

ANSI/I3A IT2.37-2001

# American National Standard

*for Photography -  
Print Grain Index -  
Assessment of Print Graininess  
from Color Negative Film*

---



This is a preview of "ANSI/I3A IT2.37-2001". [Click here to purchase the full version from the ANSI store.](#)

**ANSI/I3A IT2.37-2001**

American National Standard  
for Photography –

**Print Grain Index –  
Assessment of Print Graininess  
from Color Negative Film**

Secretariat

**International Imaging Industry Association, Inc. (I3A)**

Approved August 31, 2001

**American National Standards Institute, Inc.**

## American National Standard

Approval of an American National Standard requires review by ANSI that the requirements for due process, consensus, and other criteria for approval have been met by the standards developer.

Consensus is established when, in the judgement of the ANSI Board of Standards Review, substantial agreement has been reached by directly and materially affected interests. Substantial agreement means much more than a simple majority, but not necessarily unanimity. Consensus requires that all views and objections be considered, and that a concerted effort be made towards their resolution.

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 addressed to the secretariat or sponsor whose name appears on the title page of this standard.

**CAUTION NOTICE:** This American National Standard may be revised or withdrawn at any time. The procedures of the American National Standards Institute require that action be taken periodically to reaffirm, revise, or withdraw this standard. Purchasers of American National Standards may receive current information on all standards by calling or writing the American National Standards Institute.

Published by

**American National Standards Institute, Inc.  
25 West 43rd Street, New York, NY 10036**

Copyright © 2003 by American National Standards Institute, Inc.  
All rights reserved.

No part of this publication may be reproduced in any form, in an electronic retrieval system or otherwise, without prior written permission of the publisher.

Printed in the United States of America

## Contents

	Page
Foreword .....	ii
Introduction .....	iii
<b>1</b> Scope .....	1
<b>2</b> Normative references .....	1
<b>3</b> Terms and definitions .....	1
<b>4</b> Computational steps .....	3
<b>5</b> Summary of procedure to calculate the <i>PGI</i> .....	12
<b>6</b> Reporting results .....	13
<b>Tables</b>	
<b>1</b> Channel-dependent numerical factors used in equation (1) .....	11
<b>2</b> Optical printing magnifications.....	11
<b>3</b> Visual weighting coefficients used in equation (6).....	12
<b>Annexes</b>	
<b>A</b> Derivation of the relationship of print granularity to film granularity.....	14
<b>B</b> Bibliography .....	16

**Foreword** (This foreword is not part of American National Standard ANSI/I3A IT2.37-2001.)

The grainy appearance of directly viewed photographic prints, (as opposed to, e.g., the granularity of film negatives, which are not often directly viewed) is often of primary interest in the evaluation of image quality. Because there is a need to evaluate and compare this graininess, there has been a need to specify a standardized method for its assessment.

This standard defines "graininess" and provides an objective basis (the "Print Grain Index," or PGI) for comparing the graininess of color photographic prints made from color negative films. The method uses the RMS granularity of the color negative film as the input, and computes the PGI for a specified printing magnification. The PGI allows a photographer to choose a film, format and printing magnification based on an objective assessment of the resulting perceived graininess in the final print.

This standard contains two annexes that are informative and are not considered part of the standard.

Suggestions for improvement of this standard will be welcome. They should be sent to the International Imaging Industry Association, Inc. (I3A), 550 Mamaroneck Avenue, Suite 307, Harrison, NY 10528-1612; e-mail: i3astds@i3a.org.

This standard was processed and approved for submittal to ANSI by I3A Technical Committee on Image Evaluation, IT2. 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 IT2 Committee had the following members:

Michael R. Goodwin, Chairman  
Jack Holm, Vice-Chairman

<i>Organization Represented</i>	<i>Name of Representative</i>
International Imaging Industry Association, Inc. (I3A) .....	Sharon Bartels Richard Fisch Michael R. Goodwin Thomas Lumenello Robert A. Uzenoff Robert D. Whittal Paul J. Kane (Alt.) Thomas McKeehan (Alt.)
CGATS .....	Larry Steele
Graphic Communication Association.....	Norman W. Scharpf
Graphic Microsystems .....	Steven Headley
GTI Graphic Technology, Inc.....	Charles G. Saleski
Photographic Society of America .....	Jack Holm Ira Current (Alt.)
Professional Photographers of America .....	Tim Mathiesen
Radiological Society of North America .....	Homer L. Twigg, Jr. Eliot L. Siegel
US Department of Commerce - National Institute of Standards and Technology.....	Edward A. Early
<i>Individual Expert</i>	
Daniel Sinto	

## Introduction

RMS-granularity is a useful measure of the microdensity fluctuations present in an area of uniform exposure on a photographic film. These fluctuations arise from the random distribution of silver halide grains present in the original photographic layers. It has been shown that relative changes in the measured film rms-granularity correlate with relative changes in the graininess of prints made from the film negative [1].<sup>1)</sup> However, the film negative itself is rarely viewed, and it is the graininess of the final viewed image or print that is of primary interest in the evaluation of image quality.

This standard specifies procedures for computing the "Print Grain Index" (PGI) of a color photographic print made from a color negative film. The purpose of the PGI is to provide an objective basis for comparing the graininess of color photographic prints made from color negative films at specified magnifications.

The PGI is a complement to, rather than a replacement for, rms-granularity. In fact, rms-granularity is part of the data required to compute the PGI.

The PGI scale defined in this standard is intended for prints made by optically enlarging color negative films coated on transparent support onto color reflecting materials (photographic papers).

---

<sup>1)</sup> The number in the bracket refers to the reference in the Bibliography (annex C).

American National Standard  
for Photography –

## Print Grain Index – Assessment of Print Graininess from Color Negative Film

### 1 Scope

This standard describes a method for determining the Print Grain Index (*PGI*) of a uniform neutral color photographic print made from an unmodulated neutral exposure of a color negative film.

### 2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this American National Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this American National Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ANSI/I3A IT2.40-2003, *Root Mean Square (rms) Granularity of Film (Images on One Side Only) – Method for Measuring*

ANSI/ISO 2721:1982 (R1997), ANSI/PIMA IT3.301-1990 (R1997), *Photography – Cameras – Automatic controls of exposure*

ANSI/PIMA IT2.39-1998, *Photography – Black-and-white, continuous-tone films – Photographic modulation transfer function*

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

### 3 Terms and definitions

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