



COMMISSION INTERNATIONALE DE L'ÉCLAIRAGE
INTERNATIONAL COMMISSION ON ILLUMINATION
INTERNATIONALE BELEUCHTUNGSKOMMISSION

GUIDE FOR THE PHOTOMETRIC SPECIFICATION AND MEASUREMENT OF SPORTS LIGHTING INSTALLATIONS

PUBLICATION CIE N° 67 (1986)
CENTRAL BUREAU OF THE CIE
A—1033 VIENNA, P. O. BOX 169 — AUSTRIA

This Technical Report has been prepared by CIE Technical Committee TC-4.4 (within the former CIE structure) and has been approved by CIE Division 5 and the Council of the Commission Internationale de l'Eclairage for study and application. The document reports on current knowledge and experience within the specific field of light and lighting described, and is intended to be used by the CIE membership and other interested parties. In the case of this Guide it is expected that it will be used as a basis for national and international Recommendations or Codes of Practice. It should be noted, however, that the status of this document is advisory and not mandatory. The latest CIE proceedings or Journal should be consulted regarding possible subsequent amendments.

Any mention of organisations or products does not imply endorsement by the CIE. Whilst every care has been taken in the compilation of any lists, up to the time of going to press, these may not be comprehensive.

© CIE 1986

This report was prepared by Technical Committee 4.4.

Members of Technical Committee 4.4:

S. Burrage	Australia
(W.R.C. Bennett from 1976/80)	
H. Prochazka	Austria
M. Philippot	Belgium
(M. Hennaux from 1976/80)	
N. Vassilev	Bulgaria
S.W. McKnight	Canada
S. Raso	Czechoslovakia
J. Gudum	Denmark
(I. Ovesen from 1976/80)	
E. Kasurinen	Finland
J. Valin	France
H. Schubert	German Dem. Rep.
C.H. Ziesenis	Germany, Fed. Rep.
(A. Wald from 1976/80)	
R.C. Aldworth, Chairman	Great Britain
P. Gergely	Hungary
M. Sand	Israel
R. Grandi	Italy
T. Saitow	Japan
J.J. Balder	Netherlands
J. Ringen	Norway
M. Wierzbowski	Poland
D. Mendes	Portugal
I. Maior	Rumania
B. Lester	South Africa
(W. Wilmans from 1976/80)	
J.M. Rivero	Spain
T. Gabrielsson	Sweden
(B. Persson from 1976/80)	
T.M. Lemons	U.S.A.
G.R. Chahparunians	USSR
R. Paligoric	Yugoslavia

TABLE OF CONTENTS

	page
1. <u>INTRODUCTION</u>	1
1.1. Objectives	1
2. <u>SPECIFICATION OF LIGHTING PERFORMANCE</u>	1
3. <u>SPECIFICATION OF GRIDS FOR CALCULATION AND MEASUREMENT</u>	2
3.1. General case	2
3.2. Preferred method for vertical plane illuminance determination	5
3.3. Alternatives to vertical plane illuminance	5
3.4. Grids for football pitches and stadia	8
3.5. Grids for tracks	8
3.6. Interior installations	9
4. <u>SITE ILLUMINANCE SURVEYS</u>	9
4.1. Measuring equipment	11
4.2. Measurement record	11
5. <u>EVALUATION OF CALCULATED OR MEASURED RESULTS</u>	12
5.1. Average horizontal plane illuminance	12
5.2. Average vertical plane illuminance	12
5.3. Uniformity ratio	12
5.4. Regulation for special measurement values	13

Summary.

The purpose of this report is to establish standard procedures for calculation, measurement and reporting of the illuminance characteristics of interior and exterior sports lighting installations. By this means it will be possible to compare the performance of alternative lighting systems on a common basis at the design stage of the project, and relate this directly to the illuminance measurements made on site under the completed lighting installation. A number of alternative approaches are given, in order to allow the user or specifier to select a procedure suited to a particular project.

Résumé.

Ce guide a pour but d'établir des procédures standardisées pour les calculs, les mesures et les relevés des caractéristiques lumineuses des installations d'éclairage à l'intérieur et à l'extérieur des installations sportives. Ainsi il sera possible de comparer les performances de plusieurs systèmes d'éclairage, sur des bases identiques, lors de la conception d'un projet et de vérifier le résultat obtenu, sur le site, par des mesures effectuées sur l'installation réalisée. Plusieurs cas sont considérés, de façon à permettre à l'utilisateur ou au demandeur, de choisir la procédure spécifique à adopter.

Zusammenfassung.

In diesem Bericht werden Standardvorschläge für die Berechnung, Messung und Beschreibung der Innen- und Aussenbeleuchtung von Sporthallen und Sportplätze gemacht.

Hierdurch wird es möglich, verschiedene Beleuchtungssysteme im Planungsstadium auf einer gemeinsamen Basis zu vergleichen und die Ergebnisse direkt durch Messung in der fertiggestellten Anlage zu kontrollieren.

Es werden verschiedene Vorschläge gemacht, die es dem Betreiber oder Planer ermöglichen, für ihn spezifisch geeignete Verfahren für ein spezielles Projekt zu wählen.

1. INTRODUCTION

Most performance specifications for the lighting of interior and exterior sports areas are drawn up in terms of:

- a. Horizontal plane illuminance (E_h)
- b. Vertical plane illuminance (E_v)
- c. Uniformity of illuminance over one or more of these planes
- d. Ratio of average E_h to E_v

The usual design process involves the calculation of these values for alternative lighting systems so that their performance can be compared and evaluated.

Once it is established that a number of different lighting systems will meet the illuminance criteria, it is necessary to select the preferred system depending upon various factors which could include initial and running costs, practical installation and maintenance considerations, and so on. Having made a final choice and completed the installation, it is usually necessary to carry out illuminance measurements on site to ensure that the original design specification has been satisfied.

1.1. Objectives

The purpose of this Guide is to establish standard procedures for calculation, measurement and reporting of the illuminance characteristics of interior and exterior sports lighting installations. By this means it will be possible to compare the performance of alternative lighting systems on a common basis at the design stage of the project, and relate this directly to the illuminance measurements made on site under the completed lighting installation. A number of alternative approaches is given, in order to allow the user or specifier to select a procedure suited to a particular project.

2. SPECIFICATION OF LIGHTING PERFORMANCE

It is usual to specify the average illuminance values for an area. If this involves only the average horizontal plane illuminance, this can simply be arrived at by calculating the proportion of total lamp flux