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Photography — Guidelines for reliable testing of digital still cameras

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National foreword

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Foreword

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

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Introduction

The motivation for producing these guidelines for testing digital still cameras (DSCs) is the increasing use of tests by industries and the press. On one hand, the booming DSC market attracts published evaluations and comparisons of its products. On the other hand, complex and, more importantly, reliable testing needs expensive test equipment and experienced and knowledgeable testing technicians. This guide provides direction and procedures for reliable testing of DSCs for those people with neither a photographic nor a scientific background.

The growing commercial development of DSC test methods and equipment is additional motivation for producing these guidelines as it is often difficult to make specific assessments about the usability of new test equipment and methods and about the reliability of their results. For the credibility of test methods and equipment the disclosure of the measurement methods and the mathematical analysis used by the manufacturer of the test equipment is important.

These suggestions follow two goals in order to improve the current situation for the parties involved:

a) Technical guidelines for the testing process

   This guide gives an overview of the important, useful and useable test criteria, procedures and basic evaluation for the users and producers of test methods. It will help to avoid typical mistakes and will improve and secure the validity and reliability of the used methods.

b) Guidelines for the interpretation of test results

   At the moment, there are no guidelines by which the receiver and user of test results, especially magazine readers and digital camera producers, can estimate the reliability and practicability, or in extreme cases the credibility, of test results. This guide will provide support in securing a basis for the assessment, analysis and even discussion with the testers. Therefore, this guide will provide more transparency in this complex area.

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Photography — Guidelines for reliable testing of digital still cameras

1 Scope

This Technical Report is applied to the reliable testing of digital cameras (DSCs).

2 Tests based on visual analysis

2.1 General

The visual analysis of digital image data using test persons is not easy as it seems. This becomes more evident when one considers that digital images are not visible. In order to visualize an image, a device needs to be used, i.e. a monitor or a printer.

In order for the correct interpretation of the image data to be possible, it is important to assure that the visible representation created by the device doesn't have any imponderable or even unknown limitations. This means that the devices needs to be calibrated and profiled, and with the help of a suitable colour management workflow allow the correct reproduction of the image. The tester needs to know about the limitations that can be introduced by the device especially in the areas of colour and resolution. Use DIN 15708-1 as a guideline to find out if an acceptably good colour reproduction is available.

It is important to consider that in some cases not all colours from the test specimen can be correctly captured and that colours, which are accurately captured, are not always correctly reproduced on the display or paper.

As a prerequisite for the test person, their ability to see especially with reference to dyschromatopsia (see Ishihara Test) and lack of 20/20 vision shall be given and tested. It is preferable that the test persons be composed of people of different sex and age, so that a representative selection of basic population can be achieved. When the testing starts, all test persons need to be relaxed and healthy. ISO 20462-3 describes the recommended procedure for subjective evaluation in the "quality ruler method".

Table 1 shows the magnitude of the influence of a single person in a group of persons on the median of the subjectively acquired evaluation results. This is derived from the standard deviation:

$$s = \sqrt{\frac{1}{n-1}\sum_{i=1}^{n}\left(\bar{x} - x_i\right)^2} = \sqrt{\frac{1}{n-1}}\sqrt{\sum_{i=1}^{n}\left(\bar{x} - x_i\right)^2} \tag{1}$$

The factor $e = \sqrt{\frac{1}{n-1}}$ in Table 1 represents the impact of a single person on the result based on the total number of observers. It is the standard deviation normalized to the square root of the sum of all squared deviations.

$$e = \frac{s}{\sqrt{\sum_{i=1}^{n}\left(x - x_i\right)^2}} = \sqrt{\frac{1}{n-1}} \tag{2}$$

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