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**Light and lighting — Maintenance
factor determination — Way of
working**

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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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

ISO collaborates closely with the International Commission on Illumination (CIE) on all matters of standardization for light and lighting.

This document was prepared by Technical Committee ISO/TC 274, *Light and lighting*. The document has been jointly prepared with CIE JTC 11, *Light and Lighting — Maintenance factor — Way of working*.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

Continuous maintenance of lighting installations is essential as it ensures that the performance of a system stays within the design limits and promotes safety and efficient use of energy. In the design phase this is taken into account through the use of the maintenance factor. The maintenance factor combines several different factors such as the assumed product/installation behaviour, the environmental parameters and maintenance and cleaning schedules.

The methodology of determining the maintenance factor has been extensively documented by CIE (see [Clause 2](#) and bibliography). However, as the focus of these technical reports was predominantly on incandescent and gas discharge light sources, more clarity is needed to ensure the proper use/translation of the existing methodology towards technologies such as light emitting diodes (LED).

Technologies such as LED distinguish themselves from other technologies by their long lifetime, low failure rate and their integration of components which were previously seen as separate components. As such the previous methods used to determine the depreciation and survival of luminaires might seem unusable and cause uncertainty. However, based on work by IEC (see [Clause 2](#)) the luminous flux depreciation and light source failure parameters have now been (re)established for LED-based light sources and allow for translation into an updated way of working to determine the maintenance factor using the existing CIE methodology and data for luminaire and surface dirt depreciation.

This document combines insights from IEC standards with regard to product performance of luminaires and light sources currently in the market with the existing determination methodology from CIE Technical Reports. Furthermore, it references the data in the CIE Technical Reports with regard to the impact of the environment on luminaires (accumulation of dirt on surfaces and luminaires).

This document provides the following:

- background information with respect to the principles of the maintenance factor and the relevant parameters for indoor and outdoor applications;
- a detailed way of working on how to apply the maintenance factor determination method (as described in CIE 154:2003 and CIE 097:2005) for outdoor and indoor lighting designs using the technologies available in the market;
- explanation and examples on how to apply the maintenance factor and how to ensure proper operation over time corresponding to the determined values.