



SLOVENSKI STANDARD

SIST ISO 5-1:2010

01-maj-2010

Nadomešča:
SIST ISO 5-1:1996

Fotografija in grafična tehnologija - Merjenje optične gostote - 1. del: Geometrijske in funkcionalne oznake

Photography and graphic technology - Density measurements - Part 1: Geometry and functional notation

iTeh STANDARD PREVIEW
(standards.iteh.ai)

Photographie et technologie graphique - Mesurages de la densité - Partie 1: Géométrie et notation fonctionnelle

[SIST ISO 5-1:2010](https://standards.iteh.ai/catalog/standards/sist/bfe436f6-e6dd-4f19-b7b5-6782d30ddc51/sist-iso-5-1-2010)

[https://standards.iteh.ai/catalog/standards/sist/bfe436f6-e6dd-4f19-b7b5-](https://standards.iteh.ai/catalog/standards/sist/bfe436f6-e6dd-4f19-b7b5-6782d30ddc51/sist-iso-5-1-2010)

[6782d30ddc51/sist-iso-5-1-2010](https://standards.iteh.ai/catalog/standards/sist/bfe436f6-e6dd-4f19-b7b5-6782d30ddc51/sist-iso-5-1-2010)

Ta slovenski standard je istoveten z: ISO 5-1:2009

ICS:

01.040.37	Slikovna tehnologija (Slovarji)	Image technology (Vocabularies)
37.040.01	Fotografija na splošno	Photography in general

SIST ISO 5-1:2010

en

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[SIST ISO 5-1:2010](#)

<https://standards.iteh.ai/catalog/standards/sist/bfe436f6-e6dd-4f19-b7b5-6782d30dde51/sist-iso-5-1-2010>

INTERNATIONAL STANDARD

ISO
5-1

Second edition
2009-12-01

Photography and graphic technology — Density measurements —

Part 1: Geometry and functional notation

Photographie et technologie graphique — Mesurages de la densité —

Partie 1: Géométrie et notation fonctionnelle

iTeh STANDARD PREVIEW
(standards.iteh.ai)

SIST ISO 5-1:2010

<https://standards.iteh.ai/catalog/standards/sist/bfe436f6-e6dd-4f19-b7b5-6782d30ddc51/sist-iso-5-1-2010>



Reference number
ISO 5-1:2009(E)

© ISO 2009

PDF disclaimer

This PDF file may contain embedded typefaces. In accordance with Adobe's licensing policy, this file may be printed or viewed but shall not be edited unless the typefaces which are embedded are licensed to and installed on the computer performing the editing. In downloading this file, parties accept therein the responsibility of not infringing Adobe's licensing policy. The ISO Central Secretariat accepts no liability in this area.

Adobe is a trademark of Adobe Systems Incorporated.

Details of the software products used to create this PDF file can be found in the General Info relative to the file; the PDF-creation parameters were optimized for printing. Every care has been taken to ensure that the file is suitable for use by ISO member bodies. In the unlikely event that a problem relating to it is found, please inform the Central Secretariat at the address given below.

iTeh STANDARD PREVIEW (standards.iteh.ai)

[SIST ISO 5-1:2010](https://standards.iteh.ai/catalog/standards/sist/bfe436f6-e6dd-4f19-b7b5-6782d30ddc51/sist-iso-5-1-2010)

<https://standards.iteh.ai/catalog/standards/sist/bfe436f6-e6dd-4f19-b7b5-6782d30ddc51/sist-iso-5-1-2010>

**COPYRIGHT PROTECTED DOCUMENT**

© ISO 2009

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

Published in Switzerland

Contents

Page

Foreword	iv
Introduction.....	v
1 Scope	1
2 Normative references	1
3 Terms and definitions	1
4 Equations	4
5 Instrument representation	5
6 Coordinate system	6
7 Description of geometry	7
8 Functional notation	8
8.1 General	8
8.2 Geometric conditions.....	8
8.3 Spectral conditions	11
8.4 Examples of functional notation.....	12
Annex A (informative) Terms and definitions used in other parts of ISO 5	13
Bibliography.....	16

SIST ISO 5-1:2010

<https://standards.iteh.ai/catalog/standards/sist/bfe436f6-e6dd-4f19-b7b5-6782d30ddc51/sist-iso-5-1-2010>

ISO 5-1:2009(E)

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 5-1 was prepared by ISO/TC 42, *Photography*, and ISO/TC 130, *Graphic technology*, in a Joint Working Group.

This second edition cancels and replaces the first edition (ISO 5-1:1984), which has been technically revised. In the course of this technical revision, all parts of ISO 5 have been reviewed together, and the terminology, nomenclature and technical requirements have been made consistent across all parts.

ISO 5 consists of the following parts, under the general title *Photography and graphic technology — Density measurements*:

- *Part 1: Geometry and functional notation*
- *Part 2: Geometric conditions for transmittance density*
- *Part 3: Spectral conditions*
- *Part 4: Geometric conditions for reflection density*

Introduction

The measurement of the transmission and reflection characteristics of objects is essential to the science of photography and graphic arts. When light, or other radiant energy, is incident upon an object, it is either absorbed or propagated. Propagation can involve reflection, transmission, refraction, diffraction, scattering, fluorescence, and polarization. The propagated light is distributed in various directions about the object. In most practical applications it is neither necessary nor desirable to consider the light distributed in every direction, but only that which leaves the object in the direction for which there is response by a receiver, such as the eye.

The object modulates the flow of radiant energy from the illuminator to the receiver. The time rate of flow of radiant energy is called radiant flux, or simply flux. This part of ISO 5 provides methods to describe the measurements of the flux modulation in any system. To specify such a system accurately, geometric characteristics of the system, the spectral distribution of the flux incident on the object to be measured, and the spectral responsivity of the receiver need to be given. If the reflection characteristics of the illuminator or receiver affect the measurement, as they do in transmission measurements by the opal glass method, they need to be specified.

The area under consideration is defined by a sampling aperture, the dimensions of which can be important in some applications and need to be specified if the object has appreciable non-uniformity. If the measurement is to quantify the way the object would modulate flux in a given practical application, such as viewing or contact printing, the geometric and spectral conditions of measurement need to simulate those conditions in the practical application.

Modulation is measured and expressed as a dimensionless ratio of fluxes; that is, the flux propagated in the direction of the receiver and that part of the spectrum of interest divided by some reference flux. The reference flux can be the incident flux or the flux propagated through the system when the object is replaced by an ideal object. For some purposes, a logarithmically scaled measure of modulation is more useful than the measured arithmetic ratio. In such cases, it is customary to use optical density defined as the negative logarithm to base 10 of the ratio.

Most geometric arrangements used in photographic and graphic arts optical systems can be conveniently and adequately described in terms of uniform rays of flux bounded by right circular cones. A point on the object is often illuminated by such a conic distribution, and the geometric form of the pencil of rays reaching the receiver is generally conic. The pupil of the eye, for example, subtends a conic solid angle at an object point. In projection systems, the projection lens subtends a conic solid angle at the specimen point. This part of ISO 5 specifies a conic distribution by the half-angle of the cone and the direction of its axis.

A working knowledge of radiometry is generally required to obtain primary standard measurements of transmittance and reflectance. In good radiometric practice, for example, the effects of stray light are minimized by the use of appropriate baffles and proper blackening of certain surfaces. Because the principles and practice of radiometry are well known and are fully described in the *Handbook of Applied Photometry*^[10], it is considered unnecessary to provide a detailed specification of radiometric procedures in this part of ISO 5.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

SIST ISO 5-1:2010

<https://standards.iteh.ai/catalog/standards/sist/bfe436f6-e6dd-4f19-b7b5-6782d30dde51/sist-iso-5-1-2010>

Photography and graphic technology — Density measurements —

Part 1: Geometry and functional notation

1 Scope

This part of ISO 5 establishes terms, symbols, functional notations and a coordinate system to describe geometric and spectral conditions for the measurement of the degree to which a specimen modulates radiant flux for applications in photography, graphic technology, and radiometry.

This part of ISO 5 primarily provides a system for describing methods of measuring or specifying the transmission and reflection properties of photographic and graphic arts materials. The geometric and spectral conditions associated with such measurement are specified in ISO 5-2, ISO 5-3 and ISO 5-4.

iTeh STANDARD PREVIEW

2 Normative references (standards.iteh.ai)

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 5-2, *Photography and graphic technology — Density measurements — Part 2: Geometric conditions for transmittance density*

ISO 5-3, *Photography and graphic technology — Density measurements — Part 3: Spectral conditions*

ISO 5-4, *Photography and graphic technology — Density measurements — Part 4: Geometric conditions for reflection density*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply¹⁾.

3.1 absolute reference reflected flux

Φ_{rA}

radiant flux that would be reflected by a perfect reflecting diffuser

1) For the convenience of the user, Annex A lists those terms and definitions used in other parts of ISO 5 that are not used in this part of ISO 5.

ISO 5-1:2009(E)

- 3.2**
absolute reference transmitted flux
 Φ_{tA}
radiant flux that would be transmitted by a perfect transmitting diffuser
- 3.3**
anormal angle
 θ
angle between the normal of the reference plane and a direction
- NOTE Adapted from ASTM E1767.
- 3.4**
azimuthal angle
 η
angle between the x-axis of the reference plane and the projection of a direction onto the reference plane
- NOTE Adapted from ASTM E284.
- 3.5**
cone half-angle
 κ
angle between the central axis and the edge of the pupil with the apex at the centre of the sampling aperture
- 3.6**
efflux
radiant flux collected by the receiver from the reference plane
- NOTE Adapted from ASTM E1767.
- 3.7**
illuminator axis
central axis of the illuminator, usually the optical axis
- 3.8**
illuminator region
intersection of the illuminator beam with the reference plane
- 3.9**
incident flux
 Φ_i
radiant flux incident upon the sampling aperture
- 3.10**
influx
radiant flux projected by the illuminator onto the reference plane
- NOTE Adapted from ASTM E1767.
- 3.11**
influx spectrum
 S
spectral distribution of the radiometric quantity, such as radiance, irradiance or radiant flux, incident upon the sampling aperture
- NOTE This is a function of the source and optics used for the illumination.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[SIST ISO 5-1:2010](https://standards.iteh.ai/catalog/standards/sist/bfe436f6-e6dd-4f19-b7b5-6782d30ddc51/sist-iso-5-1-2010)

<https://standards.iteh.ai/catalog/standards/sist/bfe436f6-e6dd-4f19-b7b5-6782d30ddc51/sist-iso-5-1-2010>

3.12**ISO 5 standard density**

density value obtained using an instrument conforming to one of the geometries specified in ISO 5-2 or ISO 5-4, and one of the spectral definitions in ISO 5-3

3.13**receiver axis**

central axis of the receiver, usually the optical axis

3.14**receiver region**

intersection of the receiver beam with the reference plane

3.15**reflectance**
 ρ

ratio of the reflected flux to the incident flux under specified geometrical and spectral conditions of measurement

NOTE Adapted from ASTM E284.

3.16**reflectance density**
 D_ρ

negative logarithm to the base 10 of the reflectance

3.17**reflectance factor**
 R

ratio of the reflected flux to the absolute reference reflected flux under the same geometrical and spectral conditions of measurement

3.18**reflected flux**
 Φ_r

radiant flux that emerges from the specimen surface on which the incident flux falls

3.19**reflection density**
 D_R

negative logarithm to the base 10 of the reflectance factor

NOTE The International Commission on Illumination (CIE) designates the measurement referred to as "reflection density" in ISO 5 as "reflectance factor density". (See IEC 60050-845:1987 | CIE 17.4:1987.)

3.20**spectral responsivity**
 s

output signal of a receiver per unit input of radiant flux as a function of wavelength

NOTE Adapted from ASTM E284.

3.21**transmission density**
 D_T

negative logarithm to the base 10 of the transmittance factor