CIE S 017/E:2020



International Commission on Illumination Commission Internationale de l'Eclairage Internationale Beleuchtungskommission

International Standard

ILV: International Lighting Vocabulary 2nd Edition

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Foreword

International Standards produced by the Commission Internationale de l'Eclairage are concise documents on aspects of light and lighting that require a unique definition. They are a primary source of internationally accepted and agreed data which can be taken, essentially unaltered, into universal standard systems.

This CIE International Standard has been prepared by JTC 8 of the Commission Internationale de l'Eclairage. It includes definitions prepared by IEC TC 34/MT 2. The cooperation with IEC TC 34/MT 2 and IEC TC 1 is acknowledged.

CONTENTS

ForewordIII
Introduction1
1 Scope4
2 Normative References4
3 Terms and definitions4
Section 21: Radiation, quantities and units5
Section 22: Vision, colour rendering37
Section 23: Colorimetry
Section 24: Emission, optical properties of materials75
Section 25: Radiometric, photometric and colorimetric measurements: physical detectors 103
Section 26: Actinic effects of optical radiation123
Section 27: Light sources140
Section 28: Components of electric light sources and auxiliary apparatus
Section 29: Lighting technology and daylighting169
Section 30: Luminaires and their components201
Section 31: Visual signalling212
Section 32: Imaging235
Bibliography

Introduction

The aim of the International Lighting Vocabulary (ILV) is to promote international standardization in the use of quantities, units, symbols and terminology related to the science and art of light and lighting, colour and vision, metrology of optical radiation over the ultraviolet, visible and infrared region, photobiology and photochemistry, and image technology. This vocabulary provides the definitions and essential information necessary for the understanding and correct usage of the terms included. It does not give extensive detail or explanations of the application of these terms; such information, relevant for experts in each specialized field, is available in the Technical Reports and International Standards produced by the CIE.

The first edition of the ILV was published in 1938, the latest, the first edition of CIE S 017, in 2011. In 2015 CIE JTC 8 was established and received the task to address any issues regarding terms and definitions related to the ILV. This includes coordination within CIE Divisions to maintain and update the ILV, coordination with the IEC on questions related to the incorporation of ILV terms and definitions into IEC 60050-845 "International Electrotechnical Vocabulary. Lighting", coordination with ISO/TC 12 on questions related to the incorporation of ILV terms and definitions into ISO 80000-7 "Quantities and units – Part 7: Light and radiation", and any further terminology issues within CIE.

This new edition of the ILV is the result of intensive work carried out by CIE JTC 8 in order to harmonize the content of the ILV in its version of 2011 (published as CIE S 017:2011) with the content of the International Electrotechnical Vocabulary (IEV), subject area "Lighting" (IEC 60050-845), considering the rules for drafting definitions as given in the ISO/IEC Directives, Part 2. In addition parallel work in ISO/TC 12/WG 19 (Revision ISO 80000, all parts) was considered in the harmonization process.

This document has been prepared considering comments on CIE DIS 017:2016, CIE FDIS 017:2019, IEC CDV 60050-845:2018, and IEC FDIS 60050-845:2019. It has been harmonized with IEC 60050-845, which is published in its second edition with the identical technical content, in close cooperation with IEC TC 1 and IEC TC 34.

Organization of a terminological entry

Each of the terminological entries corresponds to a concept, and comprises:

- the ILV number.
- the term designating the concept, called "*preferred term*", possibly accompanied by *synonyms* and *abbreviations*,
- possibly a letter symbol for the quantity or unit,
- the *definition* of the concept,
- possibly non-verbal representations, examples and notes to entry,
- possibly the *source*.

ILV number

The ILV number is comprised of three elements, separated by hyphens:

"17", representing the number of this CIE standard (note that this number is "845" in the corresponding IEC document IEC 60050-845);

the section number: 2 digits (same as in IEC 60050-845);

the entry number: 3 digits (with leading zeroes) (same as in IEC 60050-845).

EXAMPLE **17-21-003**

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Letter symbols for quantities and units

These symbols are given on a separate line following the ILV term or possible accompanying synonyms and abbreviations.

EXAMPLE

```
17-21-025
wavelength \lambda
```

Preferred term and synonyms

The preferred term is the term that heads a terminological entry; it can be followed by synonyms. It is printed in boldface.

Synonyms:

The synonyms are printed on separate lines under the preferred term: preferred synonyms are printed in boldface, and admitted and deprecated synonyms are printed in lightface. Deprecated synonyms are prefixed by the text "DEPRECATED:".

Attributes

Each term (and synonym) can be followed by attributes giving additional information, which are printed in lightface on the same line as the corresponding term, following this term.

EXAMPLE

specific use of the term:

luminous efficacy, <of a light source>

national variant:

color, US

grammatical information:

cones, pl

light, <photometric> noun

deutan, adj

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IEV 1987 Section	IEV 2020 Section	ILV 2020 Section	Title	Leader
845-01	845-21	17-21	Radiation, quantities and units	CIE
845-02	845-22	17-22	Vision, colour rendering	CIE
845-03	845-23	17-23	Colorimetry	CIE
845-04	845-24	17-24	Emission, optical properties of materials	CIE
845-05	845-25	17-25	Radiometric, photometric and colorimetric measurements: physical detectors	CIE
845-06	845-26	17-26	Actinic effects of optical radiation	CIE
845-07	845-27	17-27	Light sources	IEC/CIE
845-08	845-28	17-28	Components of electric light sources and auxiliary apparatus	IEC
845-09	845-29	17-29	Lighting technology and daylighting	CIE
845-10	845-30	17-30	Luminaires and their components	IEC/CIE
845-11	845-31	17-31	Visual signalling	CIE/IEC
	845-32	17-32	Imaging	CIE

Table 1 – Numbering and assignment of IEV/ILV sections

ILV: International Lighting Vocabulary

1 Scope

This document defines terms regarding all matters relating to light and lighting, colour and vision, photobiology and image technology. It forms the second edition of CIE S 017:2011 *ILV: International Lighting Vocabulary* and replaces the first edition.

2 Normative References

3 Terms and definitions

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Section 21: Radiation, quantities and units

17-21-001 electromagnetic radiation, <phenomenon>

See IEV 702-02-07

Note 1 to entry: This entry was numbered 845-01-01 in IEC 60050-845:1987.

Note 2 to entry: This entry was numbered 17-370 in CIE S 017:2011.

17-21-002 optical radiation

electromagnetic radiation at wavelengths between the region of transition to X-rays ($\lambda \approx 1$ nm) and the region of transition to radio waves ($\lambda \approx 1$ mm)

Note 1 to entry: This entry was numbered 845-01-02 in IEC 60050-845:1987.

Note 2 to entry: This entry was numbered 17-848 in CIE S 017:2011.

17-21-003 visible radiation

optical radiation capable of causing a visual sensation directly

Note 1 to entry:	There are no precise limits for the spectral range of visible radiation since they depend
	upon the amount of radiant flux reaching the retina and the responsivity of the observer.
	The lower limit is generally taken between 360 nm and 400 nm and the upper limit
	between 760 nm and 830 nm.

Note 2 to entry: This entry was numbered 845-01-03 in IEC 60050-845:1987.

Note 3 to entry: This entry was numbered 17-1402 in CIE S 017:2011.

17-21-004 infrared radiation IR radiation IRR

optical radiation for which the wavelengths are longer than those for visible radiation

Note 1 to entry:	For infrared radiation, the range between 780 nm and 1 mm is commonly subdivided into:
	IR-A: 780 nm to 1 400 nm, or 0,78 μm to 1,4 μm; IR-B: 1,4 μm to 3,0 μm; IR-C: 3 μm to 1 mm.
Note 2 to entry:	A precise border between visible radiation and infrared radiation cannot be defined because visual sensation at wavelengths greater than 780 nm can be experienced.
Note 3 to entry:	In some applications the infrared spectrum has also been divided into "near", "middle", and "far" infrared; however, the borders necessarily vary with the application.
Note 4 to entry:	This entry was numbered 845-01-04 in IEC 60050-845:1987.
Note 5 to entry:	This entry was numbered 17-580 and 17-610 in CIE S 017:2011.

17-21-005 IR-A

infrared radiation covering the range from 780 nm (0,78 μ m) to 1 400 nm (1,4 μ m)

Note 1 to entry: This entry was numbered 17-605 in CIE S 017:2011.

17-21-006 IR-В

infrared radiation covering the range from 1,4 μm to 3,0 μm

Note 1 to entry: This entry was numbered 17-606 in CIE S 017:2011.

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17-21-007 IR-C

infrared radiation covering the range from 3 μ m to 1 mm

Note 1 to entry: This entry was numbered 17-607 in CIE S 017:2011.

17-21-008 ultraviolet radiation UV radiation UVR optical radiation for which the wavelengths are shorter than those for visible radiation				
Note 1 to entry:	The range between 100 nm and 400 nm is commonly subdivided into: UV-A: 315 nm to 400 nm; UV-B: 280 nm to 315 nm; UV-C: 100 nm to 280 nm.			
Note 2 to entry:	A precise border between "ultraviolet radiation" and "visible radiation" cannot be defined, because visual sensation at wavelengths shorter than 400 nm is noted for very bright sources.			
Note 3 to entry:	In some applications the ultraviolet spectrum has also been divided into "far," "vacuum," and "near" ultraviolet; however, the borders necessarily vary with the application (e.g. in meteorology, optical design, photochemistry, thermal physics).			
Note 4 to entry:	This entry was numbered 845-01-05 in IEC 60050-845:1987.			
Note 5 to entry:	This entry was numbered 17-1367, 17-1389 and 17-1388 in CIE S 017:2011.			

17-21-009 UV-A

ultraviolet radiation covering the range from 315 nm to 400 nm

Note 1 to entry: This entry was numbered 17-1385 in CIE S 017:2011.

17-21-010 UV-В

ultraviolet radiation covering the range from 280 nm to 315 nm

Note 1 to entry: This entry was numbered 17-1386 in CIE S 017:2011.

17-21-011 UV-C

ultraviolet radiation covering the range from 100 nm to 280 nm

Note 1 to entry: This entry was numbered 17-1387 in CIE S 017:2011.

17-21-012

light, <psychophysical> noun

radiation that is considered from the point of view of its ability to excite the visual system

Note 1 to entry: The term "light" is sometimes used for optical radiation extending outside the visible range, but this usage is not recommended.

Note 2 to entry: This entry was numbered 845-01-06 in IEC 60050-845:1987.

Note 3 to entry: This entry was numbered 17-659 (2.) in CIE S 017:2011.

17-21-013

light, <photometric> noun

radiation within the spectral range of visible radiation

Note 1 to entry: Sometimes, the term "light" is also used in physics as a synonym of optical radiation, covering the spectral range from 100 nm to 1 mm and sometimes even covering the X-ray spectral range. This misuse of the term "light" should be avoided.

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17-21-014 monochromatic radiation

radiation characterized by a single frequency or a single wavelength

- Note 1 to entry: If the wavelength is used to characterize a monochromatic radiation, the medium has to be stated.
- Note 2 to entry: In practice, monochromatic radiation is radiation of a very small range of frequencies or wavelengths that can be described by stating a single frequency or wavelength.
- Note 3 to entry: This entry was numbered 845-01-07 in IEC 60050-845:1987.
- Note 4 to entry: This entry was numbered 17-788 in CIE S 017:2011.

17-21-015 spectrum

display or specification of the monochromatic components of the radiation considered

- Note 1 to entry: There are line spectra, continuous spectra, and spectra exhibiting both these characteristics.
- Note 2 to entry: The term "spectrum" is also used for spectral efficiencies (excitation spectrum, action spectrum).
- Note 3 to entry: This entry was numbered 845-01-08 in IEC 60050-845:1987.
- Note 4 to entry: This entry was numbered 17-1238 in CIE S 017:2011.

17-21-016 spectral line

monochromatic radiation emitted or absorbed in a transition between two energy levels

- Note 1 to entry: A spectral line is often observed as a sharp feature in a spectrum.
- Note 2 to entry: This entry was numbered 845-01-09 in IEC 60050-845:1987.
- Note 3 to entry: This entry was numbered 17-1218 in CIE S 017:2011.
- 17-21-017 polarized radiation

radiation whose electromagnetic field, which is transversal, is oriented in defined directions

Note 1 to entry:	The polarization can be linear, elliptic or circular.
Note 2 to entry:	This entry was numbered 845-01-10 in IEC 60050-845:1987.

Note 3 to entry: This entry was numbered 17-966 in CIE S 017:2011.

17-21-018

circularly polarized radiation

radiation in which the electric field vector is of constant amplitude and rotates about the direction of propagation at a rate equal to the radiation frequency

Note 1 to entry: Circularly polarized radiation is described as right-handed (or left-handed) if the rotation of the electric field vector is clockwise (or anticlockwise) as viewed by an observer receiving the radiation.

Note 2 to entry: This entry was numbered 17-177 in CIE S 017:2011.

17-21-019 elliptically polarized radiation

electromagnetic radiation in which the electric field vector rotates at the radiation frequency, but varies in magnitude at a rate equal to twice the radiation frequency with the terminal point of the electric field vector describing an ellipse

Note 1 to entry: Elliptically polarized radiation is described as right-handed (or left-handed) if the rotation of the electric field vector is clockwise (or anticlockwise) as viewed by an observer receiving the radiation.

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