



International
Standard

ISO/CIE 11664-5

Colorimetry —

Part 5:

CIE 1976 $L^*u^*v^*$ colour space and u', v' uniform chromaticity scale diagram

Colorimétrie —

*Partie 5: Espace chromatique $L^*u^*v^*$ et diagramme de chromaticité uniforme u', v' CIE 1976*

**Second edition
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Foreword

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This document was prepared by the International Commission on Illumination (CIE) in cooperation with Technical Committee ISO/TC 274, *Light and lighting*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 139, *Paints and varnishes*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This second edition cancels and replaces the first edition (ISO/CIE 11664-5:2016), which has been technically revised.

The main changes are as follows:

- list of ISO/CIE 11664 series *Colorimetry* shifted from Foreword to Introduction;
- text in [3.1](#), [4.2](#), [4.3](#), and [4.4](#) updated;
- previous [Formula \(24\)](#) deleted and related formula numbers updated accordingly;
- sign in [Formula \(26\)](#) updated;
- Bibliography updated;
- minor editorial changes.

A list of all parts in the ISO/CIE 11664 series can be found on the ISO website.

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

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 and diagrams 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.^{[2][8]} Both these more-nearly uniform colour spaces have become well accepted and widely used. Numerical values representing approximately the relative 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 relative perceived size of differences.

The purpose of this document is to specify procedures for calculating the coordinates of the CIE 1976 $L^*u^*v^*$ (CIELUV) colour space and the Euclidean colour difference values based on these coordinates. This document also specifies a related chromaticity diagram that is a projection of the CIE x, y chromaticity diagram maintaining straight lines of dominant and complementary wavelengths. It does not cover the alternative uniform colour space, CIELAB,^[5] nor does it cover more sophisticated colour difference formulae based on CIELAB, such as the CMC formula,^[3] the CIE 94 formula,^[1] the DIN 99 formula,^[4] and the CIEDE2000 formula^[6].

The ISO/CIE 11664 series consists of the following parts, under the general title *Colorimetry*:

- Part 1: CIE standard colorimetric observers
- Part 2: CIE standard illuminants
- Part 3: CIE tristimulus values
- Part 4: CIE 1976 $L^*a^*b^*$ Colour space
- Part 5: CIE 1976 $L^*u^*v^*$ Colour space and u', v' uniform chromaticity scale diagram
- Part 6: CIEDE2000 Colour-difference formula

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