LIGHT CALCULATIONS AND MEASUREMENTS

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LIGHT CALCULATIONS AND MEASUREMENTS

*An introduction to the system of
quantities and units in light-technology
and to photometry*

H.A.E. KEITZ

SECOND REVISED EDITION

MACMILLAN

© N.V. Philips' Gloeilampenfabrieken, Eindhoven (The Netherlands), 1971

Softcover reprint of the hardcover 2nd edition 1971

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Published by

MACMILLAN AND CO LTD

London and Basingstoke

Associated companies in New York, Toronto, Melbourne, Dublin, Johannesburg and Madras

ISBN 978-1-349-00014-2

ISBN 978-1-349-00012-8 (eBook)

DOI 10.1007/978-1-349-00012-8

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FOREWORD

Since the first edition of this book appeared 14 years ago, it has been widely used in lighting practice and as a textbook, and appears to have received an enthusiastic response from users. It was therefore possible to leave the form and content of the book basically unchanged in this second edition.

A new section on Dourgnon and Fleury's quasi-central projection has been added to the chapter on the representation of light distributions. A section on the determination of the reflection properties of road surfaces in the chapter on reflection, absorption and transmission has completely been revised. Finally, a new section on the special measures to be taken when measuring the properties of gas-discharge lamps, with or without fittings, appears in the chapter on the measurement of luminous flux. The absorption of colour filters has also been dealt with in somewhat greater detail than in the first edition.

Measuring techniques have become much more mechanized and automated of recent years; electronics, and in particular digital techniques, are widely used in this connection. Such methods, which are also widely used for lighting measurements, belong to the field of electronics rather than that of lighting proper. They have therefore not been discussed in detail in this book, which is mainly concerned with basic photometric methods.

The author has made grateful use of the remarks and suggestions received from many readers since the appearance of the first edition. The whole text and the illustrations have also been carefully revised, and it is hoped that this second edition will also be of service to its readers in the practical and educational fields.

Thanks are due to all who have helped in the production of this book, and in particular to Prof. Dr. H. W. Bodmann of the University of Karlsruhe (until recently attached to the Philips' Lighting Laboratory in Aachen) who read the entire revised second edition through, and to whom many improvements in the text are due.

H. A. E. Keitz

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TABLE OF MOST IMPORTANT SYMBOLS USED IN THE TEXT

α	alpha	Plane angle, absorption factor
β	beta	Plane angle, luminance factor
γ	gamma	Plane angle
δ	delta	Plane angle
ϵ	epsilon	Emission factor
η	eta	Efficiency of fittings, coefficient of utilization
λ	lambda	Wavelength
μ	mu	Micro
ν	nu	Frequency
π	pi	3.1415
ρ	rho	Reflection factor
σ	sigma	Diffusion factor, transmissive exponent of diffusing media
τ	tau	Transmission factor
φ	phi	Plane angle
ψ	psi	Plane angle
ω	omega	Solid angle
Δ	delta	Small part. of a quantity
Θ	theta	Half-aperture angle of light beams
Σ	sigma	Sum of a number of quantities
Φ	phi	Luminous flux
a		Transmissive exponent of transparent media
b		Geographical latitude
c		Velocity of light
d		Distance
f		Focal distance
g		Optical limit distance of photometry, gloss number of Harrison
h		Height
i		Angle of incidence
l		Geometrical longitude, length
n		Refractive index
r		Angle of refraction
r, R		Radius
t		Time
u		Object distance
v		Image distance
E		Illumination, energy (power)
H		Luminous emittance
I		Luminous intensity
K_λ		Luminous efficiency of radiation at wavelength λ
L		Luminance
L		Equivalent luminance
M		Mechanical equivalent of light, linear magnification
Q		Quantity of light
S		Area, density
T		Periodic time
V_λ		International relative luminous efficiency of radiation for photopic vision at wavelength λ
V_λ'		International relative luminous efficiency of radiation for scotopic vision at wavelength λ

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