

SLOVENSKI STANDARD

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Fotografija in grafična tehnologija - Razširjeno barvno kodiranje za shranjevanje, izmenjavo in ravnanje z digitalnimi slikami - 4. del: RGB po Evropski barvni pobudi za barvno kodiranje slik [eciRGB (2008)]

Photography and graphic technology — Extended colour encodings for digital image storage, manipulation and interchange — Part 4: European Colour Initiative RGB colour image encoding [eciRGB (2008)]

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Photographie et technologie graphique — Codages par couleurs étendues pour stockage, manipulation et échange d'image numérique — Partie 4: Codage d'image en couleurs RGB par initiative de couleur européenne [eciRGB(2008)]

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ISO 22028-4

First edition
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Photography and graphic technology — Extended colour encodings for digital image storage, manipulation and interchange —

Part 4:

European Colour Initiative RGB colour image encoding [eciRGB (2008)]

*Photographie et technologie graphique — Codages par couleurs
étendues pour stockage, manipulation et échange d'image
numérique —*

*Partie 4: Codage d'image en couleurs RGB par initiative de couleur
européenne [eciRGB(2008)]*

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Contents

Page

Foreword	iv
Introduction	v
1 Scope	1
2 Normative references	1
3 Terms and definitions	1
4 Requirements	4
4.1 General.....	4
4.2 Reference viewing environment.....	5
4.2.1 General.....	5
4.2.2 Ambient illumination.....	5
4.2.3 Reference display surround.....	5
4.2.4 Image size and viewing distance.....	5
4.2.5 Glare.....	5
4.2.6 Measurements.....	6
4.3 Reference display.....	6
4.3.1 Contrast ratio.....	6
4.3.2 Reference display white point and luminance.....	6
4.3.3 Reference display black point and luminance.....	6
4.4 eciRGB (2008) colour image encoding.....	7
4.4.1 General.....	7
4.4.2 Colour space chromaticities and luminance.....	7
4.4.3 Colour space encodings.....	7
4.4.4 Image state.....	7
4.4.5 Normalized and absolute XYZ tristimulus values.....	8
4.4.6 Encoding an image in 24-bit eciRGB (2008) colour image encoding.....	8
4.4.7 Decoding 24-bit eciRGB (2008) to XYZ (D50) values.....	9
Annex A (informative) The eciRGB (2008) ICC profile considerations	11
Annex B (informative) Practical tolerances for viewing eciRGB (2008) encoded images	12
Annex C (informative) Comparison of primaries	15
Bibliography	17

ISO 22028-4:2023(E)

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).

ISO draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). ISO takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, ISO had not received notice of (a) patent(s) which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at www.iso.org/patents. ISO shall not be held responsible for identifying any or all such patent rights.

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

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.

This document was prepared by Technical Committee ISO/TC 42 *Photography*.

This first edition cancels and replaces the first edition (ISO/TS 22028-4:2012), which has been technically revised.

The main changes are as follows:

- this document is released as an International Standard (prior edition was a Technical Specification);
- editorial revisions have been made.

A list of all parts in the ISO 22028 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

This document has been developed in order to meet the industry need for a complete, fully documented, publicly available definition of an output-referred extended gamut RGB colour image encoding which is optimized for an 8-bit encoding and the conversion of RGB images into offset print colour spaces. Since users have also asked for a 16-bit encoding it has been added to this document as well. This colour image encoding provides a way to represent output-referred images that does not limit the colour gamut to those colours capable of being displayed on a CRT monitor, such as that represented by the sRGB colour encoding, or require the use of negative RGB colorimetry coordinates, such as with extended sRGB colour encodings like bg-sRGB.

An extended colour-gamut colour encoding is particularly desirable for professional photography applications. For example, colours used for company logos may be outside a monitor gamut and would therefore need to be clipped or compressed to a less saturated colour. Similarly, scanned photographic prints that are to be duplicated may contain colours outside a monitor RGB colour-gamut. By using a standard output-referred extended gamut colour image encoding, images containing such colours can be stored, interchanged, manipulated, and later printed, without limiting or distorting the colours of the final output.

The European Colour Initiative (ECI) RGB colour image encoding [eciRGB (2008)] specified in this document meets the needs of these types of applications.

The primaries of eciRGB (2008) (see [Annex C](#), Figures C.1 and C.2) are between Reference Output Medium Metric RGB (ROMM RGB) and sRGB, thereby providing a larger gamut than sRGB, together with lower quantization errors than ROMM RGB. The tone curve has an encoding linear to the L^* axis defined in the CIE 1976 (L^* , a^* , b^*) colour space (CIELAB 1976).

This document has been prepared to provide sufficient documentation, consistent with the definitions of ISO 22028-1, to allow the imaging community adequate opportunity for implementation and evaluation of this colour image encoding. Sufficient implementation of, and practical experience in the use of, eciRGB (2008), has led to a revision of the former Technical Specification and its conversion into an International Standard.

The European Colour Initiative owns the copyright on the name eciRGB (2008) and has granted ISO the irrevocable non-exclusive right to use the name for the purpose of this document. A colour encoding named eciRGB was initiated by ECI in 2004. A second version of this encoding with a modified tonal curve was defined in 2008. Because of its importance to the European photographers and graphic arts industry, this document was prepared in order to fully define eciRGB according to ISO 22028-1.

Photography and graphic technology — Extended colour encodings for digital image storage, manipulation and interchange —

Part 4:

European Colour Initiative RGB colour image encoding [eciRGB (2008)]

1 Scope

This document defines an extended colour-gamut output-referred RGB colour image encoding designated as European Colour Initiative RGB [eciRGB (2008)]. Digital images encoded using eciRGB (2008) can be manipulated, stored, transmitted, displayed, or printed by digital still picture imaging systems. Two precision levels are defined, using 8 bits/channel and 16 bits/channel.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

ISO 3664:2009, *Graphic technology and photography — Viewing conditions*

ISO/CIE 11664-1, *Colorimetry — Part 1: CIE standard colorimetric observers*

ISO 22028-1:2016, *Photography and graphic technology — Extended colour encodings for digital image storage, manipulation and interchange — Part 1: Architecture and requirements*

<https://standards.iso.org/standards/sist/219ae965-fcbe-4f57-a302-9757dab3ba91/sist-iso-22028-4-2024>

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <https://www.electropedia.org/>

3.1

adapted white

colour stimulus that an observer who is adapted to the viewing environment would judge to be perfectly achromatic and to have a luminance factor of unity, i.e. absolute colorimetric coordinates that an observer would consider to be a perfect white diffuser

Note 1 to entry: The adapted white can vary within a scene.

ISO 22028-4:2023(E)

3.2

additive RGB colour space

colorimetric colour space having three colour primaries (generally red, green and blue) such that CIE XYZ tristimulus values can be determined from the RGB colour space values by forming a weighted combination of the CIE XYZ tristimulus values for the individual colour primaries, where the weights are proportional to the radiometrically linear colour space values for the corresponding colour primaries

Note 1 to entry: A simple linear 3×3 matrix transformation can be used to transform between CIE XYZ tristimulus values and the radiometrically linear colour space values for an additive RGB colour space.

Note 2 to entry: Additive RGB colour spaces are defined by specifying the CIE chromaticity values for a set of additive RGB primaries and a colour space white point, together with a colour component transfer function.

3.3

colour component transfer function

single variable, monotonic mathematical function applied individually to one or more colour channels of a colour space

Note 1 to entry: Colour component transfer functions are frequently used to account for the nonlinear response of a reference device and/or to improve the visual uniformity of a colour space.

Note 2 to entry: Generally, colour component transfer functions will be nonlinear functions such as a power-law (i.e. "gamma") function or a logarithmic function. However, in some cases a linear colour component transfer function can be used.

3.4

colour encoding

generic term for a quantized digital encoding of a colour space, encompassing both colour space encodings and colour image encodings

3.5

colour gamut

solid in a colour space, consisting of all those colours that are either: present in a specific scene, artwork, photograph, photomechanical, or other reproduction; or capable of being created using a particular output device and/or medium

3.6

colour image encoding

digital encoding of the colour values for a digital image, including the specification of a colour space encoding, together with any information necessary to properly interpret the colour values such as the image state, the intended image viewing environment and the reference medium

Note 1 to entry: In some cases, the intended image viewing environment will be explicitly defined for the colour image encoding. In other cases, the intended image viewing environment can be specified on an image-by-image basis using metadata associated with the digital image.

Note 2 to entry: Some colour image encodings will indicate particular reference medium characteristics, such as a reflection print with a specified density range. In other cases, the reference medium will be not applicable, such as with a scene-referred colour image encoding, or will be specified using image metadata.

Note 3 to entry: Colour image encodings are not limited to pictorial digital images that originate from an original scene, but are also applicable to digital images with content such as text, line art, vector graphics and other forms of original artwork.

3.7

colour rendering

mapping of image data representing the colour-space coordinates of the elements of a scene to output-referred image data representing the colour-space coordinates of the elements of a reproduction

Note 1 to entry: Colour rendering generally consists of one or more of the following: compensating for differences in the input and output viewing conditions; tone scale and gamut mapping to map the scene colours onto the dynamic range and *colour gamut* (3.5) of the reproduction; and applying preference adjustments.