Measurement and assessment of personal exposures to incoherent optical radiation - Part 1: Ultraviolet radiation emitted by artificial sources in the workplace

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EESTI STANDARDIKESKUS

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

Käesolev Eesti standard EVS-EN 14255-1:2005 sisaldab Euroopa standardi EN 14255-1:2005 ingliskeelset teksti. Käesolev dokument on jõustatud 30.05.2005 ja selle kohta on avaldatud teade Eesti standardiorganisatsiooni ametlikus väljaandes. Standard on kättesaadav Eesti standardiorganisatsioonist.	This Estonian standard EVS-EN 14255-1:2005 consists of the English text of the European standard EN 14255-1:2005. This document is endorsed on 30.05.2005 with the notification being published in the official publication of the Estonian national standardisation organisation. The standard is available from Estonian standardisation organisation.

Käsitlusala: This document specifies procedures for the measurement and assessment of personal exposures to ultraviolet (UV) radiation emitted by artificial sources, where adverse effects can not readily be excluded.	**Scope:** This document specifies procedures for the measurement and assessment of personal exposures to ultraviolet (UV) radiation emitted by artificial sources, where adverse effects can not readily be excluded.

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Võtmesõnad: hazards, human factors engineering, medicine, nuclear radiation, operating stations, radiation exp, radiation hazards, radiation measurement, radiation meters, radiation protection, ultraviolet radiation, uv, working places, workplace safety

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English version

Measurement and assessment of personal exposures to incoherent optical radiation - Part 1: Ultraviolet radiation emitted by artificial sources in the workplace

Mesurage et évaluation de l'exposition des personnes aux rayonnements optiques incohérents - Partie 1: Rayonnements ultraviolets émis par des sources artificielles sur les lieux de travail

Messung und Beurteilung von personenbezogenen Expositionen gegenüber inkohärenter optischer Strahlung - Teil 1: Von künstlichen Quellen am Arbeitsplatz emittierte ultraviolette Strahlung

This European Standard was approved by CEN on 3 February 2005.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

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Contents

Foreword

This document (EN 14255-1:2005) has been prepared by Technical Committee CEN/TC 169 “Light and lighting”, the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by September 2005, and conflicting national standards shall be withdrawn at the latest by September 2005.

This document includes a Bibliography.

EN 14255 *Measurement and assessment of personal exposures to incoherent optical radiation* is published in four parts:

— *Part 1 (this part): Ultraviolet radiation emitted by artificial sources in the workplace*

— *Part 2: Visible and infrared radiation emitted by artificial sources in the workplace (in preparation)*

— *Part 3: UV-Radiation — Natural sources (in preparation)*

— *Part 4: Terminology and quantities used in UV-, visible and IR-exposure measurements (in preparation)*

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

Introduction

People may be exposed to ultraviolet (UV) radiation in the workplace. The most important natural source for such UV-radiation is the sun. There are also artificial UV-radiation sources, where UV-radiation is intentionally emitted to achieve the purpose of the source's application (e.g. UV-lamps for drying of printing colours, UV-lamps for testing of material, lamps for UV-disinfection, UV-phototherapy of patients and solaria devices, etc.) or where UV-radiation is unintentionally produced (such as welding arcs, some types of lamps, etc.). Time spent near these artificial sources may result in significant UV-exposure.

When people are irradiated by UV-radiation, injuries may occur. The eyes and the skin may be damaged by short term UV-irradiation of high intensity. Typical injuries are photoconjunctivitis and photokeratitis of the eye and UV-erythema of the skin. Minor doses of UV-radiation may induce or aggravate some diseases like porphyria or lupus erythematosis or may trigger phototoxic and photoallergic reactions. But additionally, long term UV-irradiation may result in damage to the eyes and skin, such as cataracts, skin aging and skin cancer. In order to avoid short term injuries and reduce additional risks from long term UV-exposures national regulations and international recommendations require restriction of UV-exposures in the workplace. To achieve this, it is necessary to determine the level of UV-exposure and assess its gravity.

The determination of the level of UV-exposure can be done by measurement of the UV-exposure of the people likely to be exposed. Determination of the severity of an UV-exposure is normally done by comparison of the determined UV-exposure level with the required or recommended limit value. When the UV-exposure level complies with the limit value no further action is necessary. When the limit value is exceeded protective measures have to be applied in order to decrease the UV-exposure. As the exposure situation in the workplace may change, it may be necessary to repeat the determination and assessment of UV-exposure at a later time.

UV radiation exposure measurements are often costly and time consuming. So it is reasonable to avoid measurements if possible, i. e. if the personal UV radiation exposure can be estimated and either exceeds the limit values by far or is far below the limit values. In some cases, the manufacturer may have classified a device according to International Standards such as EN 12198 and CIE S009. Knowledge of the classification of all potential sources of UV may allow a sufficiently precise assessment of hazard to be made without further measurement. Another approach could be to use known spectral data of sources in combination with calculation software in order to estimate exposure level [6]. UV- exposure measurements are only necessary if it cannot be estimated in advance whether the limit values will be exceeded or not. So as a first step of the assessment procedure it is useful to carry out a preliminary review including an exposure estimation.

This document does not specify UV-exposure limit values. UV-exposure limit values are set in national regulations or provided by international organizations, such as the International Commission for Non-ionizing Radiation Protection (ICNIRP) [1-3]. This document specifies the procedures for measurement and assessment of UV-exposures in the workplace. As the results of measurement and assessment of UV-exposure depend on the method of implementation, it is important to carry out measurements and assessments in a standardised way.

1 Scope

This document specifies procedures for the measurement and assessment of personal exposures to ultraviolet (UV) radiation emitted by artificial sources, where adverse effects can not readily be excluded.

NOTE 1 Adverse effects will usually not occur in exposures caused by commonly used artificial lighting. However, exposures to very strong light sources or light sources with extended spectra may cause a health risk nevertheless.

This document applies to UV-exposures in indoor and outdoor workplaces. It does not apply to UV-exposures in leisure time.

This document does not apply to UV-exposure caused by the sun.

NOTE 2 Part 3 of this standard will deal with UV-exposure caused by the sun.

This document does not specify UV-exposure limit values. It supports the application of limit values set by national regulations or international recommendations.

This document applies to UV-exposures by artificial incoherent sources, which emit spectral lines as well as continuous spectra. This document does not apply to coherent radiation sources.

NOTE 3 Coherent optical radiation sources are covered by standards for lasers, like EN 60825-1 etc..

This document applies to UV-exposures in the wavelength band 180 nm to 400 nm.

This document does not apply to radiation exposures which concern the retina.

NOTE 4 Part 2 of this standard will address these effects.

This document does not apply to radiation emissions of products.

NOTE 5 For radiation emissions of products other standards apply, such as: EN 60335-2-27 (IEC 60335-2-27) for sunbeds, EN 60335-2-59 (IEC 60335-2-59) for insect killers and EN 12198 for radiation emissions of machinery.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ENV 13005, *Guide to the expression of uncertainty in measurement.*

CIE 17.4:1987, *International lighting vocabulary — Chapter 845: lighting*.