
**Photography — Transmission and
reflection densitometers — Method for
determining performance**

*Photographie — Densitomètres à transmission et à réflexion — Méthode
pour la détermination de la performance*

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[ISO 14807:2001](https://standards.iteh.ai/catalog/standards/sist/e67b41ce-a5c0-46c2-8c58-5d63bae1ca6b/iso-14807-2001)

[https://standards.iteh.ai/catalog/standards/sist/e67b41ce-a5c0-46c2-8c58-
5d63bae1ca6b/iso-14807-2001](https://standards.iteh.ai/catalog/standards/sist/e67b41ce-a5c0-46c2-8c58-5d63bae1ca6b/iso-14807-2001)



Reference number
ISO 14807:2001(E)

© ISO 2001

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)

ISO 14807:2001

<https://standards.iteh.ai/catalog/standards/sist/e67b41ce-a5c0-46c2-8c58-5d63bae1ca6b/iso-14807-2001>

© ISO 2001

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.ch
Web www.iso.ch

Printed in Switzerland

Contents

Page

Foreword.....	iv
Introduction	v
1 Scope	1
2 Normative references	1
3 Terms and definitions	1
4 Sampling and handling	5
5 Determination of performance	5
5.1 General.....	5
5.2 Repeatability determination.....	5
5.3 Stability determination	6
5.3.1 8 h stability determination	6
5.3.2 7 day stability determination	6
5.4 Bias estimate determination.....	7
6 Reporting (individual instrument performance).....	8
6.1 General.....	8
6.2 Repeatability reporting.....	8
6.3 Stability reporting	9
6.4 Bias estimate reporting.....	9
7 Reporting (performance specifications).....	10
Bibliography	11

<https://standards.itech.ai/catalog/standards/sist/e67b41ce-a5c0-46c2-8c58-5d63bae1ca6b/iso-14807-2001>

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 3.

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 International Standard may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

International Standard ISO 14807 was prepared by Technical Committee ISO/TC 42, *Photography*.

iTeh STANDARD PREVIEW (standards.iteh.ai)

ISO 14807:2001

<https://standards.iteh.ai/catalog/standards/sist/e67b41ce-a5c0-46c2-8c58-5d63bae1ca6b/iso-14807-2001>

Introduction

Over the past few years, the subject of densitometer performance specifications has been discussed at length, with the observation made that the densitometer customer is met with a plethora of claims and specifications, in a variety of formats, pertaining to densitometer performance. Furthermore, various manufacturers have often used different terminology for describing what is speculated to be the same characteristic. With this in mind, this International Standard was developed and it identifies three characteristics of performance: ISO repeatability, ISO stability and ISO bias estimate. Standardized methods for evaluating these characteristics are presented herein. Any or all three of these characteristics can be evaluated and used to describe the performance of an individual densitometer and will be useful in comparisons of the performance of densitometers.

The first two of these characteristics, ISO repeatability and ISO stability, are evaluated in such a way that, by use of suitable periodic sampling of production, a densitometer manufacturer can report average or typical repeatability and stability as specifications for a particular class, type or model of densitometer. However, ISO bias estimate cannot necessarily be meaningfully averaged over such a class, type or model, since by determining a mean bias estimate, any instruments that are biased positively will be offset by any that are biased negatively. Because of this, bias estimate for a class, type or model of densitometer (if determined as a simple arithmetic mean of the bias estimates determined for individuals of that class, type or model) is of limited (if any) value and should not be reported. If determined as such an arithmetic mean, it may only be meaningful if that entire class, type or model is fraught with a systematic design defect. There is currently no agreement as to the most meaningful way to provide an ISO bias estimate for a class, type or model of densitometer.

The standardized methods for determination of ISO repeatability and ISO stability provide manufacturers with a uniform basis for stating densitometer performance characteristics as specifications, thereby providing the customer with the most useful information.

To clarify and provide mutual understanding, a list of definitions applicable to the performance characteristics has been provided.

iTeh STANDARD PREVIEW **(standards.iteh.ai)**

ISO 14807:2001

<https://standards.iteh.ai/catalog/standards/sist/e67b41ce-a5c0-46c2-8c58-5d63bae1ca6b/iso-14807-2001>

Photography — Transmission and reflection densitometers — Method for determining performance

1 Scope

This International Standard defines a common set of reporting parameters and describes the methods to be used in the determination and presentation of individual densitometer performance and manufacturer-reported performance specifications. This International Standard applies to transmission and reflection densitometers typically manufactured for and used by the photographic, graphic arts and radiographic trades.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this International Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

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

ISO 5-2:2001, *Photography — Density measurements — Part 2: Geometric conditions for transmission density*

ISO 5-3:1995, *Photography — Density measurements — Part 3: Spectral conditions*

ISO 5-4:1995, *Photography — Density measurements — Part 4: Geometric conditions for reflection density*

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

3 Terms and definitions

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

NOTE There are a number of terms that are commonly used in connection with the subject of measurement, such as bias, repeatability, stability and traceability. One can avoid confusion by using such terms in a way that is consistent with other international documents. Definitions of many such terms are given in the *International Vocabulary of Basic and General Terms in Metrology*^{[2] 1)}, the title of which is commonly abbreviated, as VIM. The VIM was developed by ISO Technical Advisory Group 4 (TAG 4).

3.1

true value (of a quantity)

value consistent with the definition of a given particular quantity

NOTE 1 This is a value that would be obtained by a perfect measurement.

1) Throughout this International Standard, raised numbers in square brackets refer to informative documents listed in the bibliography.

NOTE 2 True values are by nature indeterminate.

NOTE 3 The indefinite article “a”, rather than the definite article “the”, is used in conjunction with “true value” because there may be many values consistent with the definition of a given particular quantity.

[VIM:1993, 1.19]

3.2 conventional true value (of a quantity)

value attributed to a particular quantity and accepted, sometimes by convention, as having an uncertainty appropriate for a given purpose

[VIM:1993, 1.20]

NOTE 1 “Conventional true value” is sometimes called **assigned value**, **best estimate** of the value, **conventional value** or **reference value**.

NOTE 2 An assigned value of a certified reference material is one type of conventional true value.

3.3 measurand

particular quantity subject to measurement

EXAMPLE Vapour pressure of a given sample of water at 20 °C.

NOTE The specification of a measurand may require statements about quantities such as time, temperature and pressure.

[VIM:1993, 2.6]

3.4 repeatability (of results of measurements)

closeness of the agreement between the results of successive measurements of the same measurand carried out under the same conditions of measurement

NOTE 1 These conditions are called **repeatability conditions**.

NOTE 2 Repeatability conditions include:

- the same measurement procedure
- the same observer
- the same measuring instrument, used under the same conditions
- the same location
- repetition over a short period of time.

NOTE 3 Repeatability may be expressed quantitatively in terms of the dispersion characteristics of the results.

[VIM:1993, 3.6]

3.5 experimental standard deviation

s
for a series of n measurements of the same measurand, the quantity s characterizing the dispersion of the results and given by the formula:

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

x_i being the result of the i th measurement and \bar{x} being the arithmetic mean of the n results considered

[VIM:1993, 3.8]

3.6

systematic error

mean that would result from an infinite number of measurements of the same measurand carried out under repeatability conditions minus a true value of the measurand

[VIM:1993, 3.14]

NOTE Like true value, systematic error and its causes cannot be completely known.

3.7

stability

ability of a measuring instrument to maintain constant its metrological characteristics with time

NOTE 1 Where stability with respect to a quantity other than time is considered, this should be stated explicitly.

NOTE 2 Stability may be quantified in several ways, for example:

- in terms of the time over which a metrological characteristic changes by a stated amount, or
- in terms of the change in a characteristic over a stated time.

[VIM:1993, 5.14]

3.8

error (of indication) of a measuring instrument

indication of a measuring instrument minus a true value of the corresponding input quantity

[VIM:1993, 5.20]

iTeH STANDARD PREVIEW
(standards.iteh.ai)
ISO 14807:2001
<https://standards.iteh.ai/catalog/standards/sist/e67b41ce-a5c0-46c2-8c58-5d63bae1ca6b/iso-14807-2001>

3.9

bias (of a measuring instrument)

systematic error of the indication of a measuring instrument

NOTE The bias of a measuring instrument is normally estimated by averaging the error of indication over an appropriate number of repeated measurements.

[VIM:1993, 5.25]

3.10

traceability

property of the result of a measurement or the value of a standard whereby it can be related to stated references, usually national or international standards, through an unbroken chain of comparisons all having stated uncertainties

NOTE 1 The concept is often expressed by the adjective **traceable**.

NOTE 2 The unbroken chain of comparisons is called a **traceability chain**.

[VIM:1993, 6.10]

EXAMPLE If a ruler used to measure the width of a sheet of paper has been calibrated to a more accurate ruler and this, in turn, has been calibrated to precision gauge blocks, the measured value of the width of the paper would be **traceable** to the gauge blocks (provided the uncertainties of all steps are known).