

Classification of non-electrical sources of incoherent optical radiation

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EESTI STANDARDI EESSÕNA

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English Version

Classification of non-electrical sources of incoherent optical radiation

Classification des sources non électriques de rayonnement
optique incohérent

Klassifizierung nicht elektrisch betriebener Quellen
inkohärenter optischer Strahlung

This European Standard was approved by CEN on 1 December 2012.

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Foreword

This document (EN 16237:2013) 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of an identical text or by endorsement, at the latest by July 2013, and conflicting national standards shall be withdrawn at the latest by July 2013.

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Introduction

Optical radiation consists of the spectral regions covered by ultraviolet, visible and infrared radiation. Sources of incoherent optical radiation are used both in workplaces and privately. The radiation may intentionally be applied to carry out a specific task or may occur unintentionally as a by-product. Some sources are powered electrically, others are powered non-electrically, e.g. by gas or other fuels. Examples for non-electrically powered sources are burners, furnaces, heaters, gas welding, thermal cutting, chemical torches, hot materials etc.

People staying near to or working in the vicinity of such sources may be exposed to optical radiation. Depending on the level of exposure, injuries may occur to the skin and/or to the eyes. In order to avoid such injuries, European [1] and national legislation require the determination of exposures and the assessment of the associated risks in workplaces. In addition, maximum allowed optical radiation exposure limit values are set by legislation. Workers must not exceed these exposure limit values. If necessary, exposure reduction measures have to be applied.

Optical radiation exposures can be determined by several procedures: measurements, calculations, derivations from source emission data, etc. Not all of these procedures are appropriate in every case. Exposure measurements can be made in accordance with EN 14255-1 and EN 14255-2, but are expensive and time consuming. Generally, it is preferable to carry out a risk assessment without expensive measurements, if possible. Calculations of exposures may be done with the aid of software such as Catrayon¹⁾ [3], but not in all cases. If quantitative emission data from the source are available, the user may in some cases estimate the possible exposure of people in the vicinity of the radiation source.

A simpler approach for risk assessment is the classification of the optical radiation emissions. If such an emission classification is available, the user may easily assess the risk from use of the source. Emission classifications are already provided by standards for laser devices (EN 60825-1) [8] and for machinery (EN 12198-1) [7] as well as for lamps and lamp systems (EN 62471) [9]. This present standard provides a specific emission classification for non-electrically powered optical radiation sources.

The classification in this standard is intended to be user-friendly. The emission classes depend on the duration Δt_{\max} beyond which the exposure limit values of the European directive on artificial optical radiation 2006/25/EC [1] may be exceeded. By comparing the actual exposure duration occurring at the workplace with Δt_{\max} , the user can easily estimate if the exposure limit values may or may not be exceeded. Therefore, for a classified source, a risk assessment as required by Directive 2006/25/EC can easily be carried out.

The measurement of the optical radiation emission for the classification of the source is always carried out at a standard distance and at greater distances if that is where emission is at the maximum. Therefore, this classification represents the worst case exposure. This is appropriate if people are likely to be in the vicinity. However, sources are often operated in such a way that people will be further away than the worst-case location. For these applications, a classification shall be made not only for the worst case, but in addition for normal use conditions. The source classification measurements shall then be made for several distances around the source including the normal operating distance(s). As a result, emission classes are produced depending on the distance or even iso-emission-class lines around the source. The user is then able to estimate more easily the maximum possible exposure under normal use conditions and also under worst case conditions.

1) Catrayon is an example of a suitable software available commercially. This information is given for the convenience of users of this European Standard and does not constitute an endorsement by CEN or CENELEC of this product.

There is a limitation of the concept of risk assessment with classified sources. A risk assessment can only be carried out if the classified source contributes predominantly to the optical radiation exposure of people. If there are several optical radiation sources that significantly contribute to the exposure, the risk assessment has to be carried out in a different way, e.g. by measurement of the exposure and comparison with the exposure limit values. In many cases however, one source will be predominant and an easy risk assessment can be carried out using the emission classification. Therefore, emission classification of a source forms a practical approach.

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1 Scope

This European Standard provides a scheme for the classification of artificial non-electrical sources of incoherent optical radiation with regard to their radiation emissions. It helps users of the sources to easily carry out a risk assessment when people can be exposed to radiation from the sources.

This standard applies for sources emitting optical radiation in the wavelength between 180 nm and 3 000 nm.

This standard does not apply for electrically powered sources.

This standard does not apply for machinery, for laser devices and for lamps and lamp systems.

NOTE A classification for machinery is given in EN 12198-1 [7], a classification for laser devices is given in EN 60825-1 [8] and a classification for lamps and lamp systems is given in EN 62471 [9].

2 Normative references

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

EN 14255-1:2005, *Measurement and assessment of personal exposures to incoherent optical radiation — Part 1: Ultraviolet radiation emitted by artificial sources in the workplace*

EN 14255-2:2005, *Measurement and assessment of personal exposures to incoherent optical radiation — Part 2: Visible and infrared radiation emitted by artificial sources in the workplace*

EN 14255-4:2006, *Measurement and assessment of personal exposures to incoherent optical radiation — Part 4: Terminology and quantities used in UV-, visible and IR-exposure measurements*

ISO 7010, *Graphical symbols — Safety colours and safety signs — Registered safety signs*

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

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 14255-4:2006 and the following apply.

3.1

emission class

characteristic of an optical source which reflects the level of optical radiation emission at a specified distance

Note 1 to entry: Emission classes in this standard are correlated to maximum exposure durations Δt_{\max} according to Tables 2, 3, 4 and 5.

3.2

maximum exposure duration

Δt_{\max}

time duration up to which a person being exposed to optical radiation does not exceed the exposure limit values

Note 1 to entry: Exposure limit values associated with Δt_{\max} in this standard are taken from the European Directive on artificial optical radiation 2006/25/EC [1].