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

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

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Contents

Page

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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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.

ISO 12232 was prepared by Technical Committee ISO/TC 42, *Photography*.

This second edition cancels and replaces the first edition (ISO 12232:1998), which has been technically revised.

This corrected version incorporates the following corrections:

— the normative reference ISO 7589 has been dated;

— the symbol for the effective *f*-number of the lens has been made consistent in Equations (2), (3) and (4);

— the cross-references in the column headings have been corrected in Table 1;

— Figure A.1 has been changed and notes and footnotes have been added for better clarity;

— Equation (B.1) has been corrected and the symbol for the vignetting factor changed;

— the second paragraph in Annex D has been reworded and changed to a note to reflect its intentional informative nature;

— the second sentence in Table D.1 has been slightly reworded and added at the end of the paragraph preceding Table D.1;

— in Table D.1, zeros have been added to values to improve their readability and the text below the values has been changed to Note 1 to show its intentional informative nature;

— a note has been added to both Figure A.1 and Table D.1 to notify the reader that the decimal sign is a comma in accordance with ISO 31-0;

— ISO 31-0 has been added to the Bibliography and the references have been renumbered accordingly.

Introduction

The ISO speed rating, standard output sensitivity (SOS) and recommended exposure index (REI) are important attributes of digital still cameras (DSCs). Standardization assists users and manufacturers in obtaining proper exposures and in determining the low light capability of DSCs.

The exposure level of a DSC is determined by the exposure time, the lens aperture, the lens transmittance, the level and spectral distribution of the scene illumination, and the scene reflectance. When an image from a DSC is obtained using an insufficient exposure, proper tone reproduction can generally be maintained by increasing the electronic or digital gain, but the image will contain an unacceptable amount of noise. As the exposure is increased, the gain can be decreased, and, therefore, the image noise can normally be reduced to an acceptable level. If the exposure is increased excessively, the resulting signal in bright areas of the image may exceed the maximum signal level capacity of the image sensor or camera signal processing. This can cause the image highlights to be clipped to form a uniformly bright area, or to bloom into surrounding areas of the image. Therefore, it is important to guide the user in setting proper exposures. An ISO speed rating is intended to serve as such a guide. The methods for assigning an ISO speed rating to a DSC harmonize with current film-based photographic standards. In order to be easily understood by photographers, the ISO speed rating for a DSC should directly relate to the ISO speed rating for photographic film cameras. For example, if a DSC has an ISO speed rating of ISO 100, then the same exposure time and aperture should be appropriate for an ISO 100 rated film/process system.

The ISO speed ratings described in this International Standard are intended to harmonize with film ISO speed ratings. However, there are differences between electronic and film-based imaging systems that preclude exact equivalency. DSCs can include variable gain and can provide digital processing after the image data has been captured, enabling desired tone reproduction to be achieved over a range of camera exposures. It is therefore possible for DSCs to have a range of speed ratings. This range is defined as the ISO speed latitude. To prevent confusion, a single value is designated as the ISO speed, with the ISO speed latitude upper and lower limits indicating the speed range.

ISO 12232:2006 Photography - Digital still cameras - Determination of exposure index, ISO speed ratings, standard output sensitivity, and recommended exposure index