CGATS/ISO 12646:2008
(Identical to ISO 12646:2008)

AMERICAN NATIONAL STANDARD

Graphic technology — Displays for colour proofing — Characteristics and viewing conditions

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

CGATS

NPES

AMERICAN NATIONAL STANDARD

This standard is an identical adoption of ISO 12646:2008, an International Standard that was developed under ISO Technical Committee 130, Graphic Technology.

Approval of this American National Standard as a national adoption was done in accordance with the *ANSI Procedures for the National Adoption of ISO and IEC Standards as American National Standards*.

The use of American National Standards is completely voluntary; their existence does not in any respect preclude anyone, whether he has approved the standards or not, from manufacturing, marketing, purchasing, or using products, processes, or procedures not conforming to the standards.

The American National Standards Institute does not develop standards and will in no circumstances give an interpretation of any American National Standard. Moreover, no person shall have the right or authority to issue an interpretation of an American National Standard in the name of the American National Standards Institute. Requests for interpretations should be submitted in writing to the secretariat whose name appears on the title page of this standard, who will forward such requests to the responsible ISO committee.

CAUTION NOTICE: This American National Standard may be revised or withdrawn at any time, following the procedures set forth in the *ANSI Procedures for the National Adoption of ISO and IEC Standards as American National Standards*. Purchasers of American National Standards may receive current information on all standards by calling or writing the American National Standards Institute.

COPYRIGHT NOTICE: These materials are subject to copyright claims of ISO, ANSI and NPES. No part of this publication may be reproduced in any form, including an electronic retrieval system, without the prior written permission of NPES.

All requests pertaining to CGATS/ISO 12646:2008 should be submitted to NPES.

American National Standards Institute
25 West 43rd Street, 4th Floor, New York, New York 10036
Tel: 212-642-4900
Internet: http://www.ansi.org

Contents
Page

Foreword

ANSI CGATS/ISO 12646:2008 is an identical adoption of ISO 12646:2008. ISO 12646:2008 was prepared by ISO Technical Committee 130, *Graphic technology*, with the support of the ANSI Committee for Graphic Arts Technologies Standards (CGATS).

Minor edits have been made to this standard to prepare it as an ANSI CGATS standard. No technical changes have been made.

The CGATS consensus body approved the national adoption of ISO 12646:2008 for issuance as CGATS/ISO 12646:2008 in accordance with the *ANSI Procedures for the National Adoption of ISO and IEC Standards as American National Standards* and the CGATS Operating Procedures.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. Neither ISO, ANSI nor CGATS shall be held responsible for identifying any or all such patent rights.

Introduction

The ability to match colour images displayed on colour monitors to the images produced when the same digital file is rendered by proofing and printing systems (commonly referred to as "soft" proofing) is increasingly expected in graphic arts. Obtaining such a match is not simple and to be fully accurate requires careful control of many aspects of the process. The primary purpose of this document is to make recommendations with respect to the soft proof viewing conditions. If these are controlled, it is then possible for users to exchange meaningful calibration (3.1.1) and characterization (3.1.2) data such that a consistent and, possibly, accurate colour match to the hard copy proof is achieved. In the case of visual display devices, the RGB device values are related to CIE tristimulus values.

The appearance of a colour image on a colour display is influenced by many physical factors other than controlled ambient viewing conditions. Among the most important of these are uniformity, convergence, size and resolution (in order to permit rendition of the proof at close to its normal size and with the finest detail visible on the hard copy at normal viewing distances), variation of electro-optical properties with viewing direction, freedom from flicker and glare (specular reflections with distinct images), the opto-electronic calibration of the display and the settings of its display driver software. So, to be acceptable as a proofing system which provides a reasonable level of image quality, the display must also exhibit these properties at an acceptable quality. This document is based on the use of the flat panel display (FPD) and cathode ray tube display (CRT) technologies. It specifies the requirements for factors such as uniformity, convergence, refresh rate, size and spatial resolution. However, since these parameters are subject to improvement as display technology changes, this document only defines minimum requirements for these parameters. It is assumed that displays used for this purpose will always conform to accepted industry "standards" for computer-aided design (CAD), and generally provide quality levels considered acceptable for this purpose, where they offer an improvement over the specifications herein.

Note that, even for displays of the highest quality, the appearance of the displayed image will be limited by the accuracy of the colour transformation used for converting the digital file from its encoded colour space to that required for display purposes. This document provides no formal specifications for these transformations, although the issues are discussed in an informative annex (Annex A), together with recommendations for achieving an acceptable colour transformation.

This document only considers the setting up of colour displays as "soft" proofing devices. It primarily focuses on applications where the displayed image will be directly compared to a hard copy. However, in some practical situations, the image on the screen is evaluated in the absence of a hard copy. In this document examples of two practical use cases are described. The first concerns the comparison of a soft proof with a hard copy proof; the second concerns the viewing of displayed images independently of any hard copy image. For the viewing of displayed images independently of any hard copy image, less restrictive requirements are sufficient, and they are stated separately in this document. This viewing is therefore concerned with modifying the "hard" and "soft" controls of the display to enable it to simulate a proof. In this sense, it can be looked on as a "slave" device. However, it is in the interests of a CAD user, where the colour display in a real sense "originates" from the image, to set up the display in a similar way. This will enable simpler optimization of the colour transformation to the selected hard copy system used for rendering the image, in order to produce an accurate reproduction, if this is an important requirement. However, it is possible to undertake image processing to modify the image when rendered to make it look like the displayed image (colour gamuts permitting) whatever the opto-electronic calibration of the display. This is briefly discussed in Annex A.

Users of this document will also benefit from CIE Publication 122[14]. Those unfamiliar with the judgement of displays may also find it helpful to read IEC 61223-2-5[9] which contains much useful detailed information about evaluation and testing of image display devices.

Graphic technology — Displays for colour proofing — Characteristics and viewing conditions

1   Scope

This document specifies the minimum requirements for the characteristics of displays to be used for soft proofing of colour images. Included are requirements for uniformity, convergence, refresh rate, display diagonal size, spatial resolution and glare of the screen surface. The dependence of colorimetric properties on the electrical drive signals and viewing direction, especially for flat panel displays, is also specified.

2   Normative references

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 3664, *Graphic technology and photography — Viewing conditions*

ISO 13655:—[1), *Graphic technology — Spectral measurement and colorimetric computation for graphic arts images*

ISO 15790, *Graphic technology and photography — Certified reference materials for reflection and transmission metrology — Documentation and procedures for use, including determination of combined standard uncertainty*

CIE Publication 15, *Colorimetry*

3   Terms, definitions and abbreviated terms

3.1   Terms and definitions

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

3.1.1
calibration
operation of establishing that the measured values agree with the values specified by a standard or a characterization process

3.1.2
characterization
process of relating device-dependent colour values to device-independent colour values

3.1.3
convergence
ability of the three electron beams (R, G and B) to come together at a single spot on the surface of the CRT (see 3.2)

[1)   To be published. (Revision of ISO 13655:1996)