INTERNATIONAL STANDARD

**ISO
12232**

Photography — Digital still cameras — Determination of exposure index, ISO speed ratings, standard output sensitivity, and recommended exposure index

AMENDMENT 1: Determination of encoding-relative sensitivity (ERS)

Photographie — Appareils de prises de vue numériques — Détermination de l'indice d'exposition, des régimes de vitesse ISO, de la sensibilité normale de sortie et de l'indice d'exposition recommandé

AMENDEMENT 1: Détermination de la sensibilité relative au codage (ERS)

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

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AMENDMENT 1: Determination of encoding-relative sensitivity (ERS)

Clause 7, after the 2nd paragraph

Add the following NOTE:

"NOTE For information related to the determination of encoding-relative sensitivity (ERS), see Annex E."

Annex E

Add the following Annex E:

Annex E
(informative)

Determination of encoding-relative sensitivity (ERS)

E.1 General

E.1.1 Purpose and use cases of the ERS

The ERS recorded in an image file can be used for calibrating exposures, to provide information about the exposures used to capture an image and to determine absolute scene luminance and colorimetry estimates for scientific, technical, and archiving applications. It can be helpful in implementing ISO/TR 19263-1 and ISO/TS 19264-1.

The ERS can be used when

— a camera records a processed file, either scene-referred or output-referred, or

— a camera raw file is processed.

Additionally, in the raw file processing case, the ERS to be recorded in the file can be displayed by the raw processing software, to allow it to be set to a specific value by the user.

E.1.2 Summary

Digital camera sensitivity specifies the relation between exposure and some specified signal level. Digital camera speed ratings specify the relation between exposure and signal-to-noise and clipping. ISO speed ratings indicate the range of exposure indices for which a camera has the potential to provide acceptable to excellent image quality, but do not guarantee that the desired tone reproduction will be achieved. They assume processing of the sensor signal will be applied, either in-camera or after the fact, to achieve the desired tone reproduction.

The ERS is a type of sensitivity that indicates the camera focal plane exposure corresponding to the processed image encoding values with CIELAB $L*a*b*$ values of {50, 0, 0} ($L*$ = 50). When an 18 % reflectance test card for a flat-field image (i.e. a spatially uniform field of view of spectrally neutral reflectance) is metered using the ERS as the exposure index, the resulting signal value for the test card will be the encoding values corresponding to $L*$ = 50 for the same image encoding used. ERS values can be determined for any image where the colour encoding values corresponding to $L*$ = 50 are well-defined.

Since the ERS value typically varies along with the DSC ISO sensitivity setting and can vary with the processing applied to the sensor signal, the ERS value will necessarily be as determined for a specific sensitivity setting and processing state, such as when the image is processed to the scene-referred image state. Single ERS values cannot be determined for images where the processing applied results in spatially different output values for the spatially uniform focal plane exposure, as possibly occur with spatially varying image processing.

When operating in a scene-referred mode, it is convenient if the in-camera processing gain is set so the ERS is equivalent to the camera's ISO sensitivity setting when the camera's exposure compensation is set to zero (±0 EV). (See ISO/TR 17321-3 for scene-referred image state and scene-referred modes.)

ERS values can be reported for output-referred images, but they are likely to be image specific due to variations in the camera or raw file processing. Camera raw files do not have ERS values since the raw file values corresponding to $L*$ = 50 are not determined until the raw file is processed.

E.2   Method for calculating ERS

The ERS (I_{ERS}) is defined as Formula (E.1):

$$I_{\mathrm{ERS}} = K/H_{\mathrm{ERS}} \tag{E.1}$$

where

K	is a constant equal to 10 lx·s;
H_{ERS}	is the exposure required to produce the DSC image signal level corresponding to $L^* = 50$ for the image encoding used. The H_{ERS} value should be measured as described for H_m in 4.2 or 4.3 of this document.

E.3   Method of reporting

The value calculated using Formula (E.1) should be rounded off to the nearest two significant figures, and reported as the Encoding-Relative Sensitivity (I_{ERS}). The ERS value applied when an image is captured should be included as metadata in the image file along with the white balance and exposure compensation metadata.

It is possible that the I_{ERS} value changes as a function of the f-number of the lens, for example due to the structure of a microlens overlay on the image sensor. In such cases, the f-number used for capturing the image should be reported along with the I_{ERS} value.

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Bibliography

ISO 12232:2019/Amd 1:2020

Add these documents at the end of the Bibliography:
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[23]   ISO/TR 17321-3, Graphic technology and photography — Colour characterization of digital still cameras (DSCs) — Part 3: User controls and readouts for scene-referred imaging applications

[24]   ISO/TR 19263-1, Photography — Archiving systems — Part 1: Best practices for digital image capture of cultural heritage material

[25]   ISO/TS 19264-1, Photography — Archiving systems — Image quality analysis — Part 1: Reflective originals

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