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

Part 4:
**Lighting systems powered by the
cycle's movement**

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*Cycles — Éclairage et dispositifs rétro réfléchissants —
Partie 4: Systèmes d'éclairage alimentés par dynamo*

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ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

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Foreword

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

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

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

This second edition cancels and replaces the first edition (ISO 6742-4:2015), which has been technically revised.

The main changes are as follows:

- terms and definitions: “open system” and “closed system” were added;
- overall structure changes to clarify requirements and test methods;
- addition of “6 V/3 W with electric load” positive drive generators;
- changes in generator characteristic requirements;
- clarify test methods and improvement of requirements for open systems;
- changes in closed system requirements and test methods;
- improvement of [Clause 8](#);
- improvement of [Clause 9](#);
- improvement of [Annex A](#);
- improvement of [Annex B](#);
- improvement of [Annex C](#).

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

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

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Cycles — Lighting and retro-reflective devices —

Part 4:

Lighting systems powered by the cycle's movement

1 Scope

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

This document specifies requirements and test methods for the performance of lighting systems powered by the cycle's movement. It applies to lighting and light signalling devices complying with ISO 6742-1. Lighting systems include lighting and light signalling devices and power supplied by cycle's movement such as generator.

2 Normative references

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

ISO 6742-1:2023, *Cycles — Lighting and retro-reflective devices — Part 1: Lighting and light signalling devices*

ISO 6742-3:2023, *Cycles — Lighting and retro-reflective devices — Part 3: Installation and use of lighting and retro-reflective devices*

ISO 9227, *Corrosion tests in artificial atmospheres — Salt spray tests*

IEC 60529, *Degrees of protection provided by enclosures (IP Code)*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 6742-1 and the following apply.

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

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

3.1

frictional drive generator

generator for which the rotor or stator is linked to a pulley which press against the driving wheel over a swivel bearing through force

3.2

positive drive generator

generator which is not concerned by the definition of *frictional drive generator* (3.1)

3.3 open system

system of lamp and power source (i.e. generator or battery) combinations which are interchangeable if they meet the requirements

Note 1 to entry: The requirements are specified in this document or ISO 6742-5^[3].

3.4 closed system

system in which lamp and power source (i.e. generator or battery) are integrated, or in which the combination is specified by the manufacturer.

4 Requirements for lighting systems powered by the cycle's movement

4.1 General

There are two types of lighting systems powered by the cycle's movement: open systems and closed systems, and they shall meet the respective requirements shown in [Table 1](#).

The requirements shall be met by the maximum and minimum wheel diameters of the cycle intended for use.

Table 1 — lighting systems powered by the cycle's movement

Light system		Requirement	Test method
Both system		4.2	7.1
		4.3	7.2
Open system	Front lamp	5.2	7.3
	Rear lamp	5.3	7.4
	Generators	5.4	7.5
Closed system		6	7.6

4.2 Corrosion resistance

All functions of the lighting system shall work after testing in accordance with the test method described in [7.1](#).

4.3 Water resistance

All functions of the lighting system shall work after testing in accordance with the test method described in [7.2](#).

5 Requirements for open system

5.1 General

The complete system shall be designed as open system which requires compatibility between lamps and generators.

5.2 Front lights for open system

Front lights for open system (lamps emitting light to the front) shall correspond with the requirements of ISO 6742-1:2023, 4.2, 4.5, 4.6 and 4.9, when tested in accordance with [7.3](#).

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_{rms} .

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 $3 U_{\text{rms}}$ at the latest;
- the lighting evaluation shall be performed at test voltage;
- the power consumption shall be 110 % or less of the nominal value;
- the power consumption shall be 2,4 W or less at the test voltage;
- electronic ballasts in these units shall have the corresponding electrical rating.

Head lamps with integrated capacitor to power the light while halting 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 ISO 6742-1:2023, 4.8. The entire equipment shall fulfil the necessary requirements at test voltage, where, based on a discharged capacitor, a charging time of 120 s using test voltage is permissible and the reduction of the generator voltage through the charging of the capacitor shall correspond with the following conditions:

- a) not exceeding 60 % after 15 s;
- b) not exceeding 37 % after 30 s;
- c) not exceeding 15 % after 60 s;
- d) not exceeding 5 % after 90 s;
- e) not exceeding 1,5 % after 120 s.

Any stand light shall emit visible light for at least 240 s.

5.3 Rear lights for open system

Rear lights for open system (lamps emitting light to the rear) shall correspond with the requirements of ISO 6742-1:2023, 4.3, 4.4 and 4.8, when tested in accordance with 7.4. And the power consumption shall be 0,6 W or less at the test voltage.

Rear lamps 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 capacitor, a charging time of 120 s using test voltage is permissible and the reduction of the generator voltage through the charging of the capacitor shall correspond with the following conditions:

- a) not exceeding 60 % after 15 s;
- b) not exceeding 37 % after 30 s;
- c) not exceeding 15 % after 60 s;
- d) not exceeding 5 % after 90 s;
- e) not exceeding 1,5 % after 120 s.

Any stand light shall emit visible light for at least 240 s.

5.4 Generators for open system

5.4.1 General characteristics of generators

For measurements in accordance with 7.5, voltage and power of generators shall meet the values of Table 2.

For generators, for which the outputs characteristics are depending on diameter of the wheel, the minimum values given in Table 2 of the voltage and the efficiency refer to the largest outside diameter of the wheel as provided by the manufacturer. The measurement of the maximum values in Table 2 of the voltage refers to the smallest outside diameter of the wheel as stated by the manufacturer.

Table 2 — Characteristics of generators

Type of generator	System	Output	Between 5 km/h and less than 15 km/h		15 km/h		Over 15 km/h up to 30 km/h	
			min	max	min	max	min	max
Frictional drive generator	6 V/3 W and 6 V/2,4 W and 6 V/1,5 W with fixed resistor	Voltage V	3	7,5	5,7	7,5	5,7	7,5
		Resistance N				4		
	6 V/1,5 W with electric load	Power W	0,2	2,35	1,35	3,4	1,35	3,4
		Resistance N				4		
Positive drive generator	6 V/3 W and 6 V/2,4 W and 6 V/1,5 W with fixed resistor	Voltage V	3	7,5	5,7	7,5	5,7	7,5
		Efficiency %			30			
	6 V/1,5 W with electric load	Power W	0,2	2,35	1,35	3,4	1,35	3,4
		Efficiency %			30			
	6 V/3 W with electric load	Power W	0,2	4,7	2,7	4,7	2,7	4,7
		Efficiency %			30			

5.4.2 Frictional drive generator

For generators which press against the driving wheel over a swivel bearing through spring force, the spring force, measured perpendicularly to the rotational axis of the generator, shall be at least 10 N inside of the total swivel area to lose contact with tyre.

The increase in wheel rotation resistance due to contact between the generator and the wheel shall be less than 4 N.

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

5.4.3 Positive drive generator

For generators without gears and for the largest outside diameter of the wheel permissible for these generators 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 $50 V_{\text{rms}}$ or a DC voltage of 75 V be exceeded for this unloaded generator within the specified speed range, additional measures shall be provided in order to meet this voltage limit.

6 Requirements for closed system

6.1 General

The complete system shall be designed as closed system which does not have compatibility between lamps and generators.

6.2 Photometrical performance requirement between 5 km/h and 15 km/h

When tested by [7.6.1 a\)](#), the light shall emit. Continuous light is not required.

6.3 Photometrical performance requirement 15 km/h or higher

When tested by [7.6.1](#), photometrical performances shall conform with corresponding category of the light included into the system as specified in ISO 6742-1.

6.4 High speed endurance requirement

After tested by [7.6.2](#), photometrical performances shall comply with corresponding category of the light included into the system. It shall not flash visibly.

7 Test methods

7.1 Corrosion testing for both system

The entire lighting system (front lights, rear lights, generators in functional assembly conditions) shall undergo corrosion testing in accordance with ISO 9227. A total of 96 h shall be run with a salt concentration of 5 %.

7.2 Water resistance for both system

Generators in functional assembly conditions shall be tested in accordance with IPX4 in IEC 60529.

Front lights and rear lights for lighting systems powered by the cycle's movement shall be tested in accordance with IPX3 in IEC 60529.

At the end of the test, the unit may be drained for 1 h.

7.3 Front lights for open system

Front lights for open system (lamps emitting light to the front) shall be tested corresponding with the test methods of ISO 6742-1:2023, 4.2, 4.5, 4.6 and 4.9. The test voltage shall be the rated voltage of substantially sinusoidal AC (frequency 50 Hz or 60 Hz) or DC.

Measure the voltage at the terminal of the generator.

7.4 Rear lights for open system

Rear lights for open system (lamps emitting light to the rear) shall be tested corresponding with the test methods of ISO 6742-1:2023, 4.3, 4.4 and 4.8. The test voltage shall be the rated voltage of substantially sinusoidal AC (frequency 50 Hz or 60 Hz) or DC.

Measure the voltage at the terminal of the generator.