

## Colorimetry - Part 4: CIE 1976 L\*a\*b\* Colour space (ISO 11664-4:2008)

## EESTI STANDARDI EESSÕNA

## NATIONAL FOREWORD

Käesolev Eesti standard EVS-EN ISO 11664-4:2011 sisaldab Euroopa standardi EN ISO 11664-4:2011 ingliskeelset teksti.

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English Version

Colorimetry - Part 4: CIE 1976 L\*a\*b\* Colour space (ISO 11664-4:2008)

Colorimétrie - Partie 4: Espace chromatique L\*a\*b\* CIE  
1976 (ISO 11664-4:2008)

Farbmetrik - Teil 4: CIE 1976 L\*a\*b\* Farbenraum (ISO  
11664-4:2008)

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## Foreword

The text of ISO 11664-4:2008 has been prepared by Technical Committee CIE “International Commission on Illumination” of the International Organization for Standardization (ISO) and has been taken over as EN ISO 11664-4:2011 by Technical Committee CEN/TC 139 “Paints and varnishes” 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of an identical text or by endorsement, at the latest by October 2011, and conflicting national standards shall be withdrawn at the latest by October 2011.

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### Endorsement notice

The text of ISO 11664-4:2008 has been approved by CEN as a EN ISO 11664-4:2011 without any modification.

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## COLORIMETRY - PART 4: CIE 1976 L\*a\*b\* COLOUR SPACE

### INTRODUCTION

The three-dimensional colour space produced by plotting CIE tristimulus values ( $X, Y, Z$ ) in rectangular coordinates is not visually uniform, nor is the ( $x, y, Y$ ) space nor the two-dimensional CIE ( $x, y$ ) chromaticity diagram. Equal distances in these spaces do not represent equally perceptible differences between colour stimuli. For this reason, in 1976, the CIE introduced and recommended two new spaces (known as CIELAB and CIELUV) whose coordinates are non-linear functions of  $X$ ,  $Y$  and  $Z$ . The recommendation was put forward in an attempt to unify the then very diverse practice in uniform colour spaces and associated colour difference formulae (Robertson, 1990; CIE, 2004). Both these more-nearly uniform colour spaces have become well accepted and widely used. Numerical values representing approximately the magnitude of colour differences can be described by simple Euclidean distances in the spaces or by more sophisticated formulae that improve the correlation with the perceived size of differences. The purpose of this CIE Standard is to define procedures for calculating the coordinates of the CIE 1976 L\*a\*b\* (CIELAB) colour space and the Euclidean colour difference values based on these coordinates. The standard does not cover more sophisticated colour difference formulae based on CIELAB, such as the CMC formula (Clarke et al., 1984), the CIE94 formula (CIE, 1995), the DIN99 formula (DIN, 2001), and the CIEDE2000 formula (CIE, 2001), nor does it cover the alternative uniform colour space, CIELUV.

### 1. SCOPE

This CIE Standard specifies the method of calculating the coordinates of the CIE 1976 L\*a\*b\* colour space including correlates of lightness, chroma and hue. It includes two methods for calculating Euclidean distances in this space to represent the perceived magnitude of colour differences.

The Standard is applicable to tristimulus values calculated using colour-matching functions of the CIE 1931 standard colorimetric system or the CIE 1964 standard colorimetric system. The Standard may be used for the specification of colour stimuli perceived as belonging to a reflecting or transmitting object, where a three-dimensional space more uniform than tristimulus space is required. It does not apply to colour stimuli perceived as belonging to an area that appears to be emitting light as a primary light source, or that appears to be specularly reflecting such light. This Standard does apply to self-luminous displays, like cathode ray tubes, if they are being used to simulate reflecting or transmitting objects and if the stimuli are appropriately normalized.

### 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.

CIE 17.4-1987. *International Lighting Vocabulary* (Joint publication IEC/CIE).

CIE S 014-1:2006. *Colorimetry Part 1. CIE Standard Colorimetric Observers*. [ISO 11664-1:2007]

CIE S 014-2:2006. *Colorimetry Part 2. CIE Standard Illuminants*. [ISO 11664-2:2007]

### 3. DEFINITIONS, SYMBOLS AND ABBREVIATIONS

For the purposes of this International Standard, the terms and definitions given in CIE 17.4-1987 (International Lighting Vocabulary), as amended by this standard and the following symbols and abbreviations apply.

$X, Y, Z$	tristimulus values of test stimulus calculated using the colour-matching functions of the CIE 1931 standard colorimetric system (also known as the CIE 2° standard colorimetric system)
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