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Photography — Vesicular microfilm — Determination of ISO speed and ISO range

*Photographie — Microfilm vésiculaire — Détermination de la sensibilité
ISO et de l'étendue ISO*



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Foreword

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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.

International Standard ISO 9378 was prepared by Technical Committee ISO/TC 42, *Photography*.

Annexes A, B and C of this International Standard are for information only.

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International Organization for Standardization
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Introduction

This International Standard describes a method for determining the ISO speed and ISO range of vesicular microfilms used for making prints from microimages. The methods described are intended to standardize how manufacturers measure these film characteristics, which should aid users in selecting the best product for their application.

Highly acceptable prints are generally obtained if the log expose range (LER) of a vesicular microfilm is equal to the effective density range of negative or positive originals. Therefore, ISO range, which is directly related to LER provides a useful guide for selecting the proper product for a given effective density range, and for comparing products from various manufacturers.

Vesicular photography is based on the sensitivity of aryl diazonium salt to radiation in the 350 nm to 450 nm range. Vesicular film consists of a polymeric layer in which a diazonium salt and an image-enhancing dye are dispersed. This photosensitive layer is coated on a polyester support. The decomposition of the diazonium salt by radiation in the near-ultraviolet or violet end of the electromagnetic spectrum produces nitrogen gas and colourless photolytic products. After exposure, the nitrogen gas remains temporarily entrapped in the polymer matrix and constitutes the latent image. The latent image is developed by heat which softens the polymer and allows the nitrogen to expand and form microscopic vesicles. The vesicles, which become stable and rigid when the film cools, form the image by virtue of their light-scattering nature. After development, the image is fixed by re-exposing the film to decompose the diazo salt remaining in the unexposed areas. The nitrogen gas formed during re-exposure slowly diffuses out of the photosensitive layer without affecting the image.

Since the density of vesicular film results from scattering rather than by absorption of light incident on the film, the amount of light transmitted by the film and reaching the viewing plane depends on the aperture of the projecting optics. Standard practice for densitometry established that the optical system should have an effective aperture of $f/4,5$.

Vesicular film is used for duplicating computer output microfilm (COM) and to a lesser extent for source document work and micropublishing.

Photography — Vesicular microfilm — Determination of ISO speed and ISO range

1 Scope

This International Standard specifies a method for determining ISO speed and ISO range of vesicular microfilms which have their principal spectral sensitivity in the region of 350 nm to 450 nm and are used to produce negative-appearing images from positive originals and positive-appearing images from negative originals.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 5-1:1984, *Photography — Density measurements — Part 1: Terms, symbols and notations.*

ISO 5-2:1991, *Photography — Density measurements — Part 2: Geometric conditions for transmission density.*

ISO 5-3:1984, *Photography — Density measurements — Part 3: Spectral conditions.*

ISO 554:1976, *Standard atmospheres for conditioning and/or testing — Specifications.*

ISO 8374:1986, *Photography — Determination of ISO safelight conditions.*

3 Definitions

For the purposes of this International Standard, the following definitions apply.

3.1 exposure, H : The time integral of irradiance over a specified wavelength interval on the film, expressed in joules per square metre.

NOTE 1 Exposure is usually expressed in terms of $\log_{10}H$. (See annex B for method of calculation.)

3.2 speed, S : A quantitative measure of the response of the photographic material to radiant energy for specified conditions of exposure, processing and image measurements.

3.3 log exposure range, LER: The range of log exposure values normally used to produce a final image. It is the difference in log exposure values required to produce two specified densities in the film.

4 Sampling and storage

In determining the ISO speed and ISO range of a product, it is important that the samples evaluated yield the average results obtained by users. This will require evaluating several different batches over a period of time. Prior to evaluation, the samples shall be stored according to the manufacturer's recommendations for a length of time to simulate the average age at which the product is normally used. To ensure that all components of variance are included in the sampling plan, it is recommended that procedures such as those outlined in ISO Standards Handbook 3 be used. Alternative reference sources are cited in annex C.

5 Test method

5.1 Principle

Samples are exposed and processed as specified below. Density measurements are obtained from the resultant images to produce a sensitometric curve from which values are taken and used to determine ISO speed and ISO range.