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

SECRETARIAT
NPES THE ASSOCIATION FOR SUPPLIERS OF PRINTING AND PUBLISHING TECHNOLOGIES

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FOREWORD

(This Foreword is not a part of American National Standard CGATS.9-1994, Graphic technology — Graphic arts transmission densitometry measurements — Terminology, equations, image elements and procedures)

This standard defines terms, equations, image elements and procedures for measurement and communication of data when using transmission 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.

CGATS recommends the adoption and use of this standard by the prepress segment of the graphic arts industry and its suppliers at their earliest convenience.

Requests for interpretation must be sent in writing to the 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 Secretariat, NPES The Association for Suppliers of Printing and Publishing Technologies, 1899 Preston White Drive, Reston, VA 22091-4367.

This standard was prepared by CGATS Subcommittee 3 and was processed and approved for submittal to ANSI by Accredited Standards Committee CGATS. Committee approval of the standard does not necessarily imply that all committee members voted for its approval. At the time this standard was approved the leadership of CGATS was as follows:

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

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

Introduction

Densitometer instrumentation is widely used for quality and process control within the graphic arts industry. The intent of this standard is to define terms and establish a standard method for the use and application of transmission densitometry and measurements of graphic arts halftone images. It does not address issues of photographic process control. This document is a complement to CGATS.4-1993, *Graphic technology — Graphic arts reflection densitometry measurements — Terminology, equations, image elements and procedures*.

Transmission densitometers for photographic materials, including graphic arts, are discussed in ISO 5/2 and ISO 5/3.

Through use of this standard, characterization of photomechanical graphic arts images and associated processes can be achieved in a more consistent manner. Furthermore, the communication of data with conformance to a measurement standard will enhance the control of image reproduction across an industry becoming global in nature.

It should be noted that the basic scheme used in transmission densitometers, as with other measuring systems (such as spectrophotometers), is to measure transmittance. This transmittance is a function of the various components, including filters, of the optical system and its geometry. One important difference between densitometers and other transmittance measuring instruments is the densitometer's immediate calculation and reporting of density (negative log of transmittance) rather than the transmittance. This practice has yielded some confusion about what the unit "measures" and what it "reports", but it differentiates densitometers from other instruments. Most densitometers also report other derived data.

A colorimeter is designed to take into account the human visual response as defined by the CIE Standard Observer. Densitometers have a number of spectral responses but these do not typically bear any simple linear relationship to colorimeter responses. These spectral characteristics are generally chosen to suit the process and materials being measured. For this reason it is inappropriate to use densitometers for color measurement as defined by the human visual response. Densitometric "color" characteristics should be used in a relative sense only and are useful for process control for graphic arts materials.

NOTE — Although the printing and publishing industry uses many binary printing patterns in addition to the traditional center-weighted halftone dot, this standard uses the term halftone to refer only to the traditional dot pattern. Other binary image forms in common use include line screens, mezzotints, stochastic screens, etc.

Normative Annex C is a part of the requirements of this standard. The other annexes are for informative purposes only.

1 Scope and field of application

This standard defines terms, equations, process control elements, and procedures for measurement and communication of transmission densitometry data for graphic arts halftone images. 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.

Although this standard addresses halftone applications, there are situations where non-traditional halftones and/or continuous tone materials are used for which these computations are also appropriate.

2 References

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

- ANSI/ISO 5/1-1984, *Photography - Terms, symbols and notations — Density measurements*
- ANSI/ISO 5/2-1991, *Photography - Density measurements - Part 2: Geometric conditions for transmission density*
- ANSI/ISO 5/3-1984, *Photography - Density measurements - Part 3: Spectral conditions*
- CIE 17.4-1987, *International Lighting Vocabulary (fourth edition)*
- ANSI/ASQC A1-1987, *Definitions, Symbols, Formulas, and Tables for Control Charts*

3 Definitions

For the purposes of this standard, the following definitions apply:

- 3.1 absorption (light):** the process by which light (radiant energy) is captured by a material and converted into another form of energy, usually heat. Light which is neither transmitted nor reflected is absorbed.
- 3.2 aperture size:** the area specified by the densitometer construction that limits the size of the viewing or sampling field.
- 3.3 aperture, illumination:** the area of the sample illuminated by the instrument's light source.
- 3.4 aperture, mechanical:** the aperture created by an opaque mask used to position the specimen on the densitometer.
- 3.5 aperture, sampling (reading aperture):** the area actually measured by the instrument.