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TECHNICAL REPORT

RECOMMENDED FILE FORMAT FOR ELECTRONIC TRANSFER OF LUMINAIRE PHOTOMETRIC DATA

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FOREWORD

The following members of TC4-16 "The transfer of photometric data for exterior lighting" took part in the preparation of this report. The committee comes under CIE Division 4, Lighting and Transport with an invited member from Division 3. The report has been approved by CIE Divisions 3, 4 and 5.

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SUMMARY

RECOMMENDED FILE FORMAT FOR ELECTRONIC TRANSFER OF LUMINAIRE PHOTOMETRIC DATA

In order to calculate the light striking a surface or leaving that surface from one or a group of man made and installed luminaires, it is necessary to know the light intensity distribution at all spherical angles from each luminaire that contributes light to that surface. The advent of personal micro-computers has made it possible for each technical person to perform his own calculations using a suitable application program. It is common practice to record the light intensity at a large number of spherical angles from a specific luminaire (photometric data set) onto magnetic media, such as a computer disk. While the standardization of the size, shape and other technical features between disks and computers has been done by others, it is necessary for the computer program reading data from the disk to know the sequence of data being transmitted about the luminaire, light source, and angles at which the data has been recorded. This is termed the "file format".

While many countries, and companies within countries, have already adopted a specific file format it is necessary to have an international file format so that the photometric data set specific to a particular country can be translated (by computer program) into the international file format; or that a photometric data set received in the international file format, can be translated (by computer program) into the specific file format used in a particular country or a specific application program developed by an individual or company.

The CIE Recommended File Format is not intended to be used for manual calculations to determine the specific light intensity at a specific angle, but rather to be easily read, without error, into a computer program, either for translation into another format, or for calculation of the results of a lighting installation.

RESUME

FORMAT DE FICHIER RECOMMANDE POUR LES TRANSFERTS ELECTRONIQUES DES DONNEES PHOTOMETRIQUES DES LUMINAIRES

Pour calculer la quantité de lumière qui atteint une surface ou qui en émane depuis un luminaire ou un groupe de luminaires, il est nécessaire de connaître la distribution des intensités lumineuses pour tous les angles en coordonnées sphériques de chacun des luminaires qui contribuent à l'éclairage de cette surface. La progression des micro-ordinateurs a rendu accessible à tout technicien la possibilité de faire ses propres études à l'aide d'un programme d'application convenable. Enregistrer les valeurs d'intensité lumineuse d'un luminaire (données photométriques), pour un grand nombre d'angles en coordonnées sphériques sur un support magnétique tel qu'un disque d'ordinateur est devenu pratique courante. Maintenant que la standardisation de la taille, de la forme et d'autres caractéristiques techniques des disques et des ordinateurs ont été opérés, il apparaît nécessaire que le programme de calcul lisant les données à partir d'un disque connaisse la séquence des données transmises concernant le luminaire, les lampes et les angles pour lesquels les données ont été enregistrées. C'est ce qu'on appelle le "format de fichier".

Alors que de nombreux pays et de compagnies dans ces pays ont déjà adopté un format de fichier spécifique, il paraît nécessaire d'avoir un format de fichier international en sorte que les données photométriques propres à un pays particulier puissent être traduites (par programme d'ordinateur) dans le format de fichier international; ou bien qu'un ensemble de données photométriques reçu dans le format international puisse être traduit (par programme d'ordinateur) dans le format spécifique d'un pays donné ou utilisé dans un programme d'application développé par un particulier ou une compagnie.

Le format de fichier recommandé par la CIE n'est pas destiné aux calculs manuels pour déterminer l'intensité lumineuse spécifique correspondant à un angle donné. Il est plutôt destiné à être lu facilement, sans erreur, à l'intérieur d'un programme d'ordinateur soit pour traduction dans un autre format, soit pour calculer les résultats d'une installation d'éclairage.

ZUSAMMENFASSUNG

EMPFOHLENER DATEI-AUFBAU FÜR DIE ELEKTRONISCHE ÜBERTRAGUNG VON PHOTOMETRISCHEN LEUCHTENDATEN

Um den Lichtstrom zu berechnen, der auf eine Oberfläche auftritt oder von ihr reflektiert wird und der von einer oder mehreren Leuchten einer Anlage herrührt, ist es erforderlich, die räumliche Lichtstärkeverteilung über den Ausstrahlungswinkeln für jede Leuchte zu kennen, die Lichter auf diese Oberfläche einstrahlt. Der Einsatz von Personal-Computern ermöglicht es jedem Techniker, eigene Berechnungen mit einem geeigneten Anwendungsprogramm durchzuführen. Es ist gängige Praxis, die Lichtstärken einer Leuchte für eine Vielzahl von Ausstrahlungswinkeln (photometrischer Daten-Satz) magnetisch zu speichern, z.B. auf einer Diskette. Da die Standardisierung der Größe, der Form und anderer technischer Eigenschaften von Diskette und Computer von Dritten durchgeführt wurde, ist es erforderlich, daß das Programm bei der Datenübernahme von der Diskette die Folge der Daten betreffend Leuchte, Lampe und Ausstrahlungswinkel, unter denen die Lichtstärke erfaßt sind, erkennt. Dies wird "Datei-Aufbau" genannt.

Obwohl viele Länder und Firmen in diesen Ländern sich bereits auf einen bestimmten Datei-Aufbau festgelegt haben, ist ein internationaler Datei-Aufbau erforderlich, so daß der photometrische Datensatz, den ein bestimmtes Land verwendet, in diesen internationalen Datei-Aufbau übersetzt werden kann (durch ein Computerprogramm) oder daß ein photometrischer Datensatz aus dem internationalen Datei-Aufbau (durch ein Computerprogramm) in den Datei-Aufbau eines bestimmten Landes oder eines speziellen Anwendungsprogramms übersetzt werden kann, das ein einzelner oder eine Firma entwickelt hat.

Der von der CIE empfohlene Datei-Aufbau ist nicht für manuelle Berechnungen gedacht, um eine bestimmte Lichtstärke unter einem vorgegebenen Ausstrahlungswinkel zu ermitteln, sondern für das einfache, fehlerfreie Einlesen der Daten in ein Computerprogramm, entweder zur Übersetzung in einen anderen Datei-Aufbau oder für Berechnungen einer Beleuchtungsanlage.

1. Introduction

A photometric laboratory may elect to use any format for the storage of photometric data relative to a particular luminaire that is best suited for their equipment and operating procedures. An application computer program may be designed to calculate any performance data such as illuminance, luminance, hemispherical illuminance, or glare; and may elect to utilize any desired format for photometric data storage within that program that is most suitable to the calculations being performed.

The interface that permits data to be transferred from the storage format of the photometric laboratory to the format of the application program can and should be defined by an international body, such as the CIE, so that photometric data taken by any laboratory in any country can be used in any appropriate application program developed by any user in any country.

There may be an intermediate stage of standardization within a single country or group of countries, in fact this exists at the time this document was generated, but there still remains a need for an international format to permit the standardized data of one country to be transferred into the international format and then either used or transferred into the standardized data of another country.

In either case cited above the producer of the photometric data needs to know only 2 photometric formats, his own and the CIE format. Likewise the user of the photometric data needs to know only two formats, the CIE format and his own. There is no need for a producer to provide photometric data in a variety of formats suitable for use in a variety of application programs or suitable for use in a variety of countries.

It should be understood that photometric data in the format described in this document is not intended to be printed on paper and distributed for use in manual calculation procedures. It is intended that the transfer from one storage media, to another will be handled by computers and the transfer will occur in a few seconds or less. Computer programs can and should be written to convert photometric data from the CIE format into a form that can be printed, distributed and used for manual calculations.

The language and printed format will then be in accordance with the language and needs of the individual country performing the conversion.

1.1 Limits of scope

This document presents a recommended photometric data file format for data transfer between computers and between a computer and some form of magnetic or optical storage media. The primary purpose envisioned is for the individual user to maintain an easily accessible file of photometric data for his use with lighting application computer programs.

In order to produce accurate lighting calculations the individual user of the application program must utilize the correct photometric data for the individual luminaires and must understand the relationship between the angular planes and cones and the geometry of the building or area where the luminaires are to be installed. Particular emphasis has been placed on the technique to be used in determining, for a luminaire with an asymmetric distribution, the method of identifying the location of the zero degree half plane and the zero degree cone. Both the person using the application program and the person installing the luminaire must be aware of the necessity of correctly handling this process.

Other hardware or software issues such as magnetic storage medium formats, data transmission techniques, loss of data in transmission, operating systems, or programming languages for conversion programs are beyond the scope of this document. Any one of these issues may need to be considered in the course of transferring photometric files from one producer or user to another.

2. CIE recommended file format

The file format is divided into two major sections with each section divided into two parts. The file consists of lines of two different types, structured lines (lines beginning with a specific code name) and unstructured lines (label lines and data lines). Structured lines can be of two types, "key" lines (which must be present) and information lines (which can be omitted if information is not furnished). There are five "key" lines which, when recognized by the program reading the file, indicates to it that the type of information to follow is now different. These "key" lines can not be omitted but must always be included in the file. It is possible to separate the two major sections into two separate files with the first file calling the second one or, if desired, the two major sections may be in a single file.

In each major section there are a group of "label lines" which are not structured and which can carry any information desired to be transmitted. The number of label lines are limited to sixty in each section and the program reading the file recognizes the end of the "label lines" when it receives the next "key" line.

In the first section which transmits data relative to the physical properties of the luminaire the structured lines utilize five character names in which the last character is "=" . It is not necessary to include each and every structured line in each file, however the "key" lines must always be included even if no data follows the structured name. If it is desired to pass any item of structured data into an application program then it must be in the code prescribed by this document and follow the appropriate five character name.

In the second section, which transmits data relative to luminous intensity values (candela), all items of structured data are named except for the intensity value lines. Values must be included in the file for all structured data for all lines in the second section of the file.

The five character names consist of upper case letters and in one instance both letters and numbers with the last character "=" . It is permissible to include any number of lower case letters, including spaces, which expand the five character names into better defined names which make the file more understandable. The application program reading the names must be capable of discerning and ignoring the lower case letters. Suggested expanded names are shown in Par 2.1.

An overview of the complete file format specification is shown below. Each line marked with a double asterisk "*" is a "key" line and must be included even if it does not provide data. Each line marked with a single asterisk "*", or a double asterisk "*" must begin a new line. Descriptions enclosed within the "<" and ">" refer to the actual data stored on that line. All data is stored in the format of ISO Alphabet 5. Please note that the "*" and "*" referred to above and shown below are not a part of the file (see examples).

```

** CIEF= CIE File Format, Version 1.0 (CIE Publication 102-1993)
* <label line 1>
*
*
* <label line n>
** IDNM = <identification number>
* LUMN = <luminaire name>
* LAMP = <lamp name>
* NLPS = <number of lamps in luminaire>
* TOLU = <summation of normal rated lumens of all lamps>
* LLGE = <lamp-luminaire geometry>
* BLID = <ballast identification>
* INPW = <input power in watts>
* INVO = <input voltage>

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*   INVA =      <input volt amps>
*   TLME =      <tilt during measurement>
*   TLNM =      <tilt normal in application>
*   ROME =      <rotation during measurement>
*   LSHP =      <luminaire shape code>
*   NLAV =      <number of luminous area views to be listed>
*   LA01 =      <luminous area 1> <plane angle> <cone angle>
*   LA02 =      <luminous area 2> <plane angle> <cone angle>
*               "
*               "
*   LAnn =      <luminous area n> <plane angle> <cone angle>
**  PHOT =      <INCLUDE> or <file-spec>
(if PHOT = <file-spec> the file ends at this point.)
(if PHOT = <INCLUDE> the file continues as follows.)
*   <label line 1>
*
*
*   <label line n>
**  PTYP =      <photometric type>
*   APOS =      <angle position code>
*   LUBA =      <lumen basis of photometry>
*   MULT =      <multiplier>
*   BAFA =      <ballast factor>
*   NCON =      <number of cone angles>
*   NPLA =      <number of half-plane angles>
**  CONA =      <cone angles>
*   <first half-plane angle> <intensity for all cone angles at first half-plane angle>
*   <second half-plane angle> <intensity for all cone angles at second half-plane angle>
*
*
*   <nth half-plane angle> <intensity for all cone angles at nth half-plane angle>

(if PHOT= <file-spec> then the separate file containing the photometric data is as follows:)
**  CIEA= CIE-A File Format, Version 1.0 (CIE Publication 102-1993)
*   <label line 1>
*
*
*   <label line n>
**  PTYP =      <photometric type>
*   APOS =      <angle position code>
*   LUBA =      <lumen basis of photometry>
*   MULT =      <multiplier>
*   BAFA =      <ballast factor>
*   NCON =      <number of cone angles>
*   NPLA =      <number of half-plane angles>
**  CONA =      <cone angles>
*   <first half-plane angle> <intensity for all cone angles at first half-plane angle>
*   <second half-plane angle> <intensity for all cone angles at second half-plane angle>
*
*
*   <nth half-plane angle> <intensity for all cone angles at nth half-plane angle>

```