

INTERNATIONAL
STANDARD

ISO
15469
CIE S 011/E

Second edition
2004-02-15

**Spatial distribution of daylight — CIE
standard general sky**

Répartition spatiale de la lumière du jour — Ciel général normalisé CIE

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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.

ISO 15469 was prepared as Standard CIE S 011/E by the International Commission on Illumination, which has been recognized by the ISO Council as an international standardizing body. It was adopted by ISO under a special procedure which requires approval by at least 75 % of the member bodies casting a vote, and is published as a joint ISO/CIE edition.

The International Commission on Illumination (abbreviated as CIE from its French title) is an organization devoted to international cooperation and exchange of information among its member countries on all matters relating to the science and art of lighting.

ISO 15469 was prepared by Division 3 (Interior Environment and Lighting Design) of the CIE.

This second edition cancels and replaces the first edition (ISO 15469:1997), of which it constitutes a technical revision.

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ISO 15469:2004(E)
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Standard

Spatial Distribution of Daylight - CIE Standard General Sky

Répartition spatiale de la lumière du jour - Ciel général normalisé CIE

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FOREWORD

Standards produced by the Commission Internationale de l'Eclairage (CIE) are a concise documentation of data defining aspects of light and lighting, for which international harmony requires such unique definition. CIE Standards are therefore a primary source of internationally accepted and agreed data, which can be taken, essentially unaltered, into universal standard systems.

This Standard has been prepared by CIE Technical Committee 3-15*) of Division 3 (Interior Environment and Lighting Design) "Sky luminance models" and was approved by the National Committees of the CIE. This present standard replaces CIE S003 - 1996 "Spatial distribution of daylight - CIE standard overcast sky and clear sky".

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SPATIAL DISTRIBUTION OF DAYLIGHT - CIE STANDARD GENERAL SKY

INTRODUCTION

The luminance distribution of the sky depends on weather and climate, and it changes during the course of a day with the position of the sun. This standard lists a set of luminance distributions, which model the sky under a wide range of conditions, from the heavily overcast sky to cloudless weather. It is intended for two purposes:

- i. to be a universal basis for the classification of measured sky luminance distributions
- ii. to give a method for calculating sky luminance in daylighting design procedures.

The Standard defines relative luminance distributions: the luminance of the sky at any point is given as a function of the zenith luminance. For daylighting calculation purposes it may be used with values of zenith luminance or of horizontal illuminance to obtain absolute luminance distributions.

The Standard incorporates both the CIE Standard Clear Sky and the CIE Standard Overcast Sky, which are treated as particular cases of the General Sky. The Overcast Sky is retained as a separate formula because there are many calculation procedures that embody the mathematical formulation of this particular distribution.

1. SCOPE

This Standard defines a set of outdoor daylight conditions linking sunlight and skylight for theoretical and practical purposes.

The luminance distributions given have the following characteristics:

- i. They are symmetrical about the solar meridian and are functions of the angular distance, Z_s , between the sun and the zenith.
- ii. They are defined by smooth continuous functions. Such distributions are typical of cloudless skies and of those where the cloud cover is homogeneous. They provide an approximation to skies of broken cloud that is sufficiently accurate for many practical daylight calculation purposes.
- iii. The relative luminance at any point in the sky depends on the angle, χ , between that sky element and the sun, and on the angle, Z , between the sky element and the zenith. It is given in terms of two functions: the relative scattering indicatrix, $f(\chi)$, and the luminance gradation between horizon and zenith, $\phi(Z)$.

2. NORMATIVE REFERENCES

The following standards contain provisions, which through reference in the text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on the Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of the CIE, IEC and ISO maintain registers of currently valid international standards.

1. CIE 17.4-1987 *International Lighting Vocabulary*, ILV (joint publication IEC/CIE).
2. ISO 31:1992 *Quantities and Units, Part 6: Light and Related Electromagnetic Radiations*.