and Generators 6V, 3W – 2,4 W - 1,5W (dynamo …)
  Scope

This part of the ISO 6742 applies to lighting and signaling systems used on cycles intended to be used on public roads and, especially, bicycles complying with ISO 4210 and 8098.
This part of ISO 6742 prescribes how to check the performance of the lighting systems using 6V-3W dynamo. It applies to light devices complying with ISO 6742-1.

- Cycles — Lighting and retro-reflective devices — Part 5: Lighting systems – Integrated lamp(s) and power source
  Scope
  This part of the ISO 6742 applies to lighting and signaling systems used on cycles intended to be used on public roads and, especially, bicycles complying with ISO 4210 and 8098.
  This part of ISO 6742 prescribes how to check the photometrical performances and safety requirements of the lighting systems depending on cycle's movement or on board power supply which are not covered in part 4. It applies to light devices complying with ISO 6742-1.

5 – Discussion on the drafts (doc ISO/TC149/SC1/WG10 N0xx)

See annexes A, B, C, D and E

Modification and topics discussed during the meeting are underlined in green

5.3 – Target date

About target date, working draft should be ready for being circulated as Committee Draft (ISO CD) for comments by January 2012. The ISO/TC149/SC1 official work program must be updated accordingly.

Comments on annexes A to E are welcomed by end of August 2011.

6 - Next meeting

3rd week or 4th week of November 2011 if possible in conjunction with SC1 and WG9 meeting

5 – Annex A - Discussion on part 1

As revised during the 23rd-24th May 2011 WG10 meeting

Cycles — Lighting and retro-reflective devices — Part 1: Lighting devices

Introduction?

1 - Scope

This part of the ISO 6742 applies to lighting and signaling devices used on cycles intended to be used on public roads and, especially, bicycles complying with ISO 4210 and 8098.

This part of ISO 6742 prescribes the functions, safety requirements, photometric performance, test methods and guidelines for maintenance of lighting and signaling devices that can be used on cycles.

2 Normative references

3 Term and definition

front position lamp (sidelight)
Lamp emitting a light, white to the front of the cycle, so as to indicate its presence on the road

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

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

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

high beam
light that illuminates the road for a long distance ahead of the vehicle.

direction indicators
lamps used to indicate to other road users that the cyclist intends to change direction to the right or left.

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

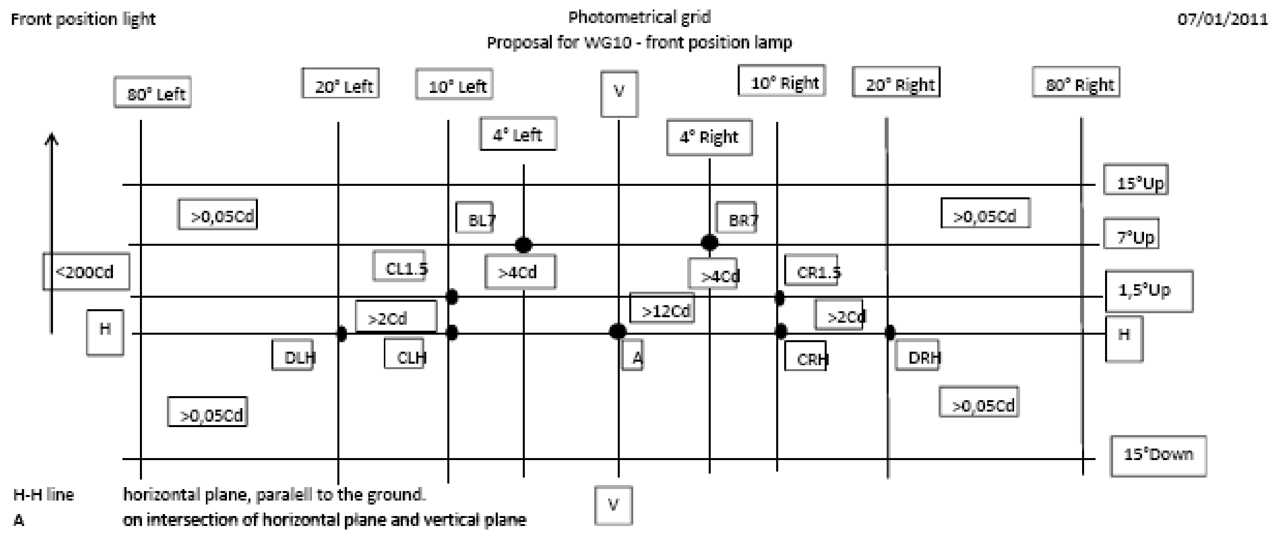
lamp equipped with replaceable light source
lamp whose light source(s) can be replaced by the user with an equivalent light source(s) of the same type

lamp equipped with non-replaceable light source
lamp whose light source(s) is permanently fitted, and not designed to be replaced by the user

nominal voltage
voltage prescribed by the manufacturer to deliver the photometric performance of a lamp.

4 Requirements

4.1 front position lamp (sidelight)

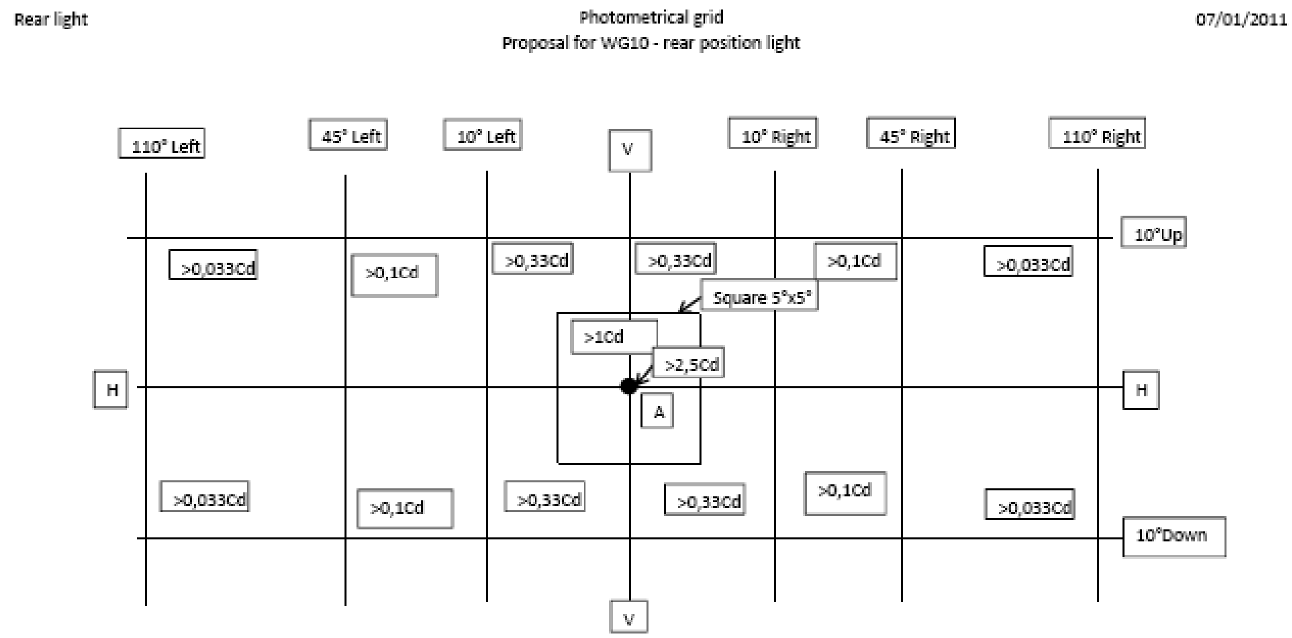


H-H line horizontal plane, paralell to the ground.
A on intersection of horizontal plane and vertical plane
CRH / CLH on H-H at +/-10° left and right
DRH / DLH on H-H at +/-20° left and right
CR1.5 / CL1.5 on horizontal line at +1,5°Up, at +/-10° left and right
BR7 / BL7 on horizontal line at +7°Up, at +/-4° left and right

Position	Value in Cd
A	> 12Cd
In area delimited by dots CLH-CRH-CR1.5-BR7-BL7-CL1.5-CLH	>4 Cd
From CLH to DLH and from CRH to DRH	>2 Cd
In rectangular area delimited by lines 15°Up, 15°Down, 80°Left, 80°Right	>0,05Cd

To avoid any dazzling effect, light intensity should be below 200Cd anywhere above H-H line.

4.2 rear lamp



H-H line horizontal plane, paralell to the ground.	
A on intersection of horizontal plane and vertical plane	Value above 2,5Cd
In area 5°Up/Down 5°Left/Right	Value above 1Cd
In area 10°Up/Down 10°Left/Right	Value above 0,33Cd
In area 10°Up/Down 45°Left/Right	Value above 0,1Cd
In area 10°Up/Down 110°Left/Right	Value above 0,033Cd

Light intensity should be less than 12Cd in any direction above H-H line

4.3 stop-lamp

General
Construction

The stop lamp shall either be a separate lamp designed to be mounted on rear of a bicycle, or may be incorporated in a rear lamp, in which case it may even use the same light source.

Operation

The stop lamp shall be operated either by electrical switches incorporated within or attached to the bicycles braking system or systems, or shall incorporate a device that operates the stop lamp when the bicycle decelerates at a rate of [1] m/s².

The light emitted by a stop lamp shall be continuous.

Colour of light

The light emitted by a stop lamp shall be red in colour, conforming with the following trichromatic co-ordinates:
Limit towards yellow : $y \leq 0.335$
Limit towards purple : $z \leq 0.008$
The colour of light shall be verified after 1 minute and after 30 minutes of continuous operation.

Field of emission

Reference axis

The reference axis, direction HV, shall point rearward along the intersection of the horizontal and vertical planes passing through the optical centre of the lamp.
If the reference axis is not clearly marked on the lamp, this direction shall be determined by that in which light is emitted with greatest intensity.

Horizontal field

Light shall be emitted from a stop lamp throughout a zone defined as follows with respect to direction HV: ±45° horizontally and ±15° vertically.
If the lamp is incapable of being fitted higher than the top of the wheel of a bicycle, the vertical field requirement reduces to: from +15° upwards to –10° downwards.

Intensity

Requirements

The minimum HV intensity measured on the reference axis of a stop lamp shall be the highest of the following two values, as appropriate:
a) 40 cd min
b) where a stop lamp function is provided by a rear position lamp: five times the greatest measurable intensity of the rear position lamp [(greatest effective intensity where that is a flashing lamp)].
The greatest measurable intensity of the stop lamp shall not exceed 185cd.
Throughout the field of emission the intensity shall not be less than 0.3cd.
The intensity in specified directions within the field of emission shall be not less than specified percentages of the minimum HV intensity. The angles and percentages relative to the HV direction and value (100%) are specified in Figure 1 below.

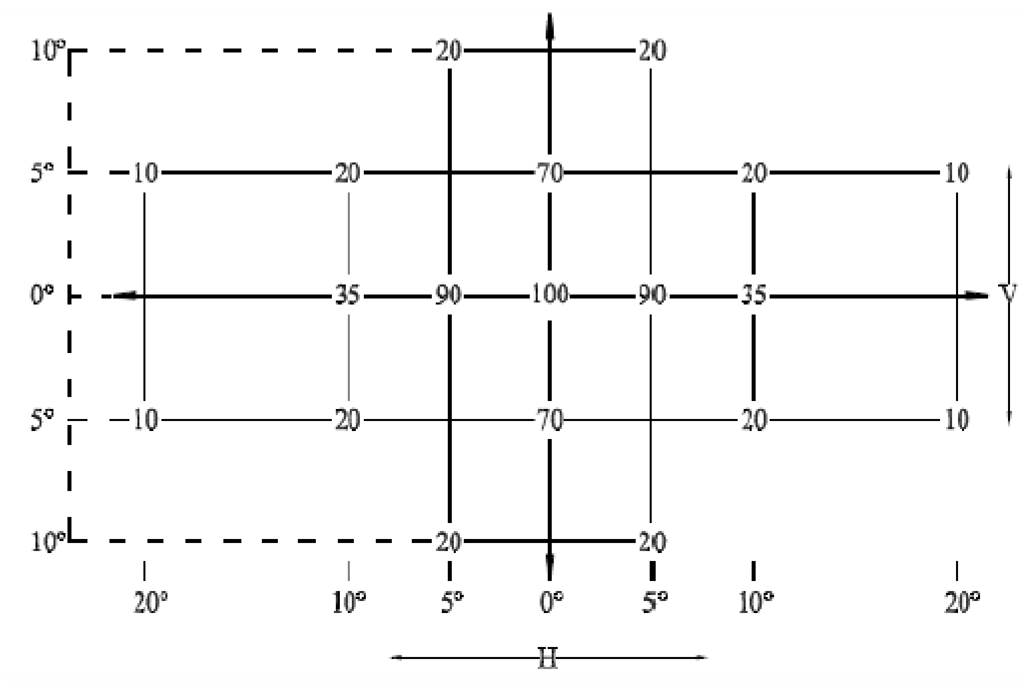
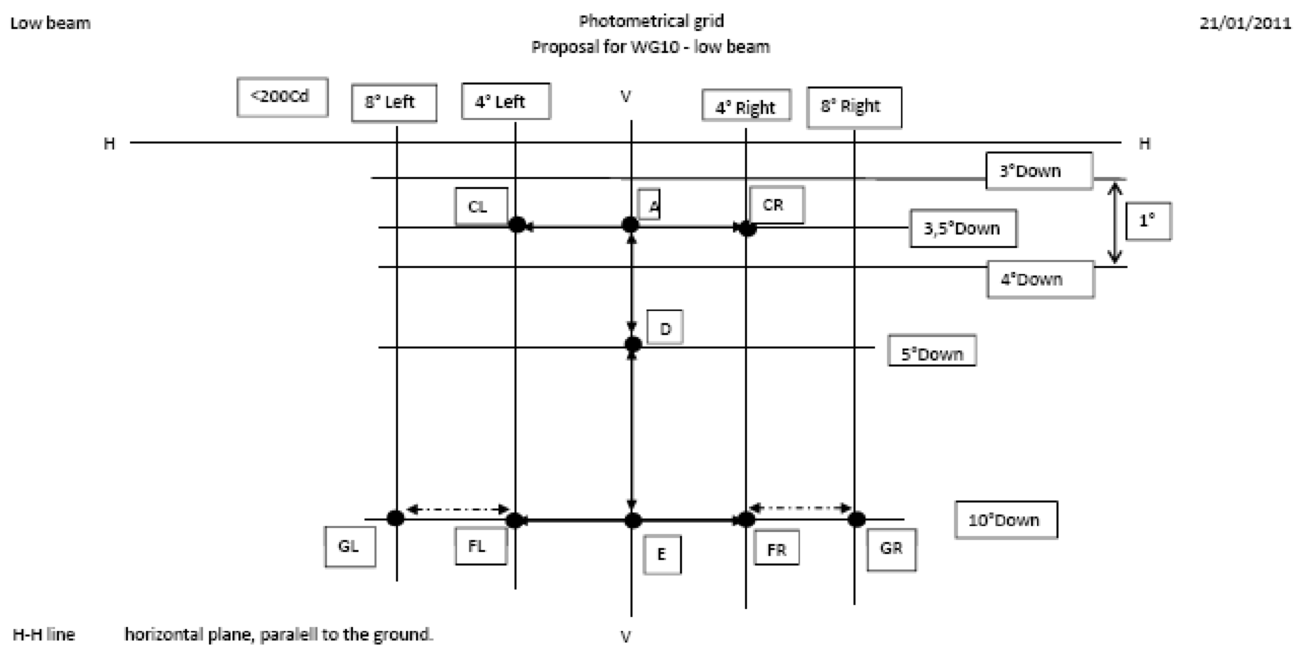


Figure 1: ECE Standard Luminous Intensity Distribution Table

4.4 low beam



H-H line	horizontal plane, paralell to the ground.
V-V line	vertical plane passing through bicycle
A	on vertical line, 3,5° down below H-H line
CL / CR	on line 3,5°down below H-H at 4° left and right
D	5° down below H-H line
E	10° down below H-H line
FL / FR	on line 10° down below H-H at 4° left and right
GL /GR	on line 10° down below H-H at 8° left and right

Low beam — Photometrical grid — 21/01/2011

Proposal for WG10 - low beam

Required values

Position	Values in lux measured on a vertical wall at 10 meters ahead from the front light
H-H line	Intensity should be lower than 200Cd in any position above H-H line
A	Illumination EA> 10lux
From CL to CR and from B to D	Illumination > EA / 2
From D to E	If EA<20lux, should be above 1,5ux If EA>20lux, should be above 3lux
From FL to FR	If EA<20lux, should be above 1lux If EA>20lux, should be above 2lux
From GL to FL and from FR to GR	If EA<20lux: no requirement If EA>20lux, should be above 2lux
Area between line 3° down and 4° down, and between vertical lines at 4°left and right	Illumination should be lower than 1,2 * EA
Area below line 4° down, and between vertical lines at 4°left and right	Illumination should be lower than EA

How to aimed bicycle light to make measurements

The bicycle light should be fit in accordance with bicycle light manufacturer.

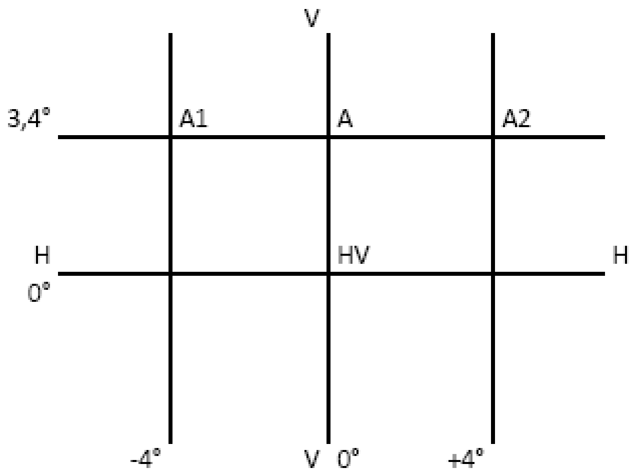
If mounting instruction are not clealy defined, there is 2 possible alternative:

1 - H-H line is the line where illumination is just 2lux

2 - H-H line is the line 3,5° above the line including Emax.

4.5 high beam

4.5.1 The intensity of the light emitted shall meet the requirements of light distribution specified in Figure 4:



	HV	*A1*	*A2*
Reference Point	*50lx min*	*Emax/2min*	*Emax/2 min*

Figure 4 – Light distribution for the high beam.

4.5.2 Test method

The lamp shall be equipped with a light source specified by the manufacturer and operated at its reference luminous flux, for the nominal voltage specified by the manufacturer.

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

The measurements are performed on a vertical screen P fitted 10 meters in front of the lamp.

HH denotes the intersection line of plane P and the plane passing through the centre of reference of the lamp; VV denotes the vertical line passing through the orthogonal projection of the reference centre of the lamp on the screen P.

4.5.3 Further requirements

The lamp shall be equipped with a device which ensures that the user can modify the light distribution with just one movement so that it meets the requirements specified in fig. 3 for a low beam lamp. 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 must be identical.

4.6 Direction indicators

General

Construction

Direction indicators shall be designed so that when fitted to any suitable bicycle in accordance with the manufacturer's fitting instructions, the optical centres of indicators on opposite sides of the bicycle are separated by at least 180mm in the case of rear indicators, or at least 240mm for front indicators. When thus fitted, the optical centres of each pair of indicators shall be at the same height, at least 350mm and not more than 1500mm above the ground. .
When fitted, the outer part of the field of emission, from the reference axis to 80°, shall not be obscured by any other part of the bicycle, or its rider, or any luggage that the bicycle is equipped to carry. ~~For example: rear indicators designed to fit the seatstays of a bicycle shall either come with instructions not to fit to any bicycle equipped with a rear luggage carrier, or project further than the width of any usual pannier.~~
Distance from the front and rear extremities of the bicycle is not specified. It may therefore be possible to combine front and rear indicator functions in one unit, provided that it is designed to be mounted in a position where it is not obscured, for example the extremity of a handlebar.

Operation

~~The switch or switches for the operation of indicators shall fit the handlebar of any suitable bicycle, in a position that places the middle of the switch not further than 60mm from the edge of one or other hand-grip.~~ It shall be possible to switch on both indicators on one side, in a single action with one hand. It shall also be possible to switch them off, and optionally switch on the opposite indicators, in a single action with one hand, not necessarily the same hand.

Flashing

~~A direction indicator shall flash at 1.5 ± 0.5 Hz. It is not necessary for all indicators on the same side to flash synchronously.~~

This must be achieved by switching with a frequency of f = 1. 5 ± 0. 5 Hz with the pulse width greater than 0. 3 s, measured at 95 per cent peak light intensity.

Colour

The light emitted by direction indicators shall be amber in colour, conforming with the following trichromatic co-ordinates:

Limit towards green : $y \leq x - 0.12$
Limit towards red : $y \geq 0.39$
Limit towards white : $y \geq 0.79 - 0.67x$

The colour of light shall be verified after 1 minute and after 30 minutes of ~~continuous~~ flashing operation.

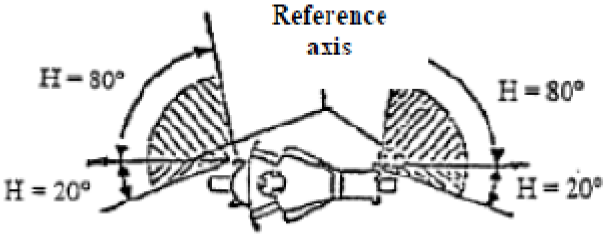
Field of emission

Reference axis

The reference axis for a front or rear indicator shall point forward or rearward respectively, along the intersection of the horizontal and vertical planes passing through the optical centre of the indicator lamp.
~~If the reference axis is not clearly marked on the lamp, this direction shall be determined by that in which light is emitted with greatest intensity.~~
It shall be possible to mount the indicator to any suitable bicycle, so that the reference axis (as defined on technical drawings ~~marked or thus determined~~) aligns as defined above and illustrated in figure 1 or 2, as appropriate.

Horizontal field

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.



Replace the motorcycle by a bicycle in the figure
Fig 1. Right front and rear indicators' horizontal fields

Vertical field

~~a)~~ The vertical field shall generally be from +15° (upwards) to –15° (downwards).
~~b) Or, if the indicator cannot be mounted higher than the top of the wheel of a bicycle the vertical field shall be from +15° to –10°.~~

Intensity

Requirements

All intensities are effective intensities, calculated with reference to the duration and profile of the flash pulse, by the method described in Appendix 1.
The minimum HV intensity measured on the reference axis of a front or rear direction indicator shall be the ~~two values:higher of the following~~
~~a)~~ the HV value in Table 1
~~b) 80% of the greatest measurable intensity in any direction~~
Discussion: Dr Kooβ asked the justification for case b).
Decision: delete b)
The greatest measurable intensity (just referred to) shall not exceed the Maximum value in Table 1.

Throughout the field of emission the intensity shall not be less than 0.3cd.

	HV value	Maximum
Front indicator	~~55~~ 50	~~420~~ 350
Rear indicator	~~30~~ 50	~~210~~ 350

Discussion: Dr Kooβ asked to the meeting how can we explain that the values are lower than those for other two wheelers?
Decision to use the same value for front and rear. The chosen HV value is 50 and max 350cd (from catergory 1é of ECE R50. Also fix a maximum value

Table 1: Effective intensity in candela

The intensity in specified directions within the field of emission shall be not less than specified percentages of the minimum HV intensity. The angles and percentages relative to the HV direction and value (100%) are specified in Figure 2 below.

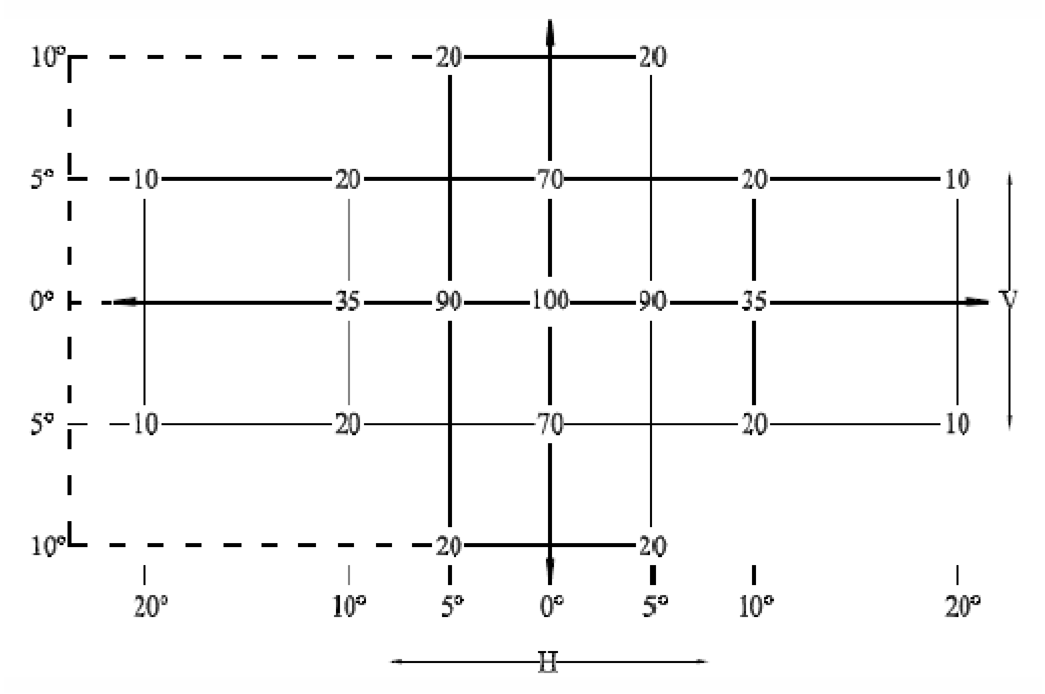


Figure 2: ECE Standard Luminous Intensity Distribution Table

Measurement method

~~*To simply testing it is permitted to use the method described in Appendix 1 to calculate the effective luminous intensity on the reference axis only, and then assume that effective luminous intensity is the same proportion of the peak intensity measured in all other directions.*~~
~~*Intensity shall be measured from a distance sufficient for the inverse square law to be effective.*~~

Discussion : Dr Muller asked if a mean (visual or auditive to check the proper working of the direction indicator is necessary. This question is very important for safety in Germany.
Decision: a tell tale (fail safe) device to check the proper working by the cyclist of the direction indicator is recommended. Add in an additional note that some countries may be required a tell tale device.

If the cyclist has in his normal field of view , a direct view of the direction indicator, it is considered as fulfilling this requirement.

Appendix A: Measurement of flashing light

Discussion: this proposal is not for direction indicator.
Do we want to include this possibility in our ISO standard?
Dr Muller proposed to define a typical signal shape.
For example some countries specify 200 flashes per minutes or 120 times per minutes or 240 per minutes, must be visible at 300m, the intensity is measured continuously.
As this system is allowed in some countries (UK, BE, DK …) agreed to add it.
In countries allowing "flashing lamps" there is no detailed requirements and test method. A revised proposal must be drafted.
The experts are invited to check the proposed formula (effect of off time , effect on duration, on-time and off-time ratio …).
Dr Kooss explained the necessity to define the pulse, and the formula of the form factor and the effect on the maximum intensity which is always less for flashing light compare to normal lights. He also underlined that these flashing light must not make confusion with indicator lamp. So he proposed to fix the minimum frequency at 2Hz, and proposes to keep the method proposed in a first step.

Add a definition of flashing: → to be done

This function is only allowed for front position lamp, rear lamp and stand light.
In this case frequency shall be higher than 2Hz , 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 ECE Regulation No. 65: Uniform Provisions Concerning the Approval of Special Warning Lights for Motor Vehicles.

A 1.1 Effective intensity

A 1.1.1 The effective intensity (Je measured in candela) of a flashing light is given by the following formula:

$$J_e = \frac{J_m}{1 + C/(F.T)}$$

where

J_m = Peak intensity (candela)
T = Duration of flash (seconds)
C = Time constant = 0.2 seconds
F = Form factor

A 1.1.2 The form factor (F) is given by the following formula:

$$F = \frac{\int_0^T J.dt}{J_m.T}$$

where

J = Instantaneous intensity (candela)

<MARGIN>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 a square wave, 0.637 for a half sine wave, or 0.5 for a triangular spike.

A 1.2 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:
a) The ratio of peak intensity between the brightest (Jh) and least bright (Jl) flash in the group
b) The overall flash frequency (f), i.e. the number of flash groups per second assuming all probable groups may be regarded as such.
c) The time interval (Tg) between consecutive flashes in the group
If the peak to peak interval (Tg) is less than or equal to 0.04 seconds, then the pulses are always evaluated as one flash. If greater, refer to the table below:

	J_h/J_l :	Between 1 and 10	Greater than 10
Limiting value of T_g :		$1/f(5.5 - 0.25\, J_h/J_l)$	$1/3f$

If: Tg exceeds a value calculated from the appropriate formula in the above table: only the flash with the highest peak intensity shall be evaluated and any adjacent peak shall be regarded as a separate flash.

A 1.3 On-time and off-time

The on-time is defined as the period of time within which the luminous intensity of the flashing light is greater than 1/10th of the peak value (Jm).
The off-time is defined as the period of time within which the luminous intensity of the flashing light is less than 1/100th of the of the peak value (Jm) or less than 10cd, whichever is the smaller.

4.7 stand-light

~~*This clause is relevant only for a cycle equipped with lamp which is designed to be driven by a generator.*~~
~~*[Photometric requirements shall be according to 4.1, 4.2]*~~
~~*Other requirements are described in ISO 6742-4.*~~

Dynamo-operated rear lights shall correspond with the requirements of 6742-1 4,2 and 4.3. ~~(ISO 6742 Part 1)~~

Rear lights with integrated stand lights shall be built so that the load of the entire equipment on the supply system is not substantially higher than that intended for this equipment. The entire equipment shall fulfil the necessary requirements at test voltage, where, based on a discharged dynamo, a charging time of 2 minutes using test voltage is permissible and the reduction of the dynamo voltage through the charging of the capacitor shall correspond with the following conditions:

The reduction of the dynamo voltage shall not exceed 1.5 % after 2 minutes.
A time change of the luminous intensity $I(t)$ is caused through the discharge of the capacitor.
Here, the luminous intensity at the starting point of the stand light has to be not lower than 200 mcd and has to fulfill 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

~~*To be checked.*~~

5 Test methods

~~*Pich up from ECE → Dr Kooss +PL*~~

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

The distance of measurements shall be such that the law of the inverse of the square of the distance is applicable;

The measuring equipment shall be such that the angular aperture of the receiver viewed from the reference centre of the lamp is between 10' 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.

Within the field of light distribution, schematically shown as a grid, the light pattern should be substantially uniform so that the light intensity in each direction of a part of the fieled formed by the grid lines meets at least the lowest minimum percentage value being shown on the grid lines surrounding the questioned direction.

For any lamps, except those equipped with filament lamps, the luminous intensities and colour measured after one minute and after 30 minutes of operation shall comply with the requirements; direction indicators shall be operated in the flashing mode (f = 1.5 Hz, duty factor 50 per cent). The luminous intensity distribution after one minute of operation can be calculated from the luminous intensity distribution after 30 minutes of operation by applying at each test point the ratio of luminous intensities measured at HV after one minute and after 30 minutes of operation.

5 – Annex B - Discussion on part 2

As revised during the 23rd-24th May 2011 WG10 meeting

5 – Annex B - Discussion on part 2: Retro reflective devices

The contributions from Dr Kooss was studied during the meeting and the draft updated

Cycles — Lighting and retro-reflective devices — Part 2: Retro reflective devices

- ***Scope***

  This part of the ISO 6742 applies to retro-reflective devices used on cycles intended to be used on public roads and, especially, bicycles complying with ISO 4210 and 8098.

  This part of ISO 6742 prescribes photometric and physical requirements of retro-reflective devices.

~~➔ To be revised on basis ECE R3 ➔ Dr Koos~~

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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 6742-2 was prepared by Technical Committee ISO/TC 149, Cycles, Subcommittee SC 01, Cycles and major sub-assemblies.

This third edition cancels and replaces the second edition (), of which it constitutes a technical revision.

ISO 6742 consists of the following parts, under the general title Cycles — Lighting and retro-reflective devices:

— *Part 1: Lighting devices*

— *Part 2:*

— *Part 3:*

— *Part 4*

— *Part 5*

Introduction

This part of ISO 6742 has been prepared in order to specify photometric and mechanical requirements for retro-reflective devices

ISO 6742-1 specifies photometric and mechanical requirements for lights of cycles intended for use on public roads.

ISO 6742-3 specifies requirements for installation and use of retro-reflective devices and lights.

ISO 6742-4-1 specifies ….

ISO 6742-4-2 specifies ….

ISO 6742-5 specifies ….

These devices are intended to:

- for sidelights, indicators, brake lights and fog lights, draw the attention of other road users about the presence of cyclists, particularly, in the case of poor visibility or at night, slowdowns or changing direction of the rider,

- for high and low beams in accordance with the requirements of this part of ISO 6742, also provide the rider adequate and comfortable lighting to allow him to see the roadway in front of him or take, if necessary, the measures necessary to avoid a potential hazard.

In the chapter definitions are listed, in addition, the different functions that can be fitted to a cycle in order to ensure the safety of cyclists.

Erreur ! Source du renvoi introuvable.

Scope

This part of the ISO 6742 applies to retro-reflective devices used on cycles intended to be used on public roads and, especially, bicycles complying with ISO 4210 and 8098.

This part of ISO 6742 prescribes photometric and physical requirements of retro-reflective devices.

Normative references

The following referenced documents are indispensable for the application 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 3768, Metallic coating – Neutral salt spray test (NSS test)

ISO 4210, Cycles – Safety requirements for bicycles

ISO 8098, Cycles – Safety requirements for bicycles for young children

ISO 17025, General requirements for the competence of testing and calibration laboratories

CIE 15, Colorimetry : official recommendations of the International Commission on Illumination

CEI 1931, XYZ color space of the International Commission on Illumination

Terms and definitions

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

3.1
retro-reflective device; reflector
assembly ready for use and comprising one or more retro-reflecting optical units

3.2
wide angle reflector
device providing retro-reflection through horizontal entrance angles of not less than 50° on either side of the reference axis

3.3
conventional reflector
device providing retro-reflection through entrance angles of not less than 20° on either side of the reference axis

Symbols and units used

Symbols are shown in figure 1. Their meaning and units used are given in table 1.

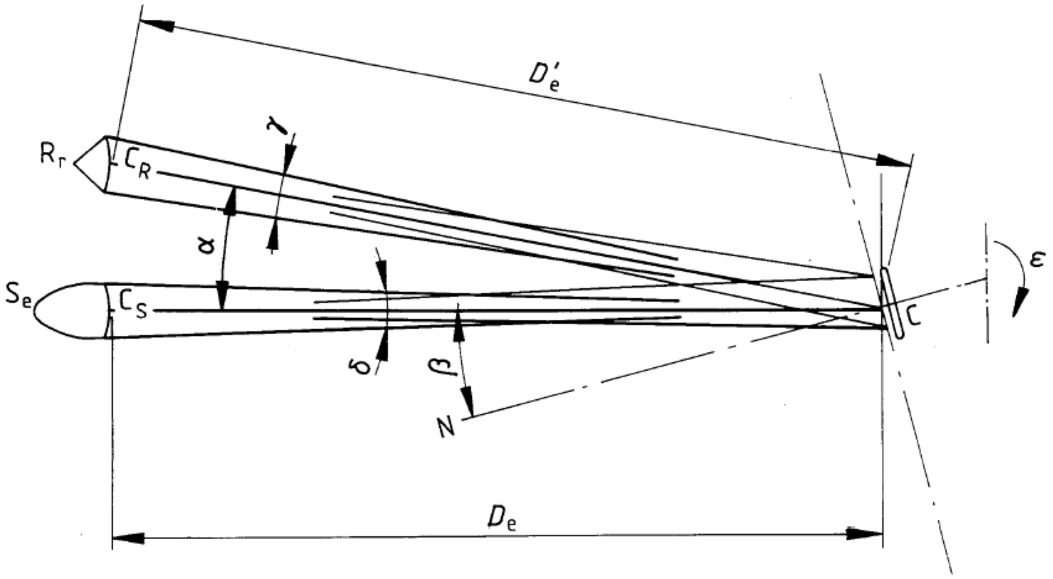

Figure 1 — Symbols

NOTE The following symbols are in accordance with regulation N°3 of the UN/ECE concerning retro-reflective devices

Table 1 — Meaning and units of symbols used

Symbol	***Meaning***	***Unit***
A	*Area of the effective reflex surface of the retro-reflective device*	*cm²*
C	*Reference centre*	---
NC	*Reference axis*	---
R_r	*Receiver, observer or measuring device*	---
C_R	*Centre of receiver*	---
$Ø_R$	*Diameter of receiver* R_r	*cm* *if circular*
S_e	*Source of illumination*	---
C_s	*Centre of source of illumination*	---
$Ø_s$	*Diameter of source of illumination*	*cm*
D_e	*Distance from centre* C_s *to centre C*	*m*
$D'_e a$	*Distance from centre* C_R *to centre C*	*m*
D	*Mean diameter of retro-reflective annulus on retro-reflective tyres*	*mm*
A	*Observation angle*	*Degree and minutes*
B	*Entrance angle. With respect to line* C_s *C which always considered to be horizontal, this angle is prefixed with signs – (left), + (right), + (up) or – (down), according to the position of the source* S_e *in relation to the axis NC, as seen when looking towards the retro-reflecting device. For any direction defined by two angles, vertical and horizontal, the vertical angle is always given first.*	*Degree and minutes*
Γ	*Angular subtense of measuring device R, as seen from point C*	*Degree and*

		minutes
Δ	*Angular subtense of the source S_e, as seen from point C*	*Degree and minutes*
E	*Rotation angle. This angle is positive when the rotation is clockwise as seen when looking towards the illuminated surface. If reflecting device is marked "TOP", the position thus indicated is taken as origin.*	*Degree and minutes*
E	*Illuminance of retro-reflecting device*	*lux*
CIL	*Coefficient of luminous intensity*	*millicandelas per lux*
[a] D_e and D'_e are generally very nearly the same and under normal conditions of observation it may be assumed that D_e =D'_e. Furthermore, the effective distances may be used when a collimated system is used in order to obtain an artificially increased measuring distance.		

Photometric requirements

Reflectors

When tested by the method given in 8, the CIL values for reflectors shall not be less than those specified in table 2 or 3.

Table 1 applies to front, side and rear reflectors. Values given are for clear (white) reflectors. Values for yellow reflectors shall be 5/8 x clear values. Values for red reflectors shall be 1/4 x clear values.

Table 2 applies to pedal reflectors.

Table 2 — Coefficients of luminous intensity, CIL, for conventional reflectors

colour	observation angle α	entrance angle β (in degree)			
		vertical V horizontal H	0° 0°	± 10° 0°	± 5° ± 20°
red	20' 1°30'		300 5	200 2,8	100 2,5
yellow	20' 1°30'		750 12,5	500 7	250 6,25
white	20' 1°30'		1200 20	800 11,2	400 10

Table 3 — Coefficients of luminous intensity, CIL, for wide angle reflectors

colour	observation angle α	entrance angle β (in degree)						
		vertical V horizontal H	0° 0°	± 10° 0°	0° ± 20°	0° ± 30°	0° ± 40°	0° ± 50°
White	20' 1°30'		1800 34	1200 24	610 15	540 15	470 15	400 15
Yellow	20' 1°30'		1125 21	750 15	380 10	335 10	290 10	250 10
Red	20'		450	300	150	135	115	100

	1°30'		9	6	4	4	4	4

~~***Table 2 — Coefficients of luminous intensity, CIL, for clear reflectors***~~

~~***Table 3 — Coefficients of luminous intensity, CIL, for yellow pedal reflectors***~~

Table 4 Coefficients of luminous intensity, CIL, for pedal reflectors

Colour	observation angle α	entrance angle β (in degree)			
		vertical V horizontal H	0° 0°	± 10° 0°	± 5° ± 20°
yellow	20' 1°30'		300 12	200 9	100 6

Retro-reflective tyres

When tested by the method given in 9, the CIL values for a retro-reflective tyre shall not be less those specified in table 5. In case where D is less than 420 mm the minimum photometric value for each observation and entrance angle shall be equal to the value for D = 420 mm

Table 5 Coefficients of luminous intensity, CIL, for tyres

observation angle α	horizontal H	entrance angle β (in degree)			
		5°	20°	40°	°50
20' 1°30'		0,16 D 0,011 D	0,14 D 0,01 D	0,047 D 0,0065 D	0,015 D 0,002 D

Colorimetric requirements

When determined by the method given in 10, the colour of the reflected light shall be located within the appropriate area defined by CIE chromaticity coordinates specified in table 5.

NOTE For ease of reference these areas are shown graphically in figure 2.

Table 4 — x-y chromaticity coordinates of the intersection points of colour boundary lines

Colour		Coordinates					
Red	*x*	0,665	0,645	0,721	0,735		
	y	0,335	0,335	0,259	0,265		
Yellow	*x*	0,560	0,546	0,612	0,618		
	y	0,440	0,426	0,382	0,382		
White	*x*	0,285	0,453	0,500	0,500	0,440	0,285
	y	0,332	0,440	0,440	0,382	0,382	0,264
White/yellow[1)]	*x*	0,380	0,509	0,618	0,440	0,380	
	y	0,408	0,490	0,382	0,382	0,337	

1) For retro-reflective tyres only.

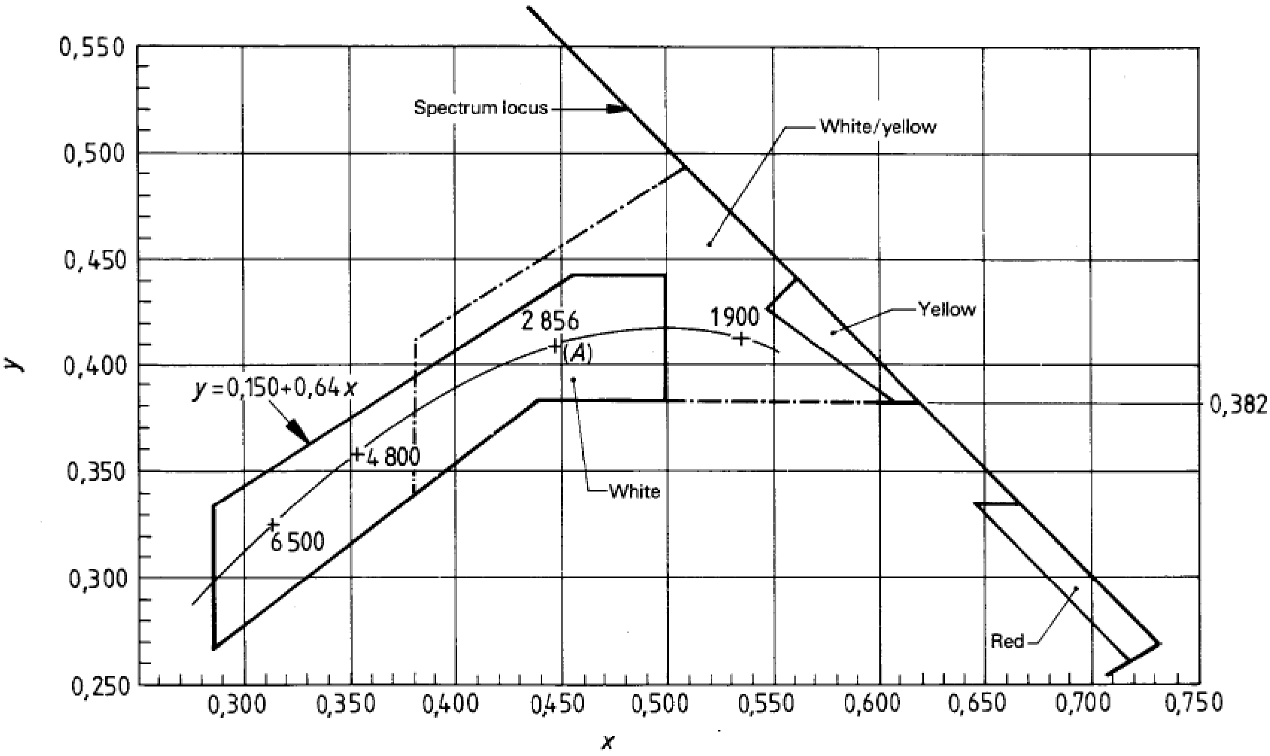

Figure 2 — Boundaries of colour areas for reflective devices

Physical requirements

Reflectors

Construction

The reflector and/or mount shall incorporate a distinct preferred assembly method to ensure that the reflector can be mounted in its designed orientation with regard to the bicycle.

Tests

General

A reflector shall comply with the photometric and colorimetric requirements of 5.1 and 6, and there shall be no loosening of the mounting(s) or distortion of the housing that would affect the performance of the reflector, after being subjected to any or all tests specified in 7.1.2.2 to 7.1.2.8.

Temperature resistance test

When tested by the following method, a reflector shall exhibit no noticeable defects:

Place the reflector in a pre-heated oven for a minimum period of 1 hour at a temperature of 50_{0}^{+5} *°C.*

NOTE A pedal reflector may be tested integrally with its pedal.

Impact test

When a reflector is tested at room temperature by the following method the lens shall no crack:

Mount the reflector in a manner similar to the way in which it is mounted on the bicycle, but with the lens face horizontal and directed upwards.

Drop a 13 mm diameter polished solid steel ball, once, vertically onto the central part of the lens from a height of 0,76 m. The ball may be guided but not restricted in free fall.

NOTE Pedal reflectors are exempt from this requirement.

Moisture resistance test

Strip all removable parts from the reflective device, whether part of a lamp or not, and immerse for 10 minutes in water at a temperature of 50 ±5 °C, the highest point of the upper part of the reflective surface being 20 mm below the surface of the water. Repeat this test after turning the reflective device through 180° so that the reflective surface is at the bottom and rear face is covered by about 20 mm of water. Then immediately immerse the optical unit in the same conditions in water at a temperature of 25 ±5 °C.

Reflector mount alignment test

When tested by the following method, the optical axis of the reflector (excluding pedal reflectors or spoke mounted reflectors) shall not deflect more than 15° during test, and shall not exhibit a permanent displacement greater than 5° after the test.

With the reflector and mount assembled to a rigid fixture duplicating the mating component or frame member for which it is designed and intended for use (including a rigidly mounted bicycle), apply a force of 90 N to the reflector unit in at least three directions selected as most likely to affect its alignment.

Resistance to corrosion

After being tested by the method specified in ISO 3768 the deflector shall not exhibit any visible signs of corrosion liable to affect the integrity of the mounting or housing.

The duration of the test shall be 50 hours comprising two periods of exposure of 24 hours each, separated by an interval of 2 hours during which the sample is allowed to dry.

Resistance to fuels

Soak the outer surface of the reflector on a mixture of 70 % of n-heptane and 30% of toluene (by volume). After 5 minutes clean the surface by washing in a detergent solution and rinse in clean water.

Resistance to lubricating oils

Wipe the outer surface of the reflex reflector lightly with cotton soaked in detergent lubricating oil. After 5 minutes clean the surface by washing in a detergent solution and rinse in clean water.

Retro-reflective tyres

Form and location

The retro-reflective strip shall be in form of a continuous circle of retro-reflective material on each sidewall of the tyre.

Tests

General

When subject to the test in 7.2.2.2 to 7.2.2.9 inclusive, the retro-reflective material on the tyre shall comply with the photometric requirements of 5.2 for α = 0° 12' or 0° 20' and β = - 4°, and with the colorimetric requirements of 6 as specified in table 6.

The table also indicates where a portion of a tyre shall be used instead of a complete tyre. The portion shall be cut from a tyre not previously subjected to physical stress of this part of ISO 6742. The requirements of 5.2 and 6 do not apply to a portion cut from a tyre.

Table 5 — Applicability of specimens to the photometric and colorimetric requirements

Test in clause	Tyre or portion to be used	Photometric requirements apply	Colorimetric requirements apply
7.2.2.2	Tyre	Yes, as in table 3	Yes
7.2.2.3	Portion	No	No
7.2.2.4	Portion	No	No
7.2.2.5	Portion	No	No
7.2.2.6	Tyre	Yes, see 7.2.2.6	Yes
7.2.2.7	Tyre	Yes, as in table 3	Yes
7.2.2.8	Tyre	Yes, as in table 3	Yes
7.2.2.9	Tyre	Yes, see 7.2.2.9	Yes

Temperature resistance

When tested by the following method, there shall be no cracking, peeling or blistering of the retro-reflective material that would affect the performance for the intended use:

Subject a test sample to the following conditions in sequence:

a) *12 h consecutively at a temperature of 65 ± 5 °C with a relative humidity of 10 ± 5 %;*

b) *At least 1 h at a temperature of 23 ± 5 °C with a relative humidity of 50 ± 5 %;*

c) *15 h consecutively at a temperature of - 20 ± 5 °C.*

Adhesion

The retro-reflective material shall adhere to the tyre in such a way that, when conditioned and tested as described, a greater force than that specified shall be required to remove it from the substrate, or the material shall brake when an attempt is made to remove it.

Condition the test sample for 30 minutes at a temperature of 50 ± 5 °C and then for 30 minutes at 23 ± 5 °C.

With a sharp knife, separate a strip of the retro-reflective material from the tyre.

Apply a tensile force of 1 N per millimetre of width of the strip in a direction normal to the strip to attempt to separate it from the substrate.

Abrasion resistance

The retro-reflective material shall be as resistant to abrasion as is the adjacent tyre material so that retro-reflective material is removed from the inflated tyre by abrasion with wet, steel-bristle brush, tyre material will be removed with the retro-reflective material.

Impact resistance

When tested with the following method the retro-reflective material shall show no cracking or separation from the tyre outside a distance of half the width of the material from the point of impact.

Condition the test sample for 1 h at - 20 ± 5 °C. Immediately after removal from the cold storage, place the sample on a solid support base and subject the retro-reflective area to an impact from a 25 mm diameter solid steel ball dropped from a height of 2 m.

Resistance to corrosion

After being tested by the method specified in ISO 3768 there shall be no evidence of corrosion of the retro-reflective material that would result in failure to meet 75 %of the CIL values in table 4, at α = 0° 12' or 0° 20' and β = - 4°.

The duration of the test shall 50 h comprising two periods of exposure of 24 hours each, separated by an interval of 2 hours during which the sample is allowed to dry.

Resistance to fuels

Lightly rub the retro-reflective area of the test sample with a cotton cloth soaked in a test fuel composed of 70 % of n-heptane and 30% of toluene (by volume).

After 5 minutes clean the retro-reflective area by washing a detergent solution and rinsing in clean water.

Resistance to lubricating oils

Lightly rub the retro-reflective area of the test sample with a cotton cloth soaked in detergent lubricating oil.

After 5 minutes wipe the area clean with a mild aliphatic solvent such as heptane and follow by washing with a neutral detergent and rinsing in clean water.

Water test

Immerse the test sample for 1 minute in water at temperature of 23 ± 5 °C. 30 s after removal measure the CIL value for α = 0° 12' or 0° 20' and β = - 4°. The CIL value shall not be less than 50 % of the minimum value in 5.2.

Photometric test for reflectors

Principle

The coefficient of luminous intensity, CIL, is determined by the measurement of the illuminance at test piece and the luminous intensity in the direction considered by means of appropriately calibrated photometers.

Instrumentation arrangement

For measuring reflective devices the general arrangement of the instrumentation shall be as shown in figure 3, with the receiver positioned vertically above the light source.

However, for measuring the photometric performance of the reflective devices with microspheres the receiver can alternatively be positioned alongside the source in the same horizontal plane.

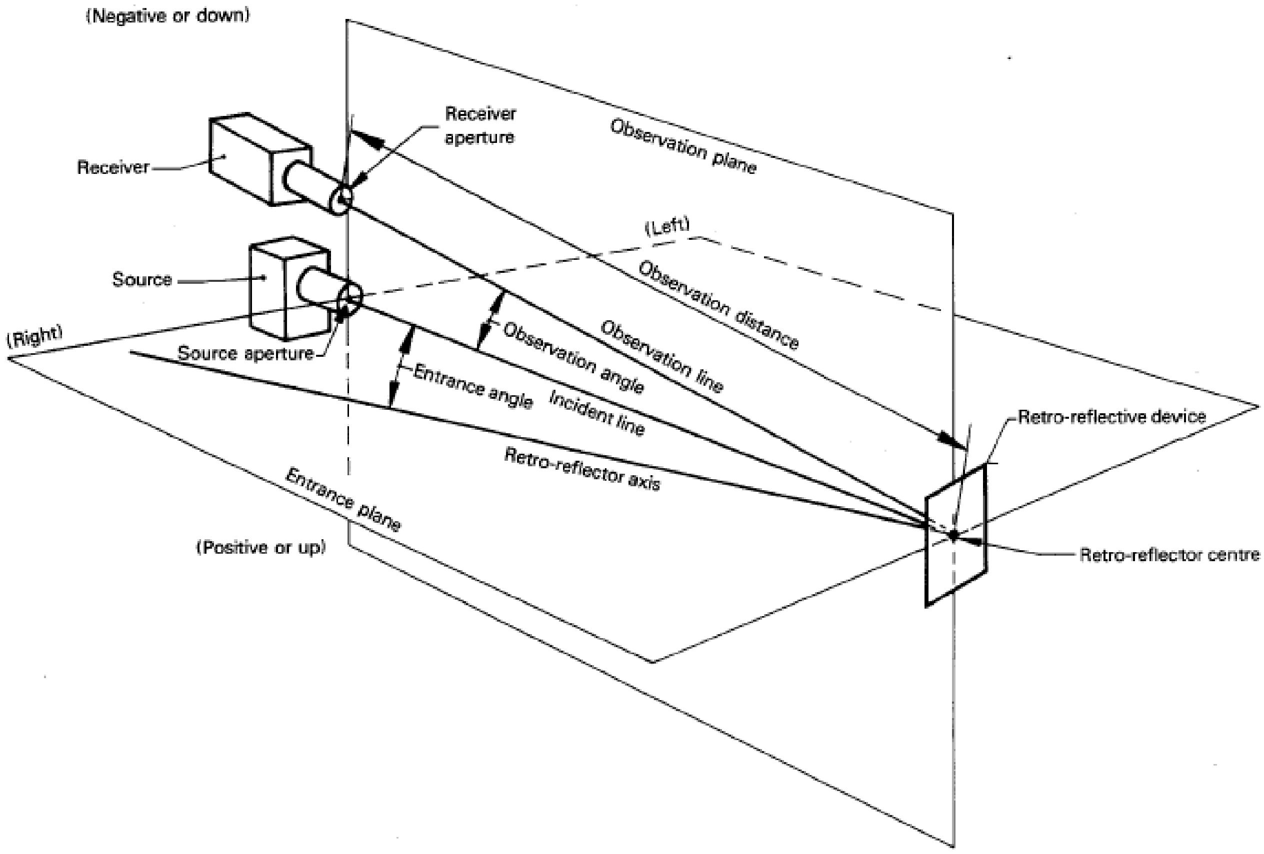

Figure 3 — retro-reflector test instrumentation arrangement

Source of illumination

8.3.1 *The source of illumination shall approximate to illuminant A as defined by CIE publication N°15, and shall be stable.*

8.3.2 *The shape and size of the aperture shall be selected in relation to the receiver aperture, the observation distance and the range of the device to be tested.*

The angular aperture of the source seen from the reference centre of the reflector shall be 10' maximum.

Receiver

8.4.1 *The receiver shall have the relative spectral response of CIE 1931Standard Colorimetric Observer.*

8.4.2 *The angular aperture of the receiver seen from the reference centre of the reflector shall be 10' maximum.*

Observation distance

The observation distance shall be 10 m minimum, or the optical equivalent.

Reflector mount (or support)

8.6.1 *The reflector under test shall be mounted on a goniometer, or other suitable support, to provide the required entrances angles.*

The retro-reflector support shall be such that the horizontal entrance angles are obtained by rotating the reflector around a mobile vertical axis; vertical angles by rotating around a fixed horizontal axis.

8.6.2 *The centre of the reflex area shall be located at the centre of rotation, and shall lie on the axis passing through the centre of the light source when β = 0/0.*

Test area of reflector

For photometric measurements, the maximum area of the reflector to be exposed and projected on a plane perpendicular to its reference axis shall be 800 cm² contained within a circle of diameter of 250 mm.

Illuminance at the reflector

Illuminance at the reflector shall be uniform within 5 % of the mean of the complete area of the reflector.

Orientation of reflector

8.9.1 *Reflectors shall be tested in the orientation in which they are designed to be used.*

Spoke reflectors shall be tested in the single orientation that provides the best overall performance.

8.9.2 *Should uncoloured reflections from the front surface interfere with the photometric readings at any test point, the reflector may be rotated around its vertical or horizontal axis through an angle not exceeding 4°.*

Photometric test for retro-reflective tyres

Instrumentation arrangement

The general arrangement of the instrumentation shall be shown in figure 3 except that the receiver may be positioned alongside the source in the same horizontal plane.

Source of illumination

9.2.1 *The source of illumination shall approximate to illuminant A as defined by CIE Publication N°15, and shall be stable.*

9.2.2 *The effective lens diameter shall nor exceed D_e / 500, where D_e is the distance from the source to the reflector.*

Receiver

9.3.1 *The receiver shall have the relative spectral response of the CIE1931 Standard Colorimetric Observer.*

9.3.2 *The dimensions of the active area of the receiver shall be such that no point on the perimeter of the receiver is more than D_e / 1000from its centre, where D_e is the distance from the source to the reflector.*

Illuminance and observation distances

The distance between the source and the centre of the wheel, and between the receiver and the centre of the wheel, shall each be not less than 10 m.

Illuminance at the reflector

Measure the illuminance incident on the retro-reflective strip at uniform intervals of no more than 45° around the wheel with the receiver in the direction of incident radiation. The average of such reading will be the mean illuminance of the sample. If any one of such reading differs by more than10% from the mean illuminance, then a more uniform source shall be obtained.

Test method

9.6.1 *For testing the retro-reflective material on a tyre, the tyre shall be mounted on a wheel and inflated to the maximum pressure recommended by the manufacturer.*

9.6.2 *The retro-reflective on each side of the tyre shall be tested.*

9.6.3 *Measure the illuminance of the receiver due to retro-reflection for the entrance and observation angles given in table 3.*

NOTE A positive entrance angle corresponds to the case in which the line of sight to the receiver lies between the line of incidence and the optic axis of the retro-reflective strip, and a negative entrance angle corresponds to the case in which the line of incidence lies between the line of sight of the receiver and the optic axis of the retro-reflective strip.

Colorimetric test

Instrumental measurements

The chromaticity coordinates shall be determined for the condition α = 0° 20', β = 5° by means of a spectrometer or colorimeter. The test specimen shall be illuminated by a source of CIE illuminant A. Sound calibration procedures and precaution shall be observed. In particular, if a colorimeter is used it shall be calibrated with standard colour sources whose spectral characteristics are closely related to those of the test samples. If standard colour surfaces having glossy or retro-reflective surfaces are used, they shall have been calibrated with the same instrument geometry.

Visual comparison

The colour of the test specimen illuminated as in 10.1 shall be compared with one of the following:

a) an acceptable reflector illuminated and viewed under the same conditions;

b) a self-luminous source of similar luminance whose colour coordinates are within the area specified in table 5.

The viewing area shall be shielded form extraneous light, preferably by a permanent structure. The background and surrounds of the enclosure shall have a low-gloss dark neutral surface. The test specimen and the comparison piece shall be contiguous.

Use of methods

Instrumental measurements shall be made for the calibration of control and comparison samples, and acceptance of new products. Visual comparison methods shall be restricted to batch testing against control samples.

Marking

Each retro-reflective device shall be durably marked with:

a) the number of this part of ISO 6742, i.e. ISO6742/2;

b) the manufacturer's name or trade-mark.

Marking a) shall appear on the front of the illuminating surface, or on one of the illuminating surfaces, in characters not less than 1 mm in height.

Instructions

If a retro-reflective device is sold as an accessory, it shall be delivered with a set of instructions containing information on the topics a) to e) below. If a retro-reflective device is mounted on a cycle, the information on the subject b) to e) shall be included in the instructions for the cycle (unless such information is provided separately).

a) warning the buyer to meet the mounting features retro-reflective device on the bicycle according to manufacturer's instructions;

b) for removable retro-reflective device, an indication that the fasteners shall be adjusted in accordance with the recommendations mentioned in the instructions (frequency);

c) a warning against modification of the retro-reflective device by the buyer;

d) a statement indicating that the proper functioning should be checked before each use;

e) a statement to the purchaser stating that the reflectors and lights should not be obscured by luggage, children seat, clothes, etc.

NOTE Any other relevant information can be added at the discretion of the manufacturer.

Test report

The test report shall meet the requirements of ISO/IEC 17025.

Bibliography

[1] UN/ECE Regulation N°3: Uniform provisions concerning the approval of reflex reflective devices for power-driven vehicles and their trailers

5 – Annex C - Discussion on part 3

As revised during the 23rd-24th May 2011 WG10 meeting

5 – Annex C – Discussion on part 3: Installation and use of retro-reflective devices and lighting devices.

This part specifies requirements for installation, and use of lights and retro reflective devices that can be used on cycles.

The last contribution from Mr King was introduced during the meeting. See proposal below. M. King informed the meeting that all test results are not yet finished. Results should be available for next September.

Dr Muller explained that the lamp and the bracket must be tested together to be stamp "complying with ISO standard". He said that for one lamp they might have 20 different brackets. The consumer has to choose the one appropriate to his bicycle for aftermarket.

The discussion raise about the necessity to distinguish two cases:

- OEM devices
- Aftermarket devices

Mr Vellinga proposed that the dynamic vibration test is made according to the lamp manufacturer and that instruction informed the user about how to correctly fit the lamp on the bicycles.

Proposal from Mr King

ISO/TC 149/SC 01/WG10 NXXXX

Date: 2010-07-16

ISO/WD 6742-5

ISO/TC 149/SC 01/WG 10

Secretariat: JISC

Cycles — Lighting and retro-refelective devices — Part 5: Fixation lighting device

Cycles — Eclairage et dispositifs rétroréfléchissants — Partie 1: Dispositifs d'éclairage

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Foreword

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International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 6742-1 was prepared by Technical Committee ISO/TC 149, *Cycles*, Subcommittee SC 01, *Cycles andmajor sub-assemblies*.

Introduction

This part of ISO 6742 has been prepared in order to specify mechanical requirements for lights of cycles intended for use on public roads.

These devices are intended to:

- for sidelights, indicators, brake lights and fog lights, draw the attention of other road users about the presence of cyclists, particularly, in the case of poor visibility or at night, slowdowns or changing direction of the rider,

- for high and low beams in accordance with the requirements of this part of ISO 6742, also provide the rider adequate and comfortable lighting to allow him to see the roadway in front of him or take, if necessary, the measures necessary to avoid a potential hazard.

In the chapter definitions are listed, in addition, the different functions that can be fitted to a cycle in order to ensure the safety of cyclists.

ISO 6742-2 specifies photometric and mechanical requirements for retro-reflective devices.

ISO 6742-3 specifies requirements for installation, power supply and use of retro-reflective devices and lights.

[must be completed]

Cycles — Lighting and retro - reflective devices — Part 5: Fixation lighting device

1 Scope

This part of the ISO 6742 applies to lighting and signalling fastening devices used on cycles intended to be used on public roads and, especially, bicycles complying with ISO 4210 and 8098.

This part of ISO 6742 prescribes the functions, safety requirements, performance, test methods and guidelines for maintenance of fastening lighting and signalling devices that can be used on cycles.

2 Normative references

The following referenced documents are indispensable for the application 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 4210, *Cycles – Safety requirements for bicycles*

ISO 8098, Cycles – Safety requirements for bicycles for young children

ISO/IEC 17025, *General requirements for the competence of testing and calibration laboratories*

3 Terms and definitions

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

3.1

cycle

any vehicle equipped with at least two wheels propelled solely or mainly by the muscular energy of the person on the vehicle, in particular through pedals.

3.2

bicycle

cycle with two wheels

3.3

lamp

device designed to illuminate the road or to emit a light signal to other road users

3.4

sidelight

lamp emitting a light, white to the front of the cycle, so as to indicate the presence of the latter on the road

3.5

rear light

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

3.6

stoplight

lamp used to indicate to other road users that the rider operates one of the brakes

3.7

low beam

lamp used to illuminate the road in front of the cycle without undue scavenged or would obstruct other users of the road from the opposite direction.

3.8

high beam

lamp used to illuminate the road for a long distance ahead of the vehicle.

3.9

indicators

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

3.10

rear fog light

lamp used to improve the visibility of the cycle by the rear in dense fog.

3.11

steady light

device ensuring nominal performance when the cycle is stopped.

3.12

lamp equipped with replaceable light source

lamp whose light source(s) can be replaced by an equivalent light source(s) of the same type

3.13

lamp equipped with non-replaceable light source

lamp whose light source(s), designed to be permanently fitted, cannot be replaced without damaging the source module

3.14

axis of reference

characteristic horizontal axis of lamp, as determined by the manufacturer for use as reference direction during use in service and during test measurements

3.15

centre of reference

intersection of the axis of reference with the light output surface of the lamp.

3.16

beam centre

as viewed on the test screen, that area at the centre of light pattern the intensity of which is not less than 80% of the maximum intensity, I_{max}, of the beam.

3.17

dazzle line

line above which the light values are limited to avoid dazzling other road users.

3.18

nominal voltage

voltage prescribed by the manufacturer to deliver the photometric performances of lights.

NOTE The nominal voltage gives only the minimum values of illumination, this means that the voltage of the power source has to be higher. For example, for the rear light, the nominal voltage maintains the value of 1.6 cd for x minutes when cycle is stopped.

4 General tolerances

The tolerances given in table 1 apply unless others specifications are indicated in the text.

Table 1 — General tolerances

Angles	± 0,1°
Masses	± 1%
Time	-0s / +5s
Temperature	± 5°C

5 Order of tests

Each test shall be conducted on a new test sample, but if only one sample is available, it is allowed to carry out all of the tests on the same sample in the order that they appear in this document.

All components shall be in the fully-finished condition.

6 Dynamic vibration tests

6.1 Requirements

a) For all system of lightening:

When tested by the method described in 6.2:

- there shall be no fracture or visible cracks in any part of the lightning system and fixation device,

- the lightning device is still working,

b) For front system of lightening:

When tested by the method described in 6.2:

- the point with the maximum intensity shall not move more than 3,4° around Y axis.

- the point with the maximum intensity shall not move more than 8° around Z axis.

c) For rear system of lightening:

When tested by the method described in 6.2:

- the point with the maximum intensity shall not move more than 10° around Y axis.

- the point with the maximum intensity shall not move more than 10° around Z axis.

6.2 Test method

All structural components shall be assembled in accordance with the manufacturer’s instructions (i.e. in the appropriate orientation for lightening correctly the road).

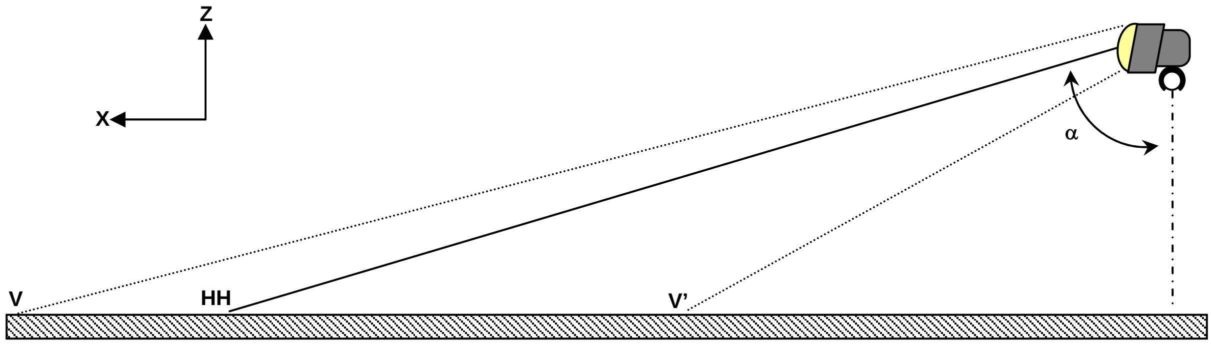


Figure 4 : description on the ‘’α’’ angle, corresponding of the appropriate orientation.

Secure the lightning system to a rigid fixture that resembles the part of the bicycle to which the lightning system is designed to fit, using the fastening devices supplied by the manufacturer. If other adjustments are possible, they shall be made so that the lightening system is attached to the rig in the way that resembles the most onerous situation that can occur in practice (i.e. position of the device witch generate the greatest torque on the attachment point).

Note the position of the point (HH) with the maximal intensity at the beginning of the test.

Vibrate the front lightening device with following power spectral density (PSD) during XX min on the plan XZ with an angle of A (see table 1 for value of A):

Figure 5 : power spectral density on XZ plan against on angle of A for front light.

Vibrate the rear lightening device with following power spectral density (PSD) during XX min on the plan XZ with an angle of A (see table 1 for value of A):

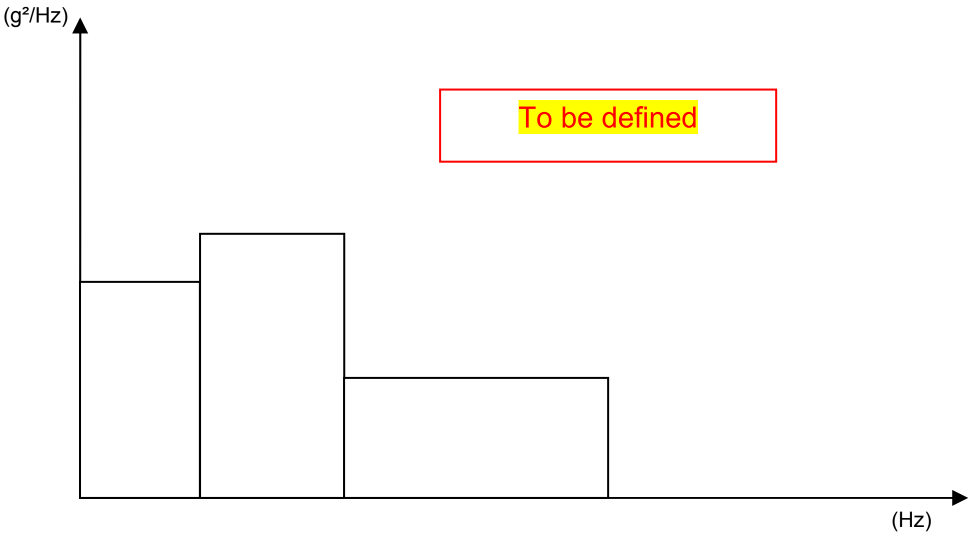


Figure 6: power spectral density on XZ plan against on angle of A for rear light.

	Front light	Rear Light
A (°)	YY	ZZ

Table 1 : Angle (A) for vibration test.

5 – Annex D - Discussion on part 4

As revised during the 23rd-24th May 2011 WG10 meeting

5 – Annex D – Discussion on part 4: Lighting systems depending on cycle's movement – Dynamo 6V, 3W, 2,4W , 1,5W

The text from the last meeting was reviewed during the meeting.

- ***Cycles — Lighting and retro-reflective devices — Part 4: Lighting systems – Lamps and Generators 6V, 3W – 2,4 W - 1,5W (dynamo …)***

1 Scope
This part of the ISO 6742 applies to lighting and signaling systems used on cycles intended to be used on public roads and, especially, bicycles complying with ISO 4210 and 8098.

This part of ISO 6742 prescribes how to check the performance of the lighting systems using 6V-3W, 2,4W, 1,5 W generator. It applies to light devices complying with ISO 6742-1.

2 Normative Reference

ISO 6742-1 specifies photometric and mechanical requirements for lights of cycles intended for use on public roads.

ISO 9227

3 term and definition

4. Requirements

4.1 Dynamo-operated head lamps

Dynamo-operated head lamps shall correspond with the requirements of ISO 6742-1 4.1, 4.4, 4.5, 4.6.

Voltage limiting resources shall only become effective above the test voltage. Here, the value of the DC voltage U corresponds with the root mean square of the AC voltage U_{eff}.

Furthermore,

— the nominal voltage of the light source shall be equal to the system voltage or the light source shall be powered via an appropriate electronic ballast;
— the lighting effect shall be deployed at 3 V at the latest;
— the lighting evaluation shall be performed at test voltage;
— the power consumption shall be ≤ 110 % of the nominal value;
— electronic ballasts in these units shall have the corresponding electrical rating.

Head lamps with integrated capacitor stand lights shall be built so that the load of the entire equipment on the supply system is not substantially higher than that intended for this equipment according to 4.7. The entire equipment shall fulfil the necessary requirements at test voltage, where, based on a discharged capacitor, a charging time of 2 minutes using test voltage is permissible and the reduction of the dynamo voltage through the charging of the capacitor shall correspond with the following conditions:

a) not exceeding 60 % after 15 seconds;
b) not exceeding 37 % after 30 seconds;
c) not exceeding 15 % after 60 seconds;
d) not exceeding 5 % after 90 seconds.

The reduction of the dynamo voltage shall not exceed 1.5 % after 2 minutes.
Any stand light shall be effective for at least 4 minutes.

~~➔ Review for not being design restrictive (battery …)~~

4.2 Dynamo-operated rear lights

Dynamo-operated rear lights shall correspond with the requirements of 6742-1 4,2 and 4.3. ~~(ISO 6742 Part 1)~~

Rear lights with integrated stand lights shall be built so that the load of the entire equipment on the supply system is not substantially higher than that intended for this equipment. The entire equipment shall fulfil the necessary requirements at test voltage, where, based on a discharged dynamo, a charging time of 2 minutes using test voltage is permissible and the reduction of the dynamo voltage through the charging of the capacitor shall correspond with the following conditions:

The reduction of the dynamo voltage shall not exceed 1.5 % after 2 minutes.
A time change of the luminous intensity $I(t)$ is caused through the discharge of the capacitor. Here, the luminous intensity at the starting point of the stand light has to be not lower than 200 mcd and has to fulfill 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

The question to move this chapter to part1 was raised by Dr Muller and Dr Kooβ.
Decision : Duplicate it in part 1.

~~➔ Review for not being design restrictive (battery …)~~

4.3 Dynamos

4.3.1 Generator — Frictional drive

For measurements according to 5.3.1 6 V/3 W and 6V/2,4W dynamos shall meet the values of table 1 and 6 V LED dynamos shall meet the values of table 2.

Table 1 — Characteristics of 6 V/3 W and 2,4W generators,

Speed in km/h	15	≥ 5		≥ 15 ≤ 30
U_{eff}/V	≥ 5.7 ≤ 7.5	≥ 3 ≤ 7.5		≥ 5.7 ≤ 7.5
Efficiency η/%	≥ 30	-		-

Table 2 — Characteristics of 6 V 1,5W LED dynamos, frictional

Speed in km/h	15	≥ 5	≥ 10	≥ 15 ≤ 30
Power W	≥ 1,35	≥ 0,2		≥ 1,35
Efficiency η/%	≥ 30	-		-

M. Carlin asked why 30% effiency has been specified for dynamo.
Theanswer from German experts is because it is the typical efficiency of the 3W dynamo.
M. Carlin asked if it is necessary to specify the efficiency and he proposed at least to change to 20% or 25%.
The efficiency value shall be checked by the experts for the next meeting.
He also questioned the meeting why 10N has been chosen.
Dr Kooβ explained that these dynamo are very sensitive to pressure apply on the wheel.
Mr Sato asked which LED lamp to choose. He asked to precise 1,5W LED.

For dynamos which press against the driving wheel over a swivel bearing through spring force, the spring force, measured perpendicularly to the rotational axis of the dynamo, shall be ~~at least~~ 10 N maximum inside of the total swivel area and under observation of the hysteresis. This value shall also be used for the measurement of the efficiency.
➔ test method to be described Is it necessary?

Should an AC voltage of 50 V_{eff} or a DC voltage of 75 V be exceeded for this unloaded dynamo within the specified speed range, additional measures shall be provided in order to meet this voltage limit.

4.3.2. Generator — Form locking ~~Positive drive ➔ add a definition~~

For measurements according to 5.3.2 6 V/3 W or 6V/2.4W dynamos shall meet the values of table 3 and
6V /1,5W LED dynamos shall meet the values of table 4, with the minimum values of the voltage
and the efficiency referring to the largest outside diameter of the wheel as provided by the manufacturer and the measurement of the maximum values of the voltage referring to the smallest outside diameter of the wheel as stated by the manufacturer.

➔ check the proposed efficiency values

Table 3 — Characteristics of 6 V/3 W dynamos, form-locking

Speed in km/h	15	≥ 5		≥ 15 ≤ 30
U_{eff}/V	≥ 5.7 ≤ 7.5	≥ 3 ≤ 7.5		≥ 5.7 ≤ 7.5
Efficiency η/%	≥ 50	-		-

Table 4 — Characteristics of 6 V/1,5W LED dynamos, form-locking

Speed in km/h	15	≥ 5	≥ 10	≥ 15 ≤ 30
Power	≥ 1,35	≥ 1		≥ 1,35
Efficiency η/%	≥ 50			

Change value of power at ≥5km/h ➔ 0,5W

For dynamos without gears and for the largest outside diameter of the wheel permissible for these dynamos and at a speed of 5 km/h, the frequency of the AC voltage shall be at least 6 Hz.

Should an AC voltage of 50 V_{eff} or a DC voltage of 75 V be exceeded for this unloaded dynamo within the specified speed range, additional measures shall be provided in order to meet this voltage limit.

Mr Sato proposed to change 50Veff to 60Veff.
Mr Carlin draws the attention of the experts on high voltage regional regulation
➔ to be checked by the next meeting.

➔ For efficiency additional description of test device is needed

4.4 Corrosion resistance

The lighting equipment shall still be functional after testing has taken place.

4.5 Water resistance

The lighting equipment shall still be functional after testing has taken place.

4.6 Impact resistance

➔ to be developped

4.7 Fatigue strength

➔ to be developped

4.8 Loading requirements

During the entire testing, the equipment shall not show any damage, shall not fail and shall still be functional after testing has taken place.

5. Test Methods

5.1 Dynamo-operated head lamps

Dynamo-operated head lamps have to be tested corresponding with the test methods of ISO 6742-1 4.1, 4.4, 4.5, 4.6.
~~(ISO 6742 Part 1)~~

To be completed

5.2 Dynamo-operated rear lights

Dynamo-operated rear lights have to be tested corresponding with the test methods of 6742-1 4,2 and 4.3. ~~(ISO 6742 Part 1)~~

To be completed

5.3 Dynamos

5.3.1 Frictional dynamos

~~Before testing, the winding of the unloaded dynamo at a number of revolutions corresponding to a speed of 15 km/h and at an ambient temperature of (23 ± 5) °C shall be short-circuited at least five times for approximately 1 s.~~
6 V/3 W dynamos at a load of 12ohms, 2,4W 15 ohms and 6V LED dynamos at a electronic load according Annex 1~~A~~ shall then be applied (see Figure A.1).

Before the measurement, the dynamo thus loaded shall be operated at an ambient temperature of (23 ± 5) °C without forced cooling for 20 minutes at a number of revolutions corresponding to a speed of 30 km/h. After cooling of the dynamo to ambient temperature, the voltage characteristics as well as the efficiency shall be determined. Here, a driving wheel with a treadless surface and with a diameter of at least 600 mm shall be used.

The measurements shall be carried out with the following procedure:

- determination of output voltage and efficiency after 5 minutes of continuous operation at a speed of 15 km/h;
- determination of output voltage ~~and efficiency~~ after reduction of speed to 5 km/h;
- determination of output voltage ~~and efficiency~~ after raising speed up to, but not exceeding 30 km/h.

5.3.2 Form-locking dynamos

~~Before testing, the winding of the unloaded dynamo at a number of revolutions corresponding to a speed of 15 km/h and at an ambient temperature of (23 ± 5) °C shall be short-circuited at least five times for approximately 1 s.~~
6 V/3 W dynamos at a load of 12ohms, 2,4 W at a load of 15ohms and 6 V LED dynamos at an electronic load according to Annex1 ~~A~~ shall then be applied (see Figure A.1).
Before the measurement, the dynamo thus loaded shall be operated at an ambient temperature of (23 ± 5) °C without forced cooling for 20 minutes at a number of revolutions corresponding with a speed of 30 km/h. After cooling of the dynamo to ambient temperature the voltage characteristics as well as the efficiency shall be determined.
The measurements shall be carried out with the following procedure:

— determination of output voltage and efficiency after 5 minutes of continuous operation at a speed of 15 km/h;
— determination of emitted voltage ~~and efficiency~~ after reduction of speed to 5 km/h;
— determination of output voltage ~~and efficiency~~ after raising speed up to, but not exceeding 30 km/h.

5.4 Corrosion testing

The entire lighting system (head lamps, rear lights, dynamos in functional assembly conditions) shall undergo corrosion testing according to ISO 9227.
A total of 96 hours shall be run.

5.5 Water spray test

The entire lighting system (head lamps, rear lights, dynamos in functional assembly conditions) shall undergo water spray testing according to IEC 60529:1989 + A1:1999, regarding Class IP X3 protection against water spray. The duration of test is 6 hour.
At the end of the test allow the unit to drain for 1 hour.
Mr Carlin proposed as no complain was registered to stick to IPX3. Mr Vellinga approved. It was agreed to keep IPX3.

5.6 Impact test

New test methods will be proposed for front and rear light only.

5.7 Mechanical durability

Same vibration test than for front and rear light for the fixation of friction generator on the frame?
Evaluation of durability of rotating parts?

To be checked

~~5.8 Resistance test~~

~~The test shall be performed for 20 minutes at a number of revolutions per minutes corresponding to a speed of 30 km/h at an ambient temperature of 23 °C ± 5 °C without forced cooling. For a dynamo whose speed is dependent on the wheel diameter, the smallest of the outer wheel diameters provided by the applicant shall be referred to.~~

Mr Lebeaume asked which requirement corresponds to this test. No answer from the floor.
Decision → delete the test

5.9 Efficiency test method

To be described

Color distribution
Doc N026 – N16
Stick to IEC standards.
→ to be checked

Annex 1

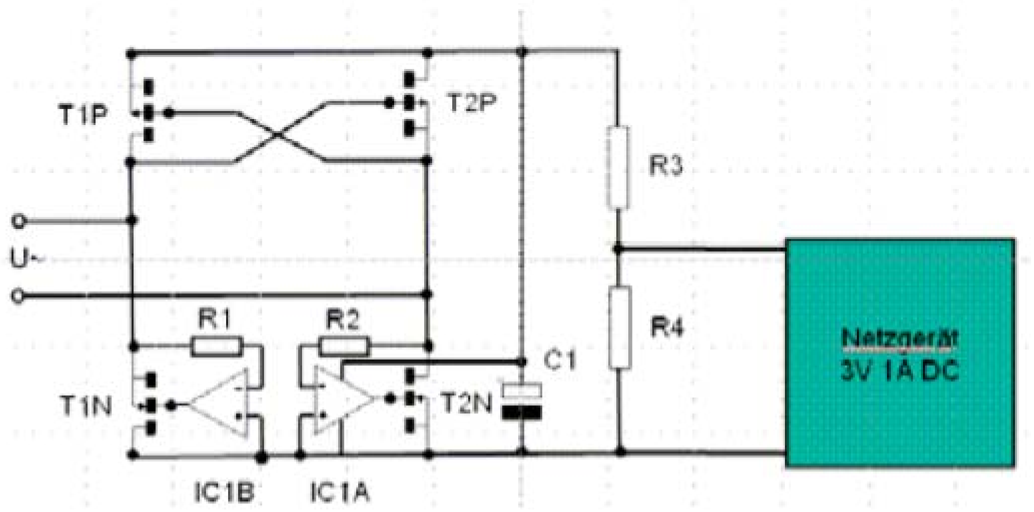


Fig A1 : Power-measurement of LED dynamos

The following components are needed for the measurement:

a) T1P, T2P: P-Kanal Mosfet (z.B.: SI 4562 DY (je ein N- und ein P-Kanal Mosfet)

b) T1N, T2N: N-Kanal Mosfet (z.B.: SI 4562 DY (je ein N- und ein P-Kanal Mosfet)

1) Total Gate Charge: Q_q < 50 nC

2) Drain-Source Voltage: U_{DS} > 30V

3) Drain-Source On-State resistance: $R_{DS(on)}$ < 50 mΩ

4) Gate Threshold Voltage: $U_{GS(th)}$ < 1,6V

c) IC1A, IC1B: Operationsverstärker (z. B.: LM 2904)

1) Input Bias Current: I_{inBias} < 50 nA

2) Input Offset Current: $I_{inOffset}$ < 5 nA

3) Supply Voltage: U_{supply} = 3 V bis 30 V

4) Offset Voltage: U_{offset} < 10 mV

5) Output Voltage Swing $U_{outH} > V_{cc} - 1,4V$, $U_{outL} < 0,3\ V$

d) R1 – R4-Widerstände

1) R1, R2: 1 MΩ

2) R3: 10 Ω (1 %)

3) R4: 3,3 Ω (10 %)

e) C1: Kondensator

f) 1000 µF 25V (20 %)

g) Netzgerät: 3V ± 30 mV, 1A DC

The Mosfet has to be cooled!

5 – Annex E - Discussion on part 5

As revised during the 23rd-24th May 2011 WG10 meeting

- **5 – Annex E – Cycles — Lighting and retro-reflective devices — Part 5: Lighting systems – Integrated lamp(s) and power source**

The contributions were studied during the meeting.

- **Cycles — Lighting and retro-reflective devices — Part 5: Lighting systems – Integrated lamp(s) and power source**

1 -Scope
This part of the ISO 6742 applies to lighting and signaling systems used on cycles intended to be used on public roads and, especially, bicycles complying with ISO 4210 and 8098.

This part of ISO 6742 prescribes how to check the photometrical performance and safety requirements of the lighting systems depending on cycle's movement ~~and~~ or on board power supply which are not covered in part 4. It applies to light devices complying with ISO 6742-1.

Proposal for clause 4 submitted by JF Carlin

Mr. Carlin introduced his proposal. His proposal was discussed and amended during the meeting.

4 Lighting systems depending on cycles movement

4.1 System definition.

System including:

- power source and at least one type of light not built to be sold separately;
- where power generator characteristics are depending of vehicle movement ~~speed~~;
- and when light output performances are depending of the speed of the vehicle, or the time during which bicycle has been stopped.

~~Example: dynamo + front light into a same housing. Usually named 'bloc dynamo '.~~

4.2 Photometrical performances.

4.2.1 General

This system concerns only position lamps, rear lamps, low beam and high beam.

Discussion: is it possible to mix components from several suppliers? Is it possible to sell the components separately ? Mr. Muller said that it is impossible.

4.2.2~~4.2.1~~ Speed ranges

Because this system is movement ~~speed~~ depending, we are defining 3 speed ranges:

4.2.2.1 ~~4.2.1.1~~ very low speed : below 5 ~~3~~ ~~5~~ km/h

No requirement.

4.2.2.2 ~~4.2.1.2~~ low speed : from 5 ~~3-5~~ to 15 ~~8~~ km/h

The light output level should be in conformity with the position function according to ISO6742-1 4.1, 4.2 and 4.7.

It is allowed than the light is flashing.

4.2.2.3 ~~4.2.1.3~~ Normal running speed : above and from 15 ~~9~~ km/h

No visible flashing.

Photometrical values should comply with corresponding category of the light included into the system.

~~4.2.3 4.2.2 When bicycle is standing :~~

~~'Steady function': a sub system which allow light to remain lighting when bicycle is standing is not compulsory.~~

~~But if such a subsystem is included into the system, all associated lights should match position level during at least 1 minute.~~

~~If this subsystem is using batteries, a charge level indicator should clearly indicate when batteries should be replaced or loaded.~~

Justification to delete this subclause: This duplicate part 1 steady light function

4.3 Safety requirement

~~4.3~~ 4.3.1 Environmental behavior.

This system should match the same requirements than any other corresponding product as described in 6742-1 and 6742-3 ~~this standard~~.

But it should withstand any speed up to 50km/h.

4.4 ~~Testing~~ Test method

There is a discussion about the pertinence to keep the following sentence. Decision was to delete it.

~~If not existing at laboratory, manufacturer should supply the features required to allow testing system into significant conditions.~~

Mr King underlined that it is very dangerous to describe a test in standard without checking its validity.

Mr Carlin answered that he already applies this proposal.

Mr Muller asked if the test is performed light on? The answer is yes.
Decision: complete by describing the test conditions.

4.4.1 Test method to check photometrical requirements

The requirements above should be tested from 5km/h to 15km/h.

If a 'steady function' is available, performances are checked in stopping ~~the bench test~~ after 2minutes of operation at 15km/h.

4.4.2 Test method to check behavior at a speed of 50 km/h

Endurance test is conducted at 30km/h during 30minutes. Just after the 30 minutes at 30km/h, the speed is ~~quickly~~ increased to 50km/h with 5 secondes, and let at 50km/h during 10 secondes. Then speed is steadily down to 0.

If the system could be switch on and off while vehicle is running, the switch is switch on/off 10 times at 30km/h.

As no satisfactory rational was presented during the meeting , the convener requests the experts to check this proposal for the next meeting and provide results

Mr Carlin explained that this does not replace the durability test described in part3, but it is an additional test for checking the behavior of the product at high speed.

The members of the working group must check if this test must also be included in part4.

Proposal for clause 5 from G Billard

Mr Billard explained the rational to consider for lighting devices having electronic circuit his approach. This proposal is based on already agreed standard for EPAC.
M. Lebeaume proposed to go through the proposal submitted by Mr Billard.

- **Cycles — Lighting and retro-reflective devices — Part 5: Lighting systems – Integrated lamp(s) and power source**

  When reading clause 5.3 of the proposal, a discussion occurs on the field of application of this part. The question to consider safety requirements was raised. Does the working group agree to cover two possible cases:
  a) lighting system with on board power supply with only battery in the lighting system
  b) lighting system with on board power supply which can be for example a battery fitted on bicycle
  Finally the group agrees to consider:
  a) photometric requirements
  b) safety requirements
  b1) lighting system device with battery provided by the light manufacturer
  b2) lighting system with battery fitted in the cycle by the cycle manufacturer

1 -Scope
This part of the ISO 6742 applies to lighting and signaling systems used on cycles intended to be used on public roads and, especially, bicycles complying with ISO 4210 and 8098.

This part of ISO 6742 prescribes how to check the photometrical performance and safety requirements of the lighting systems depending on cycle's movement ~~and~~ or on board power supply which are not covered in part 4. It applies to light devices complying with ISO 6742-1.

2 Normative references

3 Term and definition

Definition of lighting and signaling systems → to be drafted

4 Lighting systems depending on cycles movement

~~To be completed~~ see proposal from Mr Carlin

5 On board power supply lighting systems

5.1 Photometric requirements

Note of the secretary: What do we want? Comply with part1?

5.2 Safety requirement

~~5.1~~ 5.2.1 Generality

This chapter of ISO 6742-5 specifies safety requirements and test methods for the assessment of the design and assembly of on board power supply lighting systems using battery voltage up to 60 VDC or integrated a battery charger with a 100 V to 250 V ~~230 V~~ input.

~~5.2~~ 5.2.2 Electric circuit
The electrical control system shall be designed so that, it should not ~~it~~ malfunction in a hazardous manner.
If symbols are used, their meaning shall be described in the instructions for use. Their function is one described in ISO 2575, their design shall be in accordance to that standard.

5.3 Ligthing systems with battery provided by light manufacturer

~~5.3~~ 5.3.1 Batteries and battery/charger compatibility

Mr. Sato proposed to improve the title to reflect the requirements in this clause..
Decision: add "and battery/charger compatibility", additional wording to clearly states that this applies to high performance capacitor will be discussed latter.

~~5.3.1~~ 5.3.1.1 Requirements

On board power supply lighting systems and pack of batteries shall be designed in order to avoid risk of fire, mechanical deterioration resulting from abnormal use. Compliance is checked by the test described in 4.2.2.2.

Decision: 4.2.2.2: to be completed

Discussion: Dr Muller asked if the previous sentence covers only the battery of the EPAC or also the battery of the lighting system.
Mr Billard answered that it covers both.

During the test the on board power supply lighting systems and the batteries shall not emit flames, molten metal or poisonous ignitable gas in hazardous amounts and any enclosure shall show no damage that could impair compliance with this Standard.

Safety and compatibility of the combination battery/charger combination shall be ensured, according to the manufacturer's specifications.

The battery terminals shall be protected against creating an accidental short circuit. Care shall be taken to ensure that the batteries are protected against overcharging. An appropriate overheating and short circuit protection device shall be fitted.

Discussion: are we speaking of the battery terminal or of the connector of the battery casing. Battery terminal may also be "battery connector".

NOTE: Indication and example of solutions are given in Annex A.
Batteries and the charger unit shall be labeled in order to be able to check their compatibility.

~~5.3.2~~ 5.3.1.2 Test method

Mr Billard explained that Lithium technology is used, it is necessary to check this topic.
Mr Muller asked to correct the wording (ie electric motor …).
Discussion on the need to consider or not this requirement
M. Carlin asked if the test must be conducted by the bicycle manufacturer on a completed assembled bike or by the light manufacturer on a subassembly.

~~5.3.2.1~~ 5.3.1.2.1 Battery subassembly

1) Battery terminals are short-circuited with the batteries in a fully charged condition for 10 seconds.

Discussion: the question to defined the time during which the batteries are short-circuited was raised.
Precised : 10 secondes

2) Lighting system is short-circuited; all commands are in worse case condition (I.e. maximal current) ~~ON position~~, whilst the batteries are fully charged.

Mr Sato underlined that we don't know if On position is the most severe condition. He proposed to consider the worst case.
The aim of this test is to test the protection of the battery.
Decision: consider worse case (ie maximal current)

3) The on board power supply lighting systems is operated with the whole electric ~~motor or drive~~ system locked up so as to fully discharge the battery or until the system stops.

4) The battery is charged for double the recommended charging period or for 24 hours depending upon which is the longest period.

~~5.4~~ 5.3.2 Electric cables and connections

~~5.4.1~~ 5.3.2.1 Requirements

Cable and plug temperature shall be lower than that specified by the manufacturer of the cables and plugs.
There shall be no corrosion on plug pins and no damage to cable and plug insulation.

~~5.4.2~~ 5.3.2.2 Test method

Discharge the fully charged on board power supply lighting systems battery to the discharging limit specified by the ESA manufacturer at the maximum current allowable by the system and record it, giving consideration to the electric subassembly ~~motor~~ and/or the controller and/or the battery controller. Measure the cable and plug temperatures and ensure, by examination, that there is no deterioration of the insulation on either assembly.

~~5.4.3~~ 5.3.2.3 Wiring

a) Wire ways shall be smooth and free from sharp edges.
b) Wires shall be protected so that they do not come into contact with burrs, cooling fins or similar sharp edges that may cause damage to their insulation. Holes in metal through which insulated wires pass shall have smooth well-rounded surfaces or be provided with bushings.
c) Wiring shall be effectively prevented from coming into contact with moving parts.
Separate parts of the on board power supply lighting systems that can move in normal use or during user maintenance relative to each other, shall not cause undue stress to electrical connections and internal conductors, including those providing earthing continuity.
Compliance with a), b), c) shall be checked by inspection.
d) If an open coil spring is used, it shall be correctly installed and insulated. Flexible metallic tubes shall not cause damage to the insulation of the conductors contained within them.

Compliance with d) shall be checked by inspection and by the following test method.
If flexing occurs in normal use, the appliance is placed in its normal operational position and is supplied at rated voltage under normal operation.
e) The movable part is moved backwards and forwards, so that the conductor is flexed through the largest angle permitted by its construction.
For conductors that are flexed in normal use, flex movable part for 10 000 cycles at a test frequency of 0,5 Hz.
For conductors that are flexed during user maintenance, flex the movable part for 100 cycles at the same frequency at (20 ± 5) °C.
The wiring and its connections shall withstand the electrical strength test. The test voltage expressed in V shall be equal to) 2 500 (Vr × + for 2 min and applied between live parts and other metal parts only.

NOTE: Vr is the rated voltage.

f) The insulation of internal wiring shall withstand the electrical stress likely to occur in normal use.
g) In case of integrated battery charger, electric safety of battery charger applies.

~~5.4.4~~ 5.2.3.4 Power cables and conduits

Conduit entries, cable entries and knock-outs shall be constructed or located so that the introduction of the conduit or cable does not reduce the protection measures adopted by the manufacturer.
Compliance is checked by inspection.

NOTE: Power cables selection should be made referring to IEC 60364-5-52:2001, Clauses 522.1.2, 523.1523.3 and Table A 52-10.

~~5.4.5~~ 5.2.3.5 External and internal electrical connections

Electrical connection shall comply with IEC 60364-5-52:2001, Clauses 526.1 and 526.2.

5.4.6 5.2.3.6 Moisture resistance

The on board power supply lighting systems are subjected to the test of IEC 20653 as follows: IPX4 IPX3 appliances as described in table 4

5.4.7 5.2.3.7 Mechanical strength

On board power supply lighting systems shall have adequate mechanical strength and be constructed to withstand such rough handling that may be expected in normal use. Compliance is checked by:

- applying impacts to the battery pack mounted on the on board power supply lighting systems by means of the spring hammer as specified in IEC 60068-2-75. The battery pack is rigidly supported and three impacts are applied to every point of the enclosure that is likely to be weak with an impact energy of (0,7 ± 0,05) J. After the test the battery pack shall show no damage that could impair compliance with this European Standard;
- detachable battery packs are submitted to free fall at a height of 0,90 meter in three different positions.
  After the test the battery pack shall show no damage that could lead to emission of dangerous substances (gas or liquid) ignition, fire or overheating.

NOTE: It is recalled to the attention that batteries had to fulfill all relevant tests to ensure safety.

5.2.3.8 EMC

To be discussed

5.4 Lighting system with batteries fitted in the cycle by the cycle manufacturer

5.4.x

To be completed

5.5 5.4.x Electro Magnetic Compatibility

Discussion occurs on the need to consider or not EMC specification in this standard to ensure the safety of the user. Majority of the working group thing that this proposal need to be studied in detailed.
Decision: to postpone the decision to the next meeting to include or not EMC requirement in the standard.

5.5.1 5.4.X.1 Emission

The on board power supply lighting systems ESA (electronic sub-assembly) shall conform to Annex C.

5.5.2 5.4.X.2 Immunity

The on board power supply lighting systems ESA (electronic sub-assembly shall conform to Annex C.

5.5.3 5.4.X.3 Battery charger

As an on board power supply lighting systems is not intended to be used while charging, for integrated charger the whole on board power supply lighting systems plus integrated charger shall be tested.
The following European standards apply for battery charger: EN 55014-1, EN55014-2, EN61000-3-2, EN61000-3-3.

6 Instruction for use

Annex A
(informative)

~~(To be discussed)~~

Example of recommendation for battery charging
Safety and quality of battery charging can be greatly improved by sensing the battery temperature during charging.

Most battery charger manufacturers set their chargers to have an optimal ambient temperature of 20 °C to 25 °C. Lower temperatures result in under charge, higher temperatures result in over charge.

Whilst it is normal when building battery packs from Ni-Cad, Ni-Mh and Li-ion battery cells, to include temperature sensing, this is not always the case with valve regulated lead acid (VRLA) batteries.

The main reason for including temperature sensing in VRLA batteries is to protect against one or more cells within the battery pack becoming short circuited. This lowers the terminal voltage and can allow the charger to supply more power than is required, which can lead to a dangerous thermal situation.

Temperature sensors should be fitted to each battery within the pack and this information fed back to the battery charger.

It is recommended that positive temperature coefficient (PTC) thermistors are used. All thermistors should be connected in series between the charger temperature pin (T) and the battery pack negative pin (-). Should any battery or cells within the pack reach the temperature given by the battery manufacturer (e.g.; 60 °C, 70 °C…) the charger thermal detection circuitry should be adjusted to detect this condition and take suitable measures to stop any further increase in temperature.

Annex C
(normative)

Electromagnetic compatibility of on board power supply lighting systems and ESA

C.1 Conditions applying to vehicles and to electrical/electronic sub-assemblies (ESA)

C.1.1 Marking

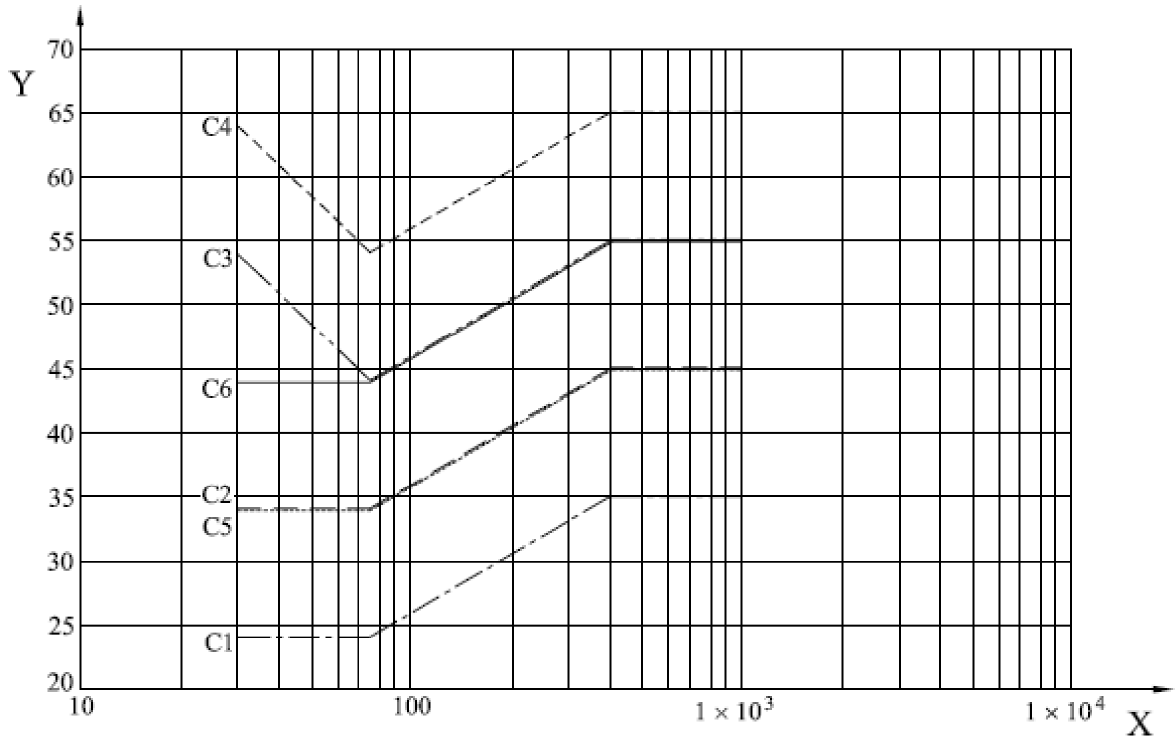
All ESAs, with the exception of cables shall bear the following and these marks shall be indelible and clearly legible:
a) make or name of the manufacturer of the ESAs and their components;
b) trade description.

C.1.2 Requirements

C.1.2.1 General requirements

All vehicles and ESAs shall be designed and constructed in such a way that, under normal conditions of use, they meet the conditions laid down in this annex.

NOTE An overview of the electromagnetic radiation emission reference limits is given in Figure C.1.



Key
X frequency f in MHz
Y reference limits L in dB [μV/m)
C1 requirements relating to narrow-band radiation emission from vehicle, antenna at 10 m
C2 requirements relating to broad-band radiation emission from vehicle, antenna at 10 m
C3 requirements relating to narrow-band ESA radiation emission, antenna at 1m

C4 requirements relating to broad-band ESA radiation emission, antenna at 1 m
C5 requirements relating to narrow-band radiation emission from vehicle, antenna at 3 m
C6 requirements relating to broad-band radiation emission from vehicle, antenna at 3 m

Figure C.1 — Overview of electromagnetic radiation emissions reference limits
Table C.1 — Overview of electromagnetic radiation emissions reference limits – Curves characteristics

Characteristic	Value	Band-width	Antenna distance [m]	Equation for L [dB(μV/m)] within f [MHz]		
				30…75	75…400	400…1000
C 1	mean value	narrow-band	10 ± 0,2	24=const.	24+15,13·log(f/75)	35=const.
C 2	quasi-peak	broad-band	10 ± 0,2	34=const.	34+15,13·log(f/75)	45=const.
C 3	mean value	narrow-band	1,0 ± 0,05	54-25,13·log(f/30)	44+15,13·log(f/75)	55=const.
C 4	quasi-peak	broad-band	1,0 ± 0,05	64-25,13·log(f/30)	54+15,13·log(f/75)	65=const.
C 5	mean value	narrow-band	3 ± 0,05	34=const.	34+15,13·log(f/75)	45=const.
C 6	quasi-peak	broad-band	3 ± 0,05	44=const.	44+15,13·log(f/75)	55=const.

However, the measuring methods used in checking the immunity of vehicles and ESAs to electromagnetic radiation are described in C.4 and C.7.

C.1.2.2 Broad-band radiation from vehicles

C.1.2.2.1 General
The electromagnetic radiation generated by the vehicle type submitted for testing are to be measured by the method described in C.2.

C.1.2.2.2 Vehicle reference limits (broad-band)

C.1.2.2.2.1 If measurements are taken using the method described in C.2, in respect of a vehicle-antenna distance of (10,0 ± 0,2) m, the radiation reference limit will be 34 dB microvolts/m in the 30-75 MHz frequency band and 34-45 dB microvolts/m in the 75 to 400 MHz frequency band. This limit will increase by the frequency logarithm for frequencies above 75 MHz. In the 400-1 000 MHz frequency band the limit remains constant at 45 dB.

C.1.2.2.2.2 If measurements are taken using the method described in C.2, in respect of a vehicle-antenna distance of (3,0 ± 0,05) m, 10 dB shall be added to the limit.

C.1.2.2.2.3 The measured values expressed in dB (microvolts/m) shall be 2 dB below the reference limit for the vehicle submitted for testing.

C.1.2.3 Requirements relating to narrow-band radiation emissions from vehicles

C.1.2.3.1 General
The electromagnetic radiation from the vehicle submitted for testing is to be measured by the method described in C.3.

C.1.2.3.2 Vehicle reference limits for vehicle narrow-band radiation

C.1.2.3.2.1 If measurements are taken using the method described in C.3, in respect of a vehicle-antenna distance of (10,0 ± 0,2) m, the radiation reference limit will be 24 dB in the 30-75 MHz frequency band and 24-35 dB in the 75-400 MHz frequency band. This limit will increase by the frequency logarithm for frequencies above 75 MHz. In the 400-1 000 MHz frequency band the limit remains constant at 35 dB.

C.1.2.3.2.2 If measurements are taken using the method described in C.3, in respect of a vehicle-antenna distance of (3,0 ± 0,05) m, 10 dB shall be added to the limit.

C.1.2.3.2.3 The measured values for the vehicle type submitted for testing expressed in dB (microvolts/m), shall be 2 below the reference limit.

For conformity of production testing do not remove the 2 dB from the reference limit.

C.1.2.4 Requirements regarding vehicle immunity to electromagnetic radiation

C.1.2.4.1 Measuring method

Tests to determine the immunity of the vehicle type to electromagnetic radiation shall be conducted in accordance with the method described in C.4.

C.1.2.4.2 Vehicle immunity reference limits

C.1.2.4.2.1 If measurements are taken using the method described in C.4, the field strength reference level shall be 24 volts/m r.m.s. in over 90 % of the 20 MHz to 2 000 MHz frequency band and 20 volts/m r.m.s. over the whole 20 MHz to 2 000 MHz frequency band.

C.1.2.4.2.2 The vehicle representative of the type submitted for testing shall not display any deterioration in the direct control of the vehicle which might be observed by the driver or by any other road user when the vehicle in question is in the state defined in C.4, and when it is subjected to the field strength expressed in volts/m, which shall be 25 % above the reference level.

C.1.2.5 Requirements concerning broad-band ESA radiation

C.1.2.5.1 Measuring method

The electromagnetic radiation generated by the ESA submitted for component type-approval shall be measured by the method described in C.5.

C.1.2.5.2 ESA broad-band reference limits

C.1.2.5.2.1 If measurements are taken using the method described in C.5, in respect of ESA antenna distance of (1,0 ± 0,05) m, the radiation reference limit will be 64-54 dB (microvolts/m) within the 30-75 MHz frequency band, this limit decreasing by the frequency logarithm, and 54-65 dB (microvolts/m) in the 75-400 MHz band, this limit increasing by the frequency logarithm.
In the 400-1 000 MHz frequency band the limit remains constant at 65 dB (1 800 microvolts/m).

C.1.2.5.2.2 The measured values for the ESA submitted for approval, expressed in dB (microvolts/m), shall be at least 2,0 dB below the reference limits.

C.1.2.6 Requirements concerning narrow-band ESA radiation emission

C.1.2.6.1 Method of measurement
The electromagnetic radiation generated by the ESA submitted for component type-approval is to be measured in accordance with the method described in C.6.

C.1.2.6.2 ESA narrow-band reference limits

C.1.2.6.2.1 If measurements are taken using the method described in C.6, in respect of ESA antenna distance of (1,0 ± 0,05) m, the radiation reference limit will be 54-44 dB (microvolts/m) in the 30-75 MHz frequency band, this limit decreasing by the frequency logarithm, and 44-55 dB (microvolts/m) in the 75-400 MHz band, this limit increasing by the frequency logarithm.
In the 400-1 000 MHz frequency band the limit remains constant at 55 dB (560 microvolts/m).

C.1.2.6.2.2 The measured values for the ESA submitted for competent type-approval, expressed in dB (microvolts/m), shall be at 2 dB below the reference limits.
For conformity of production testing do not remove the 2 dB from the reference limit.

C.1.2.7 Requirements concerning ESA immunity to electromagnetic radiation

C.1.2.7.1 Method of measurement

The immunity to electromagnetic radiation of the ESA submitted for component type approval will be tested by means of one of the methods described in C.7.

C.1.2.7.2 ESA immunity reference limits

C.1.2.7.2.1 If measurements are taken using the methods described in C.7, the immunity test reference levels will be 48 volts/m for the 150 mm stripline testing method, 12 volts/m for the 800 mm stripline testing method, 60 volts/m for the TEM cell testing method, 48 mA for the Bulk Current Injection (BCI) testing method and 24 volts/m for the Absorber lined Chamber testing method.

C.1.2.7.2.2 The ESAs representative of the type submitted for testing may not exhibit any malfunction which is able to cause any degradation on the direct control of the vehicle perceptible to the driver or other road user if the vehicle is in the state defined in Figure C.1 at a field strength or current expressed in appropriate linear units 25% above the reference limit.

C.2 Method of measuring broad-band electromagnetic radiation from vehicles

C.2.1 Measuring equipment

A peak detector shall be used to measure broad-band electromagnetic radiation.
Limits given in C.1.2.2.2.1 are for quasi-peak detector. It is possible to use peak detector, in this case a correction factor of 20 dB shall be applied to this limit.

NOTE: The measuring equipment is described in CISPR 12.

C.2.2 Test method

According to CISPR 12.

C.2.2.1 Test conditions

According to CISPR 12.

C.2.2.2 State of the vehicle during the test
Apply a load in order to test at 75% ± 10% of the continuous rated power declared by the manufacturer.

NOTE 1: The load can be achieved by braking, home trainer…
NOTE 2: For example, the test can be performed when the engine is running alone or when the driver on it using the brake.

C.2.2.3 Antenna type, position and orientation

According to CISPR 12.

C.2.3 Measurement
According to CISPR 12.

C.3 Method of measuring narrow band electromagnetic radiation from vehicles

C.3.1 General

C.3.1.1 Measuring equipment
An average-value detector is used to measure narrow-band electromagnetic radiation.
NOTE: The measuring equipment is described in CISPR 12.

C.3.1.2 Test method
According to CISPR 12.

C.3.1.3 Test conditions
According to CISPR 12.

C.3.1.4 State of the vehicle during the tests
Apply a load in order to test at 75% ± 10% of the continuous rated power declared by the manufacturer.

NOTE 1: The load can be achieved by braking, home trainer…
NOTE 2 :For example, the test can be performed when the engine is running alone or when the driver on it using the brake.

C.3.2 Antenna type, position and orientation
According to CISPR 12.

C.4 Methods of testing vehicle immunity to electromagnetic radiation

C.4.1 General
These tests are designed to demonstrate the insensitivity of the vehicle to any factor which may alter the quality of its direct control. The vehicle shall be exposed to the electromagnetic fields, described in this Annex, and shall be monitored during the tests.

C.4.2 Expression of results

The field strengths shall be expressed in Volts/m for all the tests described in this Annex.

C.4.3 Test conditions
The test equipment shall be capable of generating the field strengths in the range of frequencies defined in this Annex, and shall meet the (national) legal requirements regarding electromagnetic signal. The control and monitoring equipment shall not be susceptible to radiation fields whereby the tests could be invalidated.

C.4.4 State of the vehicle during the tests

C.4.4.1 The mass of the vehicle shall be equal to the mass in running order.

a) The engine shall turn the driving wheels at a constant speed predetermined by the testing authority in agreement with the vehicle manufacturer.

b) All vehicle systems shall be operating normally.

c) There shall be no electrical connection between the vehicle and the test surface and no connections between the vehicle and the equipment, save where so required by C.4.4.1 a) or C.4.4.2.

d) The test shall be done in at least the following conditions:

1) standstill mode or (running if this mode is pertinent)
2) Lighting system with a maximum power
3) Lighting system with a minimum power

C.4.4.2 Where ESA's are involved in the direct control of the vehicle and where these systems do not operate under the conditions described in C.4.4.1 a), the testing authority may carry out separate tests on the systems in question under conditions agreed with the vehicle manufacturer.

C.4.4.3 During the tests on the vehicle, only non-interference-generating equipment may be used.

C.4.4.4 Under normal conditions, the vehicle shall be facing the antenna.

C.4.5 Type, position and orientation of the field generator

C.4.5.1 Type of field generator
a) The criterion for the selection of the field generator type is the capacity of the latter to attain the prescribed field strength at the reference point (see C.4.5.4) and at the appropriate frequencies.
b) Either the antenna(s) or a transmission line system (TLS) may be used as the field generating device(s).
c) The design and orientation of the field generator shall be such that the field is polarised both horizontally and vertically at frequencies between 30 MHz and 2000 MHz.

C.4.5.2 Measurement height and distance

C.4.5.2.1 Height

C.4.5.2.1.1 The phase mid-point of all antennas shall not be less than 1,5 m above the vehicle plane.
C.4.5.2.1.2 No part of the antenna radiator elements shall be less than 0,25 m from the vehicle plane.

C.4.5.2.2 Measuring distance

C.4.5.2.2.1 Greater homogeneity of the field may be obtained by placing the field generator as far as technically possible from the vehicle. This distance will normally be in the range 1 to 5 m.

C.4.5.2.2.2 If the test is carried out in a closed installation, the radiator elements of the field generator shall not be less than 0,5 m from any type of radio frequency absorption material and not less than 1,5 m from the wall of the installation in question. There shall be no absorption material between the transmitting antenna and the vehicle under test.

C.4.5.3 Position of the antenna in relation to the vehicle

C.4.5.3.1 Reference point

C.4.5.3.1.1 The field generator shall be positioned in the median longitudinal plane of the vehicle.

C.4.5.3.1.2 No part of the TLS, except the vehicle plane, may be less than 0,5 m from any part of the vehicle.

C.4.5.3.1.3 Any field generator placed above the vehicle shall cover at least 75% of the length of the vehicle.

C.4.5.3.1.4 The reference point is the point at which the field strengths are established and is defined as follows:
a) horizontally, at least two metres from the antenna phase mid-point or, vertically, at least one metre from the TLS radiator elements;
b) in the median longitudinal plane of the vehicle;
c) at a height of (1,0 ± 0,05) m above the vehicle plane;
or

- o at (1,0 ± 0,2) m behind the vertical centre line of the vehicle's front wheel in the case of tricycles;

or

- o at (0,2 ± 0,2) m behind the vertical centre line of the vehicle's front wheel in the case of bicycles.

C.4.5.4 Position of the vehicle

If it is chosen to subject the rear part of the vehicle to radiation, the reference point shall be established as stated in C.5.3.1. In this case the vehicle will be positioned with its front part facing in the opposite direction to the antenna and as if it had been rotated horizontally through 180 degrees about its central point. The distance between the antenna and the nearest part of the outer surface of the vehicle shall remain the same.

C.4.6 Requisite test and condition

C.4.6.1 Range of frequencies, duration of the tests, polarisation
The vehicle shall be exposed to electromagnetic radiation in the 20-2000 MHz frequency range.
a) Measurement shall be made in the 20 to 2000 MHz frequency range with frequency steps according to ISO 11451-1, with a dwell time of (2 ± 0,2) s for each frequency.
b) The vertical polarisation modes described in C.4.5.1 c) shall be selected by common agreement between manufacturer and testing body.
c) All other test parameters are as defined in this clause.

C.4.6.2 Tests to check deterioration in direct control

C.4.6.2.1 A vehicle is deemed to fulfil the requisite immunity conditions if, during the tests carried out in the manner required by this clause, there are no abnormal changes in the speed of the vehicle's drive wheels, there are no signs of operational deterioration which might mislead other road users and there are no other noticeable phenomena which could result in a deterioration in the direct control of the vehicle.

C.4.6.2.2 For the purpose of monitoring the external part of the vehicle and of determining whether the conditions laid down in C.4.6.2.1 have been met, a video camera may be used.

C.4.6.2.3 If a vehicle does not meet the requirements of the tests defined in C.4.6.2, steps shall be taken to verify that the faults occurred under normal conditions and are not attributable to spurious fields.

C.4.7 Generation of the requisite field strength

C.4.7.1 Test method
a) The "substitution method" is to be used for the purpose of creating the field test conditions.

b) Substitution method: for each test frequency required, the RF power level of the field generator shall be set so as to produce the required test field strength at the reference point of the test area without the vehicle being present. This RF input power level, as well as all other relevant settings on the field generator shall be recorded in the test report (calibration curve). The recorded information is to be used for type-approval purposes. Should any alterations be made to the equipment at the test location, the substitution method shall be repeated.
c) The vehicle is then brought to the test installation and positioned in accordance with the conditions laid down in C.4.5. The power required by C.4.7.1 b) is then applied to the field generator for each of the frequencies indicated in C.4.6.1 a).
d) Whatever field-definition parameter is chosen in accordance with the conditions laid down in C.4.7.1 b), the same parameter shall be used in order to determine the strength of that field throughout the test.
e) For the purposes of this test, the same field generating equipment and the same equipment configuration shall be used as in the operations conducted in pursuance of C.4.7.1 b).
f) Field strength measuring device: under the substitution method, the device used to determine the field strength during the calibration stage should take the form either of a compact isotropic probe for measuring field strength or of a calibrated receiving antenna.
During the calibration phase of the substitution method, the phase mid-point of the field-strength measuring device shall coincide with the reference point.
If a calibrated receiving antenna is used as the field strength measuring device, readings will be obtained in three directions at right angles to each other. The equivalent isotropic value corresponding to these measurements is to be regarded as the field strength.
g) In order to take account of differences in vehicle geometry, a number of reference points shall be established for the relevant test installation.

C.4.7.2 Field strength contour
During the calibration phase (before the vehicle is positioned on the test surface) the field strength shall not be less than 50% of the nominal field strength at the following locations:
i) for all field-generating devices, (1,0 ± 0,02) m on either side of the reference point on a line passing through this point, and perpendicular to the median longitudinal plane of the vehicle;
ii) in the case of a TLS, (1,5 ± 0,02) m on a line passing through the reference point, and situated in the median longitudinal plane of the vehicle.

C.4.7.3 Characteristics of the test signal to be generated

C.4.7.3.1 Peak value of the modulated test field strength
The peak value of the modulated test field strength shall correspond to that of the unmodulated test field strength, the actual value in volts/m of which is defined in C.1.2.4.2.

C.4.7.3.2 Test signal waveform
The test signal shall be a radio-frequency sinusoidal wave, amplitude-modulated by a sinusoidal 1 kHz wave at a modulation rate m of 0,8 ± 0,04 (peak value).

C.4.7.3.3 Modulation rate
The modulation rate m is defined as follows:
m ≥ NUM > peak envelope value - minimum envelope value > DEN > peak envelope value + minimum envelope value
The envelope describes the curve formed by the edges of the modulated carrier as seen on an oscillograph.

C.4.8 Inspection and monitoring equipment
For the purposes of monitoring the external part of the vehicle and the passenger compartment and of determining whether the conditions laid down in C.4.6.2.2 have been met, use will be made of a video camera or cameras.

C.5 Method of measuring broad-band electromagnetic radiation from separate technical units (ESA)

C.5.1 General

C.5.1.1 Measuring equipment

A broad peak detector shall be used to measure broad-band electromagnetic emissions.

NOTE: The measuring equipment is described in CISPR 12.

C.5.1.2 Test method - Test conditions

According to CISPR 25:2008 Absorber lined Chamber.

C.5.2 State of the ESA during the test

According to CISPR 25:2008 Absorber lined Chamber.

C.5.3 Antenna type, position and orientation

According to CISPR 25:2008 Absorber lined Chamber.

C.6 Method of measuring narrow-band electromagnetic radiation from separate technical units (ESAs)

C.6.1 General

C.6.1.1 Measuring equipment

A average-value detector is used to measure the narrow-band electromagnetic radiation.

NOTE : The measuring equipment is described in CISPR 12.

C.6.1.2 Test method

According to CISPR 25:2008 Absorber lined Chamber.

C.6.2 Test conditions

According to CISPR 25:2008 Absorber lined Chamber.

C.6.3 State of the ESA during the tests

According to CISPR 25:2008 Absorber lined Chamber.

C.6.4 Antenna type, position and orientation

According to CISPR 25:2008 Absorber lined Chamber.

C.7 Methods of testing the ESA immunity to electromagnetic radiation

C.7.1 General

These tests are designed to demonstrate the insensitivity of the ESA to any factor which may alter the quality of its direct control. The ESA shall be exposed to the electromagnetic fields, described in C.7, and shall be monitored during the tests.

C.7.2 Expression of results

The field strengths shall be expressed in either in mA (BCI) or in Volts/m for all the other tests described in C.7.

C.7.3 Test conditions

The test equipment shall be capable of generating the current or the field strengths in the range of frequencies defined in this Annex, and shall meet the (national) legal requirements regarding electromagnetic signal. The control and monitoring equipment shall not be susceptible to radiation fields whereby the tests could be invalidated.

C.7.4 State of the ESA during the tests

Where ESA's are involved in the direct control of the vehicle and where these systems do not operate under the conditions described in C.4.4.1 a), the testing authority may carry out separate tests on the systems in question under conditions agreed with the vehicle manufacturer.

C.7.5 Requisite test and condition

C.7.5.1 Test methods
ESAs shall comply with the limits (C.1.2.7.2) for one of the following test methods, at the manufacturer's discretion, within the range of 20 - 2 000 MHz:
1) stripline test;
2) bulk current injection test;
3) TEM-cell test;
4) absorber lined Chamber, only in vertical polarization.

NOTE: To avoid radiation from electromagnetic fields during tests, it is recommended to carry them out in a shielded area.

C.7.5.2 Range of frequencies, duration of the tests, polarisation
The vehicle shall be exposed to electromagnetic radiation in the 20-2 000 MHz frequency range.

1) Measurement shall be made in the 20 to 2000 MHz frequency range with frequency steps according to
ISO 11452-1, with a dwell time of (2 ± 0,2) s for each frequency.
2) All other test parameters are as defined in this clause.

C.7.5.3 Tests to check deterioration in direct control

C.7.5.3.1 A vehicle is deemed to fulfil the requisite immunity conditions if, during the tests carried out in the manner required by this clause, there are no abnormal changes Lighting system, there are no signs of operational deterioration which might mislead other road users and there are no other noticeable phenomena which could result in a deterioration in the direct control of the vehicle.

C.7.5.3.2 For vehicle observation purposes, only the monitoring equipment described in C.4.6.2.2 may be used.

C.7.5.3.3 If a vehicle does not meet the requirements of the tests defined in C.4.6.2, steps shall be taken to verify that the faults occurred under normal conditions are not attributable to spurious fields.

C.7.6 Generation of the requisite field strength

C.7.6.1 Test method

C.7.6.1.1 Stripline test
According to ISO 11452-5.

C.7.6.1.2 BCI test
According to ISO 11452-4.

C.7.6.1.3 TEM cel test
According to ISO 11452-3.

C.7.6.1.4 Absorber line Chamber test
According to ISO 11452-2.

C.7.6.2 Characteristics of the test signal to be generated

C.7.6.2.1 Peak value of the modulated test field strength
The peak value of the modulated test field strength shall correspond to that of the unmodulated test current or field strength, the actual value in mAmps or in volts/m of which is defined in C.1.2.7.2.

C.7.6.2.2 Test signal waveform
The test signal shall be a radio-frequency sinusoidal wave, amplitude-modulated by a sinusoidal 1 kHz wave at a modulation rate m of 0,8 ± 0,04.

C.7.6.2.3 Modulation rate
The modulation rate m is defined as follows:
m ≥ NUM > peak envelope value - minimum envelope value > DEN > peak envelope value + minimum envelope value
The envelope describes the curve formed by the edges of the modulated carrier as seen on an oscillograph.

C.7.7 Inspection and monitoring equipment
For the purposes of monitoring the external part of the vehicle and the passenger compartment and of determining whether the conditions laid down in C.4.6.2.2 have been met, use will be made of a video camera or cameras.

C.8 ESD test

ESD test shall be performed according to EN 61000-4-2 at 4 kV for contact discharge and 8 kV for air discharge with immunity criteria B.