

CGATS/GRACoL TR 006-2007
(Revised 2016)

A Technical Report

Prepared by

Committee for Graphic Arts Technologies Standards (CGATS)

**Graphic technology —
Color characterization data for GRACoL[®]
proofing and printing on U.S. Grade 1
coated paper**

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

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CGATS



TECHNICAL REPORT

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This Technical Report was developed in cooperation with the General Requirements for Application in Commercial Offset Lithography (GRACoL) Committee, and the Print Properties Committee, organizations under the International Digital Enterprise Alliance (IDEAlliance).

Questions and comments regarding this Technical Report should be addressed to the CGATS Secretariat, NPES The Association for Suppliers of Printing, Publishing and Converting Technologies, 1899 Preston White Drive, Reston, Virginia 20191.

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Foreword

This CGATS Technical Report was prepared by the members of CGATS Subcommittee 4, Process Control, in cooperation with the members of the GRACoL Committee and the IDEAlliance Print Properties Committee. At the time of its approval, the following were the Participating Members and Observers of CGATS Subcommittee 4.

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Vice Chairman: Gerry Gerlach, Integrity Graphics

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NOTE: TR006 contains colorimetric characterization data describing offset lithographic printing meeting the requirements of the now withdrawn CGATS.6. It is now provided for historical traceability of standardized publication printing. For values and guidance for current printing aims please refer to CGATS.21 series or the ISO equivalent, ISO/PAS 15339.

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Introduction

In 1996 a group of volunteers from across the graphic arts industry came together as a task force under the direction of the former Graphic Communications Association (GCA), now known as IDEAlliance (International Digital Enterprise Alliance, Incorporated). Their collective goal was to develop a working set of guidelines and specifications for the commercial offset industry. Their mission was to improve communications and education in the graphic arts by developing best practices and specifications that reflect the influence and impact of new technologies in the workflow of commercial offset lithography.

In 1997 the first GRACoL® publication, Version 1.0, was released. GRACoL updated their guidelines as the industry advanced. GRACoL guidelines are being gradually accepted by the printing industry and are being incorporated more formally into printing contracts as a measure of quality.

In 2000 the GRACoL Committee initiated the creation of specifications for commercial offset printing to accompany their guidelines. This initial work by GRACoL to characterize commercial offset printing on U.S. Grade 1 paper was published as CGATS Draft Technical Report 004 (DTR 004). GRACoL now believes that this data is not representative of commercial printing and is no longer recommended.

The development of these characterization data represents a departure from previous procedures in which the multiple data sets were averaged to produce a final result. Such an approach inevitably includes the unique characteristics of the press(s) involved in the testing and often includes non-uniformities that must be either accepted or mathematically corrected.

The new approach to characterization data creation (used here) first defines the aims for the outer printing gamut (i.e. the color of the solids, two color overprints, and the paper) using printing tests, industry specifications, and other input. Existing well known characterization data that represents similar printing is then mathematically adjusted and smoothed, using color management tools, to provide the mapping of the internal overprint data. For the data of TR 006 this step included the requirement that the G7™ neutral print density curve was satisfied. Finally, these characterization data were validated by comparison to the results of printing tests aimed at the defined printing conditions.

The printing aims used were based on the GRACoL 2006 publication. The work done to create the idealized characterization data was accomplished by a team of industry volunteers working under the GRACoL/ IDEAlliance Print Properties Committee banner. The validating press tests were done in representative industry printing plants.

The GRACoL/IDEAlliance Print Properties Committee believes that these characterization data represent the best current estimate of achievable printing using either sheet-fed or web printing on U.S. Grade 1 coated paper using inks meeting the requirements of ISO 2846-1 and is within the aims and tolerances of ISO 12647-2 for paper type 1. They represent the aim relationship between input data and printed color for both printing and proofing for this printing condition.

This Technical Report, prepared jointly by GRACoL and CGATS, supports the GRACoL mission by providing color characterization data for GRACoL proofing and printing on U.S. Grade 1 coated paper.

Graphic technology — Color characterization data for GRACoL® proofing and printing on U.S. Grade 1 coated paper

1 Scope

This Technical Report provides color characterization data (the relationship between CMYK printing values and measured color on the printed sheet) for proofing and for sheet-fed printing on U.S. Grade 1 coated papers (ISO 12647-2, paper type 1). Because the majority of U.S. Grade 1 papers contain significant amounts of optical brightening agents (OBA), these data only apply when the measurement conditions match those described in this report.

2 References

ANSI/CGATS.5-2003 + Supplement 1, *Graphic technology — Spectral measurement and colorimetric computation for graphic arts images*

ANSI/IT8.7/4-2005, *Graphic technology — Input data for characterization of 4-color process printing*

GRACoL® 2007 Version 7.0 <http://www.gracol.org/specification/>

ISO 3664:2000, *Viewing conditions — Graphic technology and photography*

ISO 12647-1:2004, *Graphic technology — Process control for the production of half-tone colour separations, proof and production prints — Part 1: Parameters and measurement methods*

ISO 12647-2:2005, *Graphic technology — Process control for the production of half-tone colour separations, proof and production prints — Part 2: Offset lithographic processes*

CIE Publication No 163:2004, *The Effect of Fluorescence on the Characterization of Imaging Media*

3 Background

The newest version of the GRACoL Specification, GRACoL 7, breaks from tradition by focusing on colorimetric data for grey balance and a standardized "Neutral Print Density Curve" (NPDC), rather than on traditional TVI aims for each ink. This new philosophy allows a careful user to achieve a closer visual match from device to device (at least on neutral gray tones), while maintaining the same overall "appearance" of traditional printing. The approach does NOT guarantee a perfect match in all colors, but it DOES reduce the need for custom separations for each press, which is a valuable benefit in today's ICC workflows.

Characterization data may be prepared in a variety of ways. Using limited, controlled printing tests that are carefully adjusted to exactly match the specification aims are one approach. When this is done, the resultant small sample of data is often mathematically adjusted and smoothed to allow it to "fit" the predefined process control aims. A second approach is to mathematically adjust earlier characterization data to fit new aims and or papers. A third approach is to collect and average a large body of test data. The method chosen by the GRACoL committee to prepare these data was the second approach.

The most important issue is a clear understanding and definition of the source and provenance of the data. That is one of the purposes of this Technical Report.

U.S. Grade 1 paper often contains high amounts of fluorescent dyes known as optical brightening agents (OBA) which are also known as fluorescent whitening agents (FWA). The presence of these agents introduces many complications for the instrumental reading of the color and gray balance of a print. When prints on U.S. Grade 1 paper are measured, each colorimetric instrument is likely to read the bidirectional radiance factor (apparent reflectance), and hence the color, differently. The magnitude of the differences in measured data depend upon the exact type (incandescent, xenon, etc.) and quality (filtered, pulsed, ramped, etc.) of the source used in the instrument which impacts the amount of ultraviolet and short wave visible light incident upon the specimen. CIE Publication 163 documents the magnitude of this effect for a range of printing, office and specialty papers.

The relative spectral power distribution of the instrument and viewing source impacts both the measured and perceptual white points. ISO 3664 describes methods to characterize the viewing source.