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BS ISO 22028-1:2016



BSI Standards Publication

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

Part 1: Architecture and requirements

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

Part 1: Architecture and requirements

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

Partie 1: Architecture et exigences



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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).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

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

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: [Foreword - Supplementary information](#)

The committee responsible for this document is ISO/TC 42, *Photography*.

This second edition cancels and replaces the first edition (ISO 22028-1:2004), of which it constitutes a minor revision with changes in Annex B and Bibliography. It also incorporates the Technical Corrigendum ISO 22028-1:2004/Cor. 1:2007.

ISO 22028 consists of the following parts, under the general title *Photography and graphic technology — Extended colour encodings for digital image storage, manipulation and interchange*:

- *Part 1: Architecture and requirements*
- *Part 2: Reference output medium metric RGB colour image encoding (ROMM RGB)*
- *Part 3: Reference input medium metric RGB colour image encoding (RIMM RGB)*
- *Part 4: European Colour Initiative RGB colour image encoding [eciRGB (2008)]*

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Introduction

Modern digital imaging systems serve a variety of consumer and commercial applications. Depending on the application, differing priorities will apply to such system attributes as image quality, interoperability, simplicity of system architecture and computations, and the flexibility for optimally using images for a variety of purposes. Trade-offs among these attributes are application-dependent.

A fundamental choice for any imaging system architecture is how to represent images numerically, in what colour space and with what digital encoding. In some applications, a single colour encoding designed to be compatible with the prevalent mode of image viewing by the end user can suffice. Since both multimedia and Internet-based imaging rely heavily on the viewing of images on a softcopy display, the use of sRGB as a colour encoding makes sense for those applications. However, because the colour gamut of sRGB does not encompass the colour gamuts of many common input and output devices, a system architecture that depends exclusively on the use of sRGB would compromise colour reproduction accuracy unacceptably for some applications.

Colour management systems, such as that defined by the International Colour Consortium (ICC), provide a mechanism for transforming between various device-dependent and device-independent colour encodings through the use of colour profiles that are used to define transformations between the various colour encodings and a standard colour space known as the profile connection space (PCS). (The ICC.1:2001-12 specification defines two different PCS variations; one for colourimetric intent profiles and one for perceptual intent profiles.) The ICC PCS is intended to be a colour space to be used for connecting together different colour profiles and as such has a colour gamut large enough to encompass most common input and output devices and media. However, the ICC PCS was not designed to be used as a colour encoding for the storage, transmission or editing of digital images. Additionally, since ICC colour management is primarily designed to work with colour images in a picture-referred image state, it does not provide any explicit mechanism for the representation and manipulation of image data corresponding to other image states.

There are many different applications in the fields of digital photography and graphic technology that involve editing, storage and interchange of digital images in a variety of image states and colour encodings. In order to clearly communicate colour image information within and between these applications, it is necessary to unambiguously describe the meaning of the colour values used to encode digital images. The colour encoding definitions need to not only include a specification of the relationship between the digital code values and corresponding physical colour values but they also need to clearly specify any other information needed to unambiguously interpret the colour values. Accordingly, there is a need to identify what information is required when defining a colour encoding in order to ensure that digital image data can be clearly communicated between various applications.

This part of ISO 22028 addresses this need by specifying a set of requirements to be met by colour encodings defined for various digital imaging applications. This part of ISO 22028 also describes a reference image-state-based digital imaging architecture that is flexible enough to support a wide variety of applications and workflows. This image-state-based digital imaging architecture can be used to classify colour encodings into a number of different image states. However, this part of ISO 22028 does not specify any particular workflow(s) that needs to be used for any particular digital imaging applications.

There is also a need for the specification of standard extended-gamut colour encodings that can be used in the context of this architecture to preserve the full range of colour information at every stage of the workflow, from the initial image capture through to the final step of producing a softcopy or hardcopy reproduction. It is anticipated that subsequent parts of this multi-part standard will define at least one scene-referred extended-gamut colour encoding and at least one output-referred extended-gamut colour encoding.

The International Organization for Standardization (ISO) draws attention to the fact that it is claimed that compliance with this part of ISO 22028 can involve the use of a patent concerning colour management given in [Clause 4](#) and [5.4.3](#).

ISO takes no position concerning the evidence, validity and scope of this patent right.

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

Part 1: Architecture and requirements

1 Scope

This part of ISO 22028 specifies a set of requirements to be met by any extended-gamut colour encoding that is to be used for digital photography and/or graphic technology applications involving digital image storage, manipulation and/or interchange. This part of ISO 22028 is applicable to pictorial digital images that originate from an original scene, as well as digital images with content such as text, line art, vector graphics and other forms of original artwork. This part of ISO 22028 also describes a reference image-state-based digital imaging architecture, encompassing many common workflows, that can be used to classify extended colour encodings into a number of different image states. However, this part of ISO 22028 does not specify any particular workflow(s) that are to be used for digital photography and/or graphic technology applications.

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.

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

3 Terms and definitions

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

3.1

absolute colorimetric coordinates

tristimulus values, or other colorimetric coordinates derived from a tristimulus values, where the numerical values correspond to the magnitude of the physical stimulus

EXAMPLE When CIE 1931 standard colour-matching functions are used, the Y-coordinate value corresponds to the luminance, not the luminance factor (or some scaled value thereof).

3.2

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 may vary within a scene.