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## AMERICAN NATIONAL STANDARD

# Graphic technology — Graphic arts reflection densitometry measurements — Terminology, equations, image elements and procedures

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SECRETARIAT  
NPES THE ASSOCIATION FOR SUPPLIERS OF PRINTING, PUBLISHING  
AND CONVERTING TECHNOLOGIES

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AMERICAN NATIONAL STANDARDS INSTITUTE, INC.

# CGATS



## AMERICAN NATIONAL STANDARD

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## Foreword

This standard defines terms, equations, image elements and procedures for measurement and communication of data when using reflection densitometer instrumentation for graphic arts.

The Committee for Graphic Arts Technologies Standards (CGATS) was accredited by the American National Standards Institute in 1989 to serve as the coordinator of graphic arts standards activities. CGATS identifies areas in which standards are needed and desired, respecting the established activities of existing accredited standards committees and industry standards developers. CGATS writes standards only where need exists and no other committee is undertaking the writing.

This edition of CGATS.4 updates and replaces the 1993 version of this document. It includes no substantial technical changes but has been reorganized to make the information more readily accessible and to bring some nomenclature into closer agreement with that used in ISO. CGATS recommends the voluntary implementation and use of this standard by all segments of the graphic arts industry.

Requests for interpretation must be sent in writing to the CGATS Secretariat. This request will be forwarded to the appropriate committee, which will respond in writing. A statement, written or oral, that is not processed in accordance with the procedures noted above will not be considered the official position of CGATS, and should not be relied upon as a Formal Interpretation.

Suggestions for improving this standard are welcomed. They should be sent to the CGATS Secretariat, NPES The Association for Suppliers of Printing, Publishing and Converting Technologies, 1899 Preston White Drive, Reston, Virginia 20191-4367, USA; Fax: 703-620-0994; E-mail: standards@npes.org.

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This standard was processed and approved for submission to ANSI by Accredited Standards Committee CGATS. Committee approval of the standard does not imply that all committee members voted for its approval. At the time this standard was approved CGATS had the following members:

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## Introduction

Reflection density is widely used for quality and process control within the graphic arts industry. This standard defines terms and establishes a standard method for the use and application of instrumentation used to determine reflection density in the graphic arts field. Through use of this standard, more consistent measurement of process control elements can be achieved. Furthermore, the computation of derived parameters and communication of data based on a common definition will enhance the control of image reproduction across an industry that is global in nature.

It should be noted that many instruments measure reflectance factor and immediately calculate density using the appropriate spectral products. This direct reporting of density (-log of reflectance factor) rather than the reflectance factor differentiates densitometers from other instruments. This practice has yielded some confusion about what the unit "measures" and what it "reports."

A significant difference between densitometry and colorimetry is the weighting factors used to determine status density versus colorimetry.

Status responses used for densitometry are designed to optimize the instrument's ability to measure the quantity of particular colorants present. Colorimetry is designed to take into account the human visual response as defined by a CIE Standard Observer. Therefore, it is inappropriate to use densitometers for color measurement as defined by the human visual response.

A document similar to this one has been developed to address transmission densitometry. That document is CGATS.9, *Graphic technology — Graphic arts transmission densitometry — Terminology, equations, image elements and procedures.*

# Graphic technology — Graphic arts reflection densitometry measurements — Terminology, equations, image elements and procedures

## 1 Scope and field of application

This standard defines terms, equations and procedures for measurement, use, and communication of data obtained using reflection densitometry in the graphic arts. Graphic arts includes, but is not limited to, the preparation of material for, and volume production by, production printing processes, which include offset lithography, letterpress, flexography, gravure, and screen printing.

This standard also applies to measurement of materials produced by systems such as photographic, ink jet, thermal transfer, electrophotographic, and toner technology (including off-press proofs), etc., when used for graphic arts applications.

## 2 Normative references

The following standards contain provisions that, through reference in this text, constitute provisions of this standard. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ANSI/CGATS.17, *Graphic technology — Exchange format for spectral measurement, colorimetric, and densitometric data in electronic form*

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

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

## 3 Terms and definitions

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

### 3.1

#### **absorption (light)**

process by which light (radiant energy) is captured by a material and converted into another form of energy, usually heat; light that is neither transmitted nor reflected is absorbed

### 3.2

#### **aperture, illumination**

area of the sample illuminated by the instrument's light source

### 3.3

#### **aperture, mechanical**

aperture created by an opaque mask used to position the densitometer on the specimen