

# Idealliance Digital Press Certification Program

Version 2.3.6

January 2017



## **Warning**

This document is not a standard, but is intended to be a specification specific to outline the requirements to achieve digital print certification. It is distributed for review and comment. It is subject to change without notice and should not be reproduced for distribution. All recipients of this document are invited to submit their comments for review.

# Version History

## Changes introduced in Version 2.1

1. Changed Digital Press Form 6, new version now includes crop marks for use in determining registration.
2. Changed header in Section 2.1 to indicate that instead of Digital Press Form 4, now Digital Press Form 6 will be used to determine register.
3. Updated “Annex B - Application Data Sheet for Digital Press Certification”. Editorial changes made to the ADS template.

## Changes introduced in Version 2.2

1. Section 2.2, the following line is added for clarification, “....2 press sheets of Digital Press Form 1 are randomly chosen for this evaluation.”
2. Section 2.11. Clarified the number of visual (subjective) tests to be conducted. Now an initial GENERAL INSPECTION is conducted to determine if the submitted press sheets are physically OK, and there are no defects that would affect measurement. Further visual evaluation is considered in tests for VIGNETTES and MOIRÉ. Removed old ANNEX D - Visual Examination Checklist.
3. Section 4, introduced a new requirement that ANNEX C - Check List for File Submission, be completed and included with the press sheets when shipping submissions to the Evaluation Contractor.
4. Annex D – Example Certificate – added “GRACoL” to the certificate to prominently state the targeted reference printing condition.

## Changes introduced in Version 2.3

1. All references to IDEAlliance changed to Idealliance.
2. Add GRACoL 2013 and M1 Measurement Condition, as valid dataset targets and evaluation options where GRACoL 2006 was previously only allowed. (sections 1.3, 1.8, 1.9, 1.10, Annex A)
3. Removed reference to Color Port (section 1.10)
4. Add all “Idealliance published, G7 calibrated” datasets as targets. (sections 1.3, 1.8, 1.9, 1.10, Annex A)
5. Change all references of Control Strip 2011 to Control Strip 2013 (sections 1.3, 1.7, 1.9, 2.2)
6. Replace Control Strip 2011 with Control Strip 2013 on all press forms.
7. Update press forms 5 (20, 40, 65) to remove minor jpeg compression artifacts.
8. Change mid-tone definition from 40% to 50%, Control Strip 2013 use 50% for primary and secondary mid-tone values. (table 2 and table 3)

## Table of Contents

<b>1. Program Overview</b>	<b>4</b>
1.1 Abstract	4
1.2 What is a Digital Press?	4
1.3 Overview of the Certification Process	5
1.4 Related ISO Standards	6
1.5 Use of Delta E (2000)	6
1.6 PDF Files	7
1.7 Substrate	7
1.8 Reference Printing Condition- Characterization Dataset	8
1.9 IDEAlliance Digital Press Control Strip 2013	8
1.10 Measurement Configuration	8
1.11 "Silent" Entries	9
1.12 Published Tolerances	9
1.13 Failed Submissions	9
1.14 Marketing and PR	10
<b>2. Description of Tests</b>	<b>10</b>
2.1 ADS Review and Approval	10
2.2 Colorimetric Evaluation (uses Digital Press Form 1)	10
2.3 Uniformity within the Press Run (1000 sheets) (uses Digital Press Form 2)	12
2.4 Creating #1, 2, 3,... 1000 Slugline	13
2.5 Short-Term and Long-Term Repeatability (uses Digital Press Form 3)	13
2.6 Minimum Font Size (uses Digital Press Form 4)	14
2.7 Uniformity within a Press Sheet (uses Digital Press Form 5)	14
2.8 Density Loss During Abrasion (uses Digital Press Form 6)	16
2.9 Measurement of Gloss (uses Digital Press Form 6)	16
2.10 Registration of CMYK Separations (uses Digital Press Form 6)	16
2.11 Visual Evaluation	16
<b>3. Certification and Reporting</b>	<b>17</b>
<b>4. Submission Check List</b>	<b>17</b>
<b>ANNEX A- Online Application Form</b>	<b>18</b>
<b>ANNEX B - Application Data Sheet for Digital Press Certification</b>	<b>19</b>
<b>ANNEX C- Check List for File Submission</b>	<b>20</b>
<b>ANNEX D- Example Certificate</b>	<b>21</b>

# 1. Program Overview

## 1.1 Abstract

This document describes the procedure and tolerances for the Idealliance Digital Press Certification program. The Digital Press Certification program is similar to what GRACoL and SWOP is for inkjet proofing, but for digital presses. Certification is presently intended for production digital printing systems that use xerographic and inkjet technologies. The framework is based on upcoming international standards ISO 12647-8, 15311, and 15339.

The Digital Press Certification program consists of testing and certification in areas of color, print properties and print production. In the certification process, a series of test forms are provided, suppliers print these forms according to given criteria, the forms are sent to the Idealliance designated Evaluation Contractor where they are measured and compared against pre-determined tolerances. Systems that pass all tests are awarded certification, the supplier system details are published on the Idealliance web site and the supplier is able to display the certification logo on their product collateral. Potential customers are able to recognize the certification logo and have confidence when considering purchase of a certified system.

A digital press system consists of the Digital Front End (DFE) and the print engine. Substrate and colorants are also considered. Documentation for certified systems are made available in terms of an Application Data Sheet (ADS). Certification for a given configuration does not expire.

The Digital Press Certification procedure is governed by Idealliance via its Print Properties & Colorimetric Council, and submissions and testing are coordinated via an Evaluation Contractor.

The certification process certifies that a system has been shown to be *capable* of meeting specific print standards, however this does not guarantee that in a given customer location the same system will always produce work to the certified tolerances. Site/shop certification are further steps in an ultimate certification process where a particular print shop or printer is certified to produce work that meets the required standards.

While the market for digital production printing is large and established, international standards for printing and process control using digital presses are still being developed. Digital press technology has been advancing steadily over the last decade and has now reached a level of maturity and stability; digital presses are no longer a “moving target” and it is now appropriate to determine realistic certification procedures and tolerances. There is the urgent need for independent system verification and certification. Certification serves to safeguard the customer and assist suppliers in improving their technologies. Certification processes enhance our understanding and application of digital printing which creates and grows opportunities for everybody in digital production printing – that is the spirit in which this certification process is offered to the community.

## 1.2 What is a Digital Press?

For the purposes of this certification, digital presses refers to commercial and production printing where short run jobs are printed using xerographic (laser toner) digital presses, inkjet production presses or any other technologies that produce similar output. Digital presses tend to be associated with short and medium run lengths, variable data, on-demand printing, and short turn around times.

Idealliance Digital Press Certification is aimed at digital presses and production inkjet devices, however there is no rigid clause that precludes certification of any print technology that can pass the prescribed tests.

In future developments it is anticipated that there will be further categories for digital printing, so that we may have for example

- Part 1: Digital (xerographic) presses and production inkjet devices
- Part 2: Large format inkjet (sign and graphics)
- Part 3: Inkjet for industrial and textile applications.

### **1.3 Overview of the Certification Process**

The main steps of the certification process are now summarized. (The remainder of the document provides a detailed description for each part of the process.)

- The submission process begins with an Application Form (Annex A) that is completed online and submitted to Idealliance, along with the entire certification fee. The full fee is payable irrespective of the outcome of the testing.
- The online form is copied internally to the Evaluation Contactor who is alerted to the new submission.
- In Annex B, the Submitter must also provide information to create an Application Data Sheet (ADS). An ADS provides system details such as the DFE, print engine, substrate, settings, etc. Enough detail must be provided for a skilled practitioner in our industry, to replicate the press output. Each ADS will be reviewed by the Evaluation Contractor.
- The Submitter is to ensure that they have appropriate licenses for use of any ISO SCID (12640) CMYK images that constitute the test forms.
- The Submitter is to download and print a number of supplied test forms, Digital Press Forms 1-6 (Annex C). Different quantities, formats and configurations are described. Generally files are provided as PDF/X-1a or PDF/X-3 files of print size 12 x 18". The Submitter is also required to submit blank, unprinted paper samples of the same stock as used to produce the printed samples.
- Colorimetric targets are based on measurement data generated per ISO 13655 for hard copy press sheets, from the following targets - IT8.7/4 and the Idealliance Digital Press Control Strip 2013. All colorimetric measurements are done using an X-Rite iSisXL (Rev E) spectrophotometer. An X-Rite iSis 2 XL may also be employed.
- The reference printing condition target CIELAB values are specified, and take the form of a published reference printing condition. The original Digital Press Certification used GRACoL 2006 as the target dataset. The current certification process allows for all Idealliance published, G7 calibrated datasets; GRACoL 2006, GRACoL 2013, CRPC 1-7. As new datasets are developed and published by Idealliance, they shall be adopted as certification target datasets. Certifications are evaluated under the measurement condition of the targeted dataset. GRACoL 2006 targeted certifications are evaluated under M0, GRACoL 2013 or CRPC targeted certifications are evaluated under M1.
- The Submitter is to print the specified press sheets and ship them to the Evaluation Contractor.

- A visual examination of press sheets will be undertaken to ensure that the press sheets have not been damaged in shipping. Formal visual examination is also part of the certification process. This may include but not be limited to, physical abrasions, image artifacts (such as vignettes and moiré), etc.
- A number of test procedures and colorimetric measurements will be conducted using specified instruments, measurement conditions, and measurement geometry.
- A system must pass every required test in order to achieve certification. In other words, failure even in a single test represents a failure to achieve certification.
- The press sheets will be retained by Idealliance and will not be returned.
- The Evaluation Contractor will provide a report to the Submitter by e-mail. The report includes a description of each test, the results of each test and whether the system passed or failed each test. Results will be reported usually within 5 working days of the conclusion of the testing. An example report format is shown in Annex D.
- Suppliers who have achieved successful certification will be provided with the certification logo and intellectual property rights for use of the logo and text on their websites and in marketing material.
- Idealliance will maintain a list of Digital Press Certified Systems on the official web site and will update the site with details of a newly certified system within 7 days of successful certification.

#### 1.4 Related ISO Standards

There exist a number of very relevant and appropriate evolving standards as follows.

- *ISO 12647-8 Validation print processes working directly from digital data*
- *ISO 15311 Graphic technology - Requirements for printed matter utilizing digital printing technologies for commercial and industrial production*
- *ISO 15339 Graphic Technology – Printing from digital data*

These standards and their contents are referenced, acknowledged and utilized in developing the procedures and tolerances for the Idealliance Digital Press Certification Program.

#### 1.5 Use of Delta E (2000)

The tolerances in this certification process are based on Delta E (2000), abbreviated as  $DE_{00}$  or  $\Delta E_{00}$ . This “weighted” Delta E equation provides better correlation between measured and perceived color differences. While many ISO standards and Idealliance procedures are based on “traditional”  $DE^*_{ab}$ , most procedures are in the process of migrating to a weighted Delta E equation<sup>1</sup>. Digital Press Certification is a new procedure and with no legacy requirements, it is prudent to stipulate tolerances in  $DE_{00}$ .

There is no easy translation or conversion math between  $DE^*_{ab}$  to  $DE_{00}$ . When calculating  $DE_{00}$  the calculation changes, depending on what color is being measured, this enables us to create more sensitivity to flesh tones and near neutral colors, and gives less importance to very dark or very saturated colors. We may say that a weighted equation such as  $DE_{00}$  is non-linear or

<sup>1</sup> Technical White Paper, *Mapping of ISO 12647 tolerances from CIELAB to CIEDE2000*, Danny Rich, 30 September 2010

dynamic, changing the calculation depending on where in the color space the calculation is being performed. While this is good in terms of reconciling measured and perceived color differences, it does mean that there is no simple math to convert between the two systems, so it is not easy to answer  $DE_{ab}^*$  of 3.0 is the same as  $DE_{00} = ?$ , etc. In general, on average, we find that  $DE_{ab}^* = 1.5X$  to  $2X DE_{00}$ , so if  $DE_{00}$  is around 2 for a color sample pair,  $DE_{ab}^*$  is approximately 3 or 4 for the same colors. The exact conversion differs of course depending on the specific color being considered.

Given that  $DE_{ab}^*$  and  $DE_{00}$  will each produce a different numerical result, in this context it is more important to

- chose a CIE approved metric,
- clearly specify the metric used, and
- use the same metric consistently throughout the certification process.

With this in mind, the Idealliance Digital Press Certification is based exclusively on  $DE_{00}$ .

## 1.6 PDF Files

Generally the test files may be provided as PDF/X-1a or PDF/X-3 or PDF/X-4. No output intent ICC profile is described in the PDF file. This is in violation of the relevant PDF standards as in general, the printing condition or output intent needs to be specified in the file. The output intent is not specified as the forms are generic and may be used for different reference printing conditions.

Due to the missing output intent profile, the supplier should use caution in any type of workflow that is based on “use embedded profile”. Of course a supplier is free to open the PDF files and rectify the missing output intent.

## 1.7 Substrate

In the Digital Press Certification program, the supplier is able to submit press sheets printed with the substrate of their choice. The substrate must be specified in the ADS. The supplier should list attributes of the paper including parameters such as finish and grammage. For digital (xerographic) printing it is expected systems will probably use a coated sheet with gloss finish, 80-100lb (120-140  $g/m^2$ ) text stock.

- The paper has significant influence on the appearance and properties of the press sheet therefore the supplier is expected to have tested and verified the pairing of the media with their printing system.
- The paper used should be commercially available in North America and be representative of a typical production environment.
- The choice of substrate should not cause the machine to deviate from advertised run speeds.
- The paper may be sheet or roll-fed depending on the system configuration.
- The certification process provides no specific tolerance for the white point of the substrate. While the paper color is not explicitly considered, it is intrinsically considered in creating the colorimetry of every printed color on the press sheet. We note that the effect of the substrate, for example, is more evident in lighter colors where there is less ink coverage on the press sheet.

- Some arbitrary paper samples were acquired and measured. Samples were obtained from Sappi Fine Paper North America. The following samples were measured - McCoy Gloss for HP Indigo, McCoy Silk for HP Indigo, and McCoy Silk Digital. Delta E to GRACoL was calculated as between 4.0-5.0  $DE^*_{00}$  with UV included, using X-Rite 530 and 939 instruments. The papers are bluer than GRACoL Grade #1 paper, so most of the measured color difference occurs in  $b^*$ . Papers used in digital presses today differ from the GRACoL specifications, in this situation, colorimetric evaluation in the certification process provides no specific tolerance for the white point of the substrate. In other words, the paper color is measured and analyzed as simply another patch in the IT8.7/4 or Digital Press Control Strip 2013 targets, without a specific tolerance for CMYK patch of 0,0,0,0.

### 1.8 Reference Printing Condition – Characterization Dataset

Many of the test procedures are based on the ability of a digital press system’s ability to match a reference printing condition. While proofing certifications may have considered different specific reference printing conditions (GRACoL, SWOP #3, SWOP #5), All colorimetric testing, at this point in time, are conducted with reference to G7 calibrated datasets published by Idealliance like; GRACoL 2006, GRACoL 2013, or CRPC 1-7 datasets.

The GRACoL 2006, GRACoL 2013, CRPC 1-7 datasets are freely available online e.g. Idealliance web site or ICC Profile Registry, and different ICC profiles are also available (e.g. in Adobe Photoshop CS5, or at color.org).

### 1.9 Idealliance Digital Press Control Strip 2013



In order for the certification process to be consistent with emerging standards in the area of digital printing, it is necessary to include a mid-tone (40-60%) tint for CMYKRGB. The Idealliance ISO 12647-7 Control Wedge 2013 50% patches are used. The Idealliance ISO 12647-7 Control Wedge 2013 is used in many different parts of this certification process.

### 1.10 Measurement Configuration

Colorimetric values are based on measurement data generated using ISO 13655 for hard copy prints. Measurement condition M0 is used for GRACoL 2006, and M1 for GRACoL 2013 or CRPC 1-7. In the Digital Press Certification process, measurements will be conducted using white backing,  $L^*a^*b^*$  ( $D50/2^\circ$ ). The wavelength range for measurement is 380 - 730 nm. Proofs will be measured against white backing as per ISO 13655, or the most current version. Single sided, simplex printing is used in all instances to avoid the influence of “show through” and to prevent any influence on measurement values.



The X-Rite iSisXL (Rev E) or X-Rite iSis2 XL are currently used for system certification. Any *intra*-instrument measurement differences will be addressed using the X-Rite Graphic Arts standard (XRGAs)<sup>2</sup>. Measurement data will be acquired using X-Rite I1Profiler, to obtain XRGAs values.

In order to deal with issues of *inter*-instrument agreement, the Submitter may supply a sample to the Evaluation Contractor for measurement with the designated certification instrument. This will allow the Submitter to determine if there is any instrumentation offset prior to submission. A nominal fee may be charged for this service.

### **1.11 “Silent” Entries**

As suppliers develop new systems, the certification process can provide valuable independent benchmarking and feedback. The certification process can be used to support R&D efforts of individual supplier systems. In particular, for digital printing technologies that are continuing to evolve at the time of the publication of this document, it is a useful service to conduct the certification process to provide feedback to the supplier. The certification process is therefore provided in a “silent” mode. This is seen as independent testing but with identical test procedures, instruments and protocols as the normal certification process.

Silent entries must be declared at the outset of the registration and cannot be re-classified thereafter. In the silent format, suppliers provide their samples and all documentation according to the normal test procedures; their samples are measured and evaluated in the same manner as normal submissions. The standard report and feedback from these tests is provided to the supplier.

Systems submitted for silent testing are not eligible to receive certification, even if they successfully pass all tests. A system must be re-submitted for testing in the proper manner to receive certification. A silent entry need not be shipping or commercially available — R&D, beta devices or development software and products are permitted. The supplier can request a non-disclosure agreement (NDA).

### **1.12 Published Tolerances**

The Print Properties & Colorimetric Council defines the tolerances for the Digital Press Certification program. The Print Properties & Colorimetric Council reserves the right to adjust any of the tolerances on an annual basis to reflect industry trends, but only after due consideration and notice.

### **1.13 Failed Submissions**

Idealliance will notify the contact person at the submitter company by e-mail, for both successful and unsuccessful certification.

- Suppliers are required to submit duplicate press sheets. If in a particular test, the criteria are not met, Press Sample #1 will be re-measured and if it fails a second time, Press Sample #2 will be measured. If Press Sample #2 fails, the system Submitter will be notified that the system has not passed certification.
- In all instances submitters will be notified of the outcome of each individual test. In all instances submitters will be provided the measurement values for each test.
- There may be a reduced fee for re-submission of a system that fails certification.

<sup>2</sup> X-Rite Graphic Arts Standard, [www.xrite.com/xrga](http://www.xrite.com/xrga)

#### **1.14 Marketing and PR**

All attempts will be made to deal with submissions in a timely manner. Results will be reported within 5 working days of the conclusion of the testing.

Suppliers who have a successful certification will be provided with the certification logo and intellectual property rights for use on their websites and in marketing material.

Idealliance will maintain a list of Digital Press Certified Systems on the official web site and will update the site with new systems within 7 business days of notification of the results.

## **2. Description of Tests**

The press sheets will be evaluated colorimetrically using a traceable spectrophotometer and compared to the Idealliance published characterization dataset. The supplier is able to determine their own color workflow, and it may include, for example, setting in the controller/RIP, the source ICC profile as GRACoL and the destination profile as the digital press. The supplier may choose to use the absolute colorimetric rendering intent.

### **2.1 ADS Review and Approval**

Each ADS will be reviewed by the Evaluation Contractor. The ADS should include well-defined operating procedures and workflow settings. Any discrepancies or omissions will be reviewed with the Submitter.

### **2.2 Colorimetric Evaluation (uses Digital Press Form 1)**

2 press sheets of Digital Press Form 1 are randomly chosen for this evaluation. All submitted press sheets must pass measurement requirements found in Table 1 or as otherwise specified. The numeric criteria described in Table 1 must be met in order for a system to be deemed to have passed certification and to be labeled as "Certified".

**Table 1: Tolerances for reproduction of patches in the digital press sheet as compared to the values of the targeted characterization dataset**

<i>Evaluation of printing of the IT8.7/4 (ISO 12642-2) Target</i>	<i>Tolerance</i>
All patches of IT8.7/4 target	Average $\Delta E_{00} \leq 2.5$ 95 <sup>th</sup> percentile $\Delta E_{00} \leq 4$
Outer gamut patches of IT8.7/4 target <sup>a</sup>	Average $\Delta E_{00} \leq 3$ 95 <sup>th</sup> percentile $\Delta E_{00} \leq 5$
<i>Evaluation of printing of the Digital Press Control Strip 2013</i>	<i>Tolerance</i>
All patches of the Digital Press Control Strip 2013	Average $\Delta E_{00} \leq 2.5$ Maximum $\Delta E_{00} \leq 5$
C,M,Y,K,R,G,B solid patches of Digital Press Control Strip 2013	Maximum $ \Delta H^*  \leq 5^b$
Grayscale evaluation – 5 CMY patches (specified in Section 2.2)	Average $\Delta C_h \leq 3^c$

<sup>a</sup> 226 outer gamut patches as listed in Annex C of ISO 12647-7:2007

<sup>b</sup>  $\Delta H^* = \sqrt{(\Delta E^*)^2 - (\Delta L^*)^2 - (\Delta C^*)^2}$

<sup>c</sup>  $\Delta C_h = \sqrt{(\Delta a^*)^2 + (\Delta b^*)^2}$

It is important not to confuse  $\Delta H^*$  with  $\Delta h$ .

$\Delta h$  is the hue angle difference in a 2-dimensional  $a^*b^*$  plane, example values could be 7.7° or 15.6°. The lightness of the samples is ignored in the calculation of  $\Delta h$  and it is used in the same way as we would compute  $\Delta L^*$ ,  $\Delta a^*$ , or  $\Delta b^*$ . We may therefore, describe  $\Delta h$  as a simple, 2-dimensional hue angle difference.

The hue error  $\Delta H^*$ , on the other hand, describes the hue difference between each sample as a Euclidean, 3-dimensional difference. The hue error  $\Delta H^*$  provides a better indication of the differences in hue only, of two color samples. Worked examples are available<sup>3</sup> and a technical reference<sup>4</sup> provides an efficient and simple method for calculation of  $\Delta H^*$ . Digital Press Certification (in common with a number of ISO standards) uses  $\Delta H^*$  to estimate the hue difference of printed colors.

The gray balance,  $\Delta C_h$ , is defined in relation to the chosen characterization dataset. Thus 5 gray patches from the Digital Press Control Strip are compared to their corresponding values in the targeted characterization dataset. To pass certification, the average  $\Delta C_h$  between these 5 patches and their corresponding characterization dataset  $L^*a^*b^*$  values should meet tolerances as shown in Table 1.

<sup>3</sup> [Delta E, Delta H, Delta T: What does it mean? EFI Technical Document](#)

<sup>4</sup> Efficient Computation of  $\Delta H^*$ , M.Stokes and M.Brill, Color Res Appl, 17, 410-411, (1992)

The five patches in the Idealliance Digital Press Control Strip to be used to compute  $\Delta C_h$  are as follows:

C	M	Y	K
3	2.2	2.2	0
10	7.5	7.5	0
25	18.9	18.9	0
50	40	40	0
75	66.1	66.1	0

### 2.3 Uniformity within the Press Run (1000 sheets) (uses Digital Press Form 2)

This test measures the sheet-to-sheet variation over a press run. The length of the run has been chosen to be 1000 sheets as representative of a typical and realistic run-length for production digital printing.

- The supplier recommended start up procedure should be instituted before the run. This may include a recommended warm-up period and any calibration procedures. These processes should be considered before the first sample sheet is printed.
- The supplier is to print the provided press form. The supplier must include an automated counter on the sheet either via the image area or a tagline/slugline that shows sheet #1, 2, 3, .... 1000.
- Supplier is to produce 1000 sheets at supplier recommended operating speeds for the chosen paper grade. It is intended that this is a unique job and that sheet #1 is the first sheet of this job in the print queue, in other words the 1000 sheets are not to be extracted from an ongoing press run.
- Supplier is to select and provide sheets as follows
  - Sheet #100-104 (5 sequential sheets indicative of short term variation)
  - Sheets from a randomly generated sequence, with the following page numbers 125, 188, 206, 397, 445, 738, 745, 809, 876, 974 (10 sheets)
- Supplier is to extract and provide only the requested 5+10 sheets, but the supplier is required to make available the remainder press sheets on request. Idealliance may request the remainder sheets for a period of no longer than 3 months from the application date.
- The 5+10 sheets described above will be measured and analyzed as a single continuous dataset.
- The sheets will be measured using the X-Rite iSisXL or X-Rite iSis2 XL with measuring geometry and configuration as stipulated in this document. The criterion stipulated in Table 2 will be used as a pass/fail criterion for this test. The press samples must pass all measurements in accordance with Table 2.
- The colorimetry of the sheet should be in accordance with the chosen reference characterization dataset (GRACoL 2006, GRACoL 2013, CRPC 1-7, etc.).

**Table 2: Tolerances for repeatability over 1000 press sheets for primary and secondary color mid-tones and solids**

	<i>Mid-tones – 50% (C, M, Y, K, R, G, B)</i>	<i>Solids – 100% (C, M, Y, K, R, G, B)</i>
<i>Maximum between any patch and the average L*a*b* of that patch during the run (variation)</i>	$\Delta E_{00} \leq 2.5$	$\Delta E_{00} \leq 2.0$

#### 2.4 Creating #1, 2, 3, ....1000 Slugline

There is a requirement to provide an automated counter on the sheet either via the image area or a slugline that shows sheet #1, 2, 3, .... 1000, etc. A numbered PDF file can be easily created using InDesign. Here is a description of how the process can work.

Using Adobe InDesign CS5 a new Document is created. The press sheet test images, are placed on the Master Page. On the same Master Page, in the slug line area, a Text Box is created. In the Text Box using the Type Tool select Type > Insert Special Character > Markers > Current Page Number. Next change the Document Setup to create 1000 pages based on the Master Page. A [video tutorial](#) on page numbering in InDesign is available.

Use Export to export the InDesign document as a 1000-page PDF file. The press sheet content will not be unnecessarily repeated in the exported PDF file. It will be written into the PDF file as a single XObject, then referenced 1000 times. There is no need to use the new standard PDF/VT file to obtain this benefit. (PDF/VT stands for Variable Transaction and is a PDF format and ISO standard, intended for variable data and transactional printing.)

There are two ways to interpret and rasterize this file for printing.

- Adobe PDF Print Engine 2 - if the PDF file is output via a Digital Front End which includes the Adobe PDF Print Engine version 2 then the repeating content will be cached, avoiding the need to rasterize it 1000 times. The latest version of all major 3<sup>rd</sup> party DFEs (EFI/Creo ColorServers) and supplier DFEs (e.g. Xerox FreeFlow Print Server) now implement the Adobe PDF Print Engine 2 and thus direct interpretation and printing of the PDF file.
- Postscript RIP - for a PostScript RIP, where the RIP must convert the PDF to PostScript prior to rendering, the supplier can output 1000 separate PostScript files, one for each page of the PDF file. The same content would still need to be rendered 1000 times, but this method can be used for DFEs that use a Postscript RIP. This process will avoid a RIP crash due to excessive activity and overburden of information.

There is however, no requirement for the supplier to use the process described above. There are DFEs that already offer the functionality to auto-number each sheet, e.g. EFI Fiery v9 or Xeikon X-800 DFE. Suppliers with existing capabilities are free to use any technology they wish to produce numbered sheets, especially if the supplier is concerned with any color changes that may occur in the printing workflow.

#### 2.5 Short-Term and Long-Term Repeatability (uses Digital Press Form 3)

Test shall be performed at the start, after one hour, and after one day. The test is relevant to understand the stability and repeatability of a digital press system. A calibration process should ensure that we return the system to the same baseline as the day before, and submitters are expected to perform a baseline calibration and attempt to create a consistent printing environment.

- The repeatability of the printing system will be evaluated for primary and secondary color midtones, and primary and secondary color solids.
- Suppliers are required to provide a press sample corresponding to three press runs, at time = 0, time = 0 + 1 hour, time = 0 + 24 hours. The date and time stamp should be in the slug line imprinted via the DFE/RIP or as indicated on a banner page as appropriate.
- The difference for the CMYKRGB patches will be measured and Delta E computed between all combinations of the three press sheets, i.e. sheets 1 and 2, sheets 1 and 3, and sheets 2 and 3.

A system will pass this test if the colorimetric difference does not exceed the pertinent values given in Table 3.

**Table 3: Tolerances for short and long-term repeatability for a press sheet after 1 hour and 1 day for primary and secondary color solids and mid-tones.**

	<i>Mid-tones – 50% (C, M, Y, K, R, G, B)</i>	<i>Solids – 100% (C, M, Y, K, R, G, B)</i>
<i>Colorimetric difference between any patch on any combination of the three press sheets</i>	$\Delta E_{00} \leq 3$	$\Delta E_{00} \leq 3$

## 2.6 Minimum Font Size (uses Digital Press Form 4)

The resolving power of the digital printing shall be such that C, M, K positive, non-serif, type of 2 point size and reverse (negative) of 8 point size are legibly reproduced. The supplier should choose a substrate and print system to ensure that the resolution of the system enables reproduction of these type elements.

The resolving power of the validation print shall be such that

- C, M, K positive, sans-serif type (like Helvetica or Arial) of 2 point size, and
- reverse (negative) of 8 point size

are legibly reproduced.

## 2.7 Uniformity within a Press Sheet (uses Digital Press Form 5)

It is important to reproduce a tint uniformly within a press sheet. The variability of the coloration across and down the sheet is determined via measurement of 3 sheets containing uniform tints, representing low, medium and high density levels. We note that variations can depend on density level, thus while a CMYK test file is provided, the colorimetry of the sheet should be in accordance with the chosen reference characterization dataset. The nominal CMYK/L\*a\*b\* pixel values for GRACoL are:

<b>C</b>	<b>M</b>	<b>Y</b>	<b>K</b>	<b>L*</b>	<b>a*</b>	<b>b*</b>
20	15	15	15	71	0	-2
40	30	30	30	51	-1	-3
65	50	50	50	31	-2	-3

The press sheets described above will be measured using colorimetry and the measuring geometry and configuration as stipulated in this document. The M-Score procedure is used as a pass/fail criterion for this test.

The M-Score is based on ISO 15311. The M-Score computes a single value, scaled from 0 (poor reproduction) to 100 (perfect reproduction), which correlates well with the perception of print variations for a uniform tinted test form printed on digital press systems. The following procedure is used to calculate the M-Score.

- Print the supplied 12 x 18" test form.
- Measure the L\*a\*b\* values of all columns (n) and rows (m) with an xy-scanning measurement device (e.g. X-Rite iSisXL) using 6 mm patches.
- Average the L\*a\*b\* measurements along the columns and rows. For the 12 x 18" format with n=46 columns and m=64 rows there will be 46 color differences and 64 color differences respectively.
- Compute the L\*a\*b\* color differences,  $\Delta E_{00}$ , for the columns by comparing each column average with its neighbor average. Compute the  $\Delta E_{00}$  for the rows by comparing each row average with its neighbor average. Sum all measurements, and multiply by 10;

$$\Delta E_{short\_line} = 10 \times \sum_{i=1}^{n-1} \Delta E_i(Lab_i, Lab_{i+1})$$

$$\Delta E_{long\_line} = 10 \times \sum_{i=1}^{m-1} \Delta E_i(Lab_i, Lab_{i+1})$$

- Then average by the number of samples

$$\Delta E_{long\&short} = \frac{\Delta E_{long\_line}}{m-1} + \frac{\Delta E_{short\_line}}{n-1}$$

- Finally, compute the final M-Score, as

$$M\text{-Score} = 100 \times \frac{1}{2 \left( \frac{2 \times \Delta E_{long\&short}}{15} \right)}$$

In order to pass this test, the lowest M-Score of all three sheets must be  $\geq 60$ .

## **2.8 Density Loss During Abrasion (uses Digital Press Form 6)**

Ink scuffing or rub off during shipping and handling can spoil the effect of quality printed products. The rub resistance of a sample will depend on many variables such as the choice of media, coating, characteristics of the toner particles, etc. Various instruments exist to determine the rub resistance of a printed sample, the Taber test is well established and accepted. The Taber test will be conducted according to standardized test method ASTM 1478.

No coating should be applied to the print process unless this forms part of the normal print process for a given printing system.

In the Taber test, the sample is mounted on a rotating turntable, specimens are subjected to the rub-wear action of two abrasive wheels. Driven by the test sample, the wheels produce abrasion marks over approximately a 30 cm circular ring. This reveals abrasion resistance at all angles relative to the grain of the paper. The device simulates the motion of a truck or train during shipping, or processing of high-speed mail by the US Postal Service. At the end of the test, the before and after print will be measured, and the percentage loss of density computed. The data can be used to assess the surface resilience and the transit scuff resistance of the print process.

The maximum percent loss in density reading, for any channel, should not exceed 50% of the starting value. The 50% criterion will be used as a pass/fail criterion for this test.

## **2.9 Measurement of Gloss (uses Digital Press Form 6)**

The gloss of printed and unprinted press sheets will be measured. The gloss of the unprinted substrate and the printed solid areas will be measured with light incident at 75° (15° from the plane of the print substrate) and measurement at 75°. The instrument configuration will be in accordance with ISO 8254-1. Values will be reported in percent, quoting "ISO 8254-1 TAPPI gloss" as the method. The device used will be BYK Gardner. Relevant standards are ISO 19799 and ASTM D7163-05.

Average delta gloss between printed solids and unprinted press sheet white paper will be reported.

Average delta gloss between printed solids and printed press sheet white paper will be reported.

This is an information only test – there is no pass/fail criterion associated with this test.

## **2.10 Registration of CMYK Separations (uses Digital Press Form 6)**

The maximum deviation between the image centers of any two printed color separations shall not be larger than 0.1 mm as measured using a travelling microscope or other suitable apparatus.

The cross hairs will be examined at the 4 corners of the press sheet. In order to pass certification, all cross hairs for all color separations, must have a deviation of less than 0.1 mm.

## **2.11 Visual Evaluation**

The following visual evaluations will be conducted.

**GENERAL INSPECTION:** The Evaluation Contractor, prior to the metrological evaluation, will visually inspect all submitted press sheets. The inspection seeks to determine any artifacts that can affect measurement or visual evaluation. The inspection can detect damage caused during shipping. Other defects in this category include physical printing problems such as streaks in the printing direction caused by, for example, rollers, photoconductive drum, etc. Defects that could



affect measurement include scuffs, folded forms, bent corners, damaged press sheets, physical abrasion, offsetting, excessive buckling/blistering, etc. The inspection is intended to halt the process if any physical defects on the sheet are observed that could affect colorimetric testing.

**VIGNETTES:** The test forms will be visually inspected by the Evaluation Contractor. Visual examination will be conducted relating to reproduction of vignettes (Digital Press Form 2). Reproduction of the CMYK data of image S6 of ISO 12640-1 shall show no visible steps within the tone value reproduction limits if viewed under ISO viewing condition P1 of ISO 3664. The vignettes on the press sheet will be examined to ensure that they show no visible steps within the tonal ramps. 2 press sheets will be randomly chosen from the submitted number, both sheets should show clean and continuous vignettes. This is a pass/fail test and if either selected sheet shows incorrect reproduction of a vignette the test is failed.

**MOIRÉ:** A press sheet (Digital Press Form 3) shall be visually inspected for any obvious moiré/patterning in areas of fine detail caused by interference due to screening or other issues. The printing system should not introduce any patterning or interference (moiré) that was not present in the original imagery. 2 press sheets will be randomly chosen from the submitted number, both sheets should show sharp, distinct high frequency information. This is a pass/fail test and if either selected sheet shows incorrect reproduction of detail, the test is failed.

In general, for all the above visual evaluations, a submission may pass the colorimetric testing yet be failed based on visual evaluation.

### **3. Certification and Reporting**

It is suggested that the following parameters should be included in the certification process. An example Idealliance Digital Press Certification certificate is shown, Annex D.

- Reference to this document and version number
- The validation printer/print engine (vendor, type, article number)
- The raster image processor/controller/DFE (type and version, operating system)
- The print substrate (vendor, type, article number)
- The colorant (vendor, type, article number)
- Any coating that has been applied
- Any test conditions or deviations from the Idealliance Digital Press Certification document that might have influenced the results
- The test results for the system including indication of pass/fail in each category
- The date of the certification.

### **4. Submission Check List**

The document shown as Annex C, "Check List for File Submission" should be completed and included with the submitted press sheets to ensure a complete submission.

## ANNEX A – Online Application Form

1. Company name
2. Company Address
3. City/State/ZIP
4. Country
5. Contact Name
6. Title
7. Email
8. Telephone
9. Are you an Idealliance Member?
10. Is this a “silent” submission?
11. Official name/title of print engine (to be used for reporting and publiclisting)
12. Official name/title of print engine (to be used for reporting and publiclisting)
13. Target dataset and measurement condition, choose one
  - a. GRACoL 2006, M0
  - b. GRACoL 2013, M1
  - c. CRPC1, M1
  - d. CRPC2, M1
  - e. CRPC3, M1
  - f. CRPC4, M1
  - g. CRPC5, M1
  - h. CRPC7, M1
  - i. Other target dataset: \_\_\_\_\_, measurement condition: \_\_\_\_\_

## Vendor Logo Here

---



## Digital Press Supplier and System Name Here

**Note:** Certification is in accordance with Idealliance Digital Press Certification Program v2.1 (Increment version number as necessary)

The Idealliance Print Properties Digital Print Working Group has established a certification process for digital production presses (xerographic/inkjet). The following information is intended to assist printers and customers in understanding the printing conditions and how they were achieved and/or to replicate these results on a similar system.

### I. Manufacturer

Manufacturer's name and address is listed here.

### II. Product Name

This must be a unique descriptor of the printing system to be certified. Specify the name of the digital press system as: *Manufacturer / print engine model or device name / controller or DFE including version number and any options / substrate details.*

### III. Overview

Introductory statements are left to the manufacturer's discretion; and can be used to identify or explain purpose and use of the product. This must not include advertising of the system's supposed attributes and benefits, but rather be a simple explanation of the system technology and intended use or target market.

### IV. System Components and Printing Procedure

This section shall include a list of all system components specific to generating a finished press sheet. This section should include a short description of the printing procedure including calibration, profiles, iterations, other settings, etc. The status of all serviceable items should be noted. The supplier does not need to provide an intricate description of each menu, and can point to a source of available information, for example an instruction book or user's guide. The level of detail should be such that a skilled operator, experienced with this equipment should be able to follow the procedure and be able to re-create the printed press sheets.






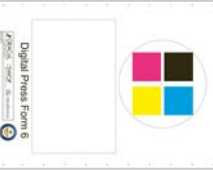

### V. Finishing Procedures (Optional)

This section shall include a list of any necessary finishing instructions in order for the (vendor's product) to conform to this Application Data Sheet, such as coatings, varnishes, oils, etc.

### VI. Additional Data (Optional)

Additional data can be added in this section for clarification of specific press or printing details. The supplier is able to include any further information not covered in the sections above.

### ANNEX C - Check List for File Submission

Check	Image	Filename	Relevant Section	Print Size	Quantity
<input type="checkbox"/>		<b>Digital Press Form 1</b>	Section 2.2	12 x 18"	6
<input type="checkbox"/>		<b>Digital Press Form 2</b>	Section 2.3 Place page numbering on each sheet Submit pages 100-104 (5 sheets) Submit pages 125, 188, 206, 397, 445, 738, 745, 809, 876, 974 (10 sheets) File provided in different versions - a single page pdf or a 1000 page pdf	12 x 18"	5 + 10
<input type="checkbox"/>		<b>Digital Press Form 3</b>	Section 2.5 2 x 3 (0, 1 hour, 1 day)	12 x 18"	2 x 3
<input type="checkbox"/>					
<input type="checkbox"/>					
<input type="checkbox"/>		<b>Digital Press Form 4</b>	Section 2.6, 2.10	12 x 18"	3
<input type="checkbox"/>		<b>Digital Press Form 5</b>	Section 2.7	12 x 18"	3 x 3
<input type="checkbox"/>		<b>Digital Press Form 6</b>	Section 2.8, 2.9, 2.10 Do not use color management Can be printed 8.5 x 11", 11 x 17" or 12 x 18"	8.5 x 11"	6
<input type="checkbox"/>		Blank, unprinted paper sample	Section 2.9	12 x 18"	3



## Idealliance Digital Press Certification



Job	25
Manufacturer	Press Company Example
System	Digital Press x000
DFE	DFE Type Example v2
Substrate	Substate Gloss 80lb
Certification Date	5-Jun-17
Reference	GRACoL 2013 CRPC6 Reference
Version	Program V2.3.6

Test Description	Tolerance	Measured	Result
<b>Colorimetric accuracy (IT8.7/4)</b>			
All patches	Average $\Delta E_{00} \leq 2.5$	1.11	✓
All patches	95 <sup>th</sup> Percentile $\Delta E_{00} \leq 4$	2.50	✓
Outer gamut	Average $\Delta E_{00} \leq 3$	1.42	✓
Outer gamut	95 <sup>th</sup> Percentile $\Delta E_{00} \leq 5$	3.90	✓
<b>Digital Press Control Strip 2013</b>			
All patches	Average $\Delta E_{00} \leq 2.5$	1.62	✓
All patches	Maximum $\Delta E_{00} \leq 5$	4.20	✓
Solids (C,M,Y,K,R,G,B)	Maximum $\Delta H \leq 5$	3.42	✓
Grayscale evaluation	Maximum $\Delta C_h \leq 3$	1.06	✓
<b>Variation over 1000 sheet press run</b>			
Midtones (50%)	Maximum $\Delta E_{00} \leq 2.5$	1.45	✓
Solids (100%)	Maximum $\Delta E_{00} \leq 2$	1.18	✓
<b>Repeatability from day 1 to day 2</b>			
Midtones (50%)	Maximum $\Delta E_{00} \leq 3$	2.50	✓
Solids (100%)	Maximum $\Delta E_{00} \leq 3$	2.23	✓
<b>Uniformity of the press sheet</b>			
M-Score	$\geq 60$	69	✓
<b>Resolvable Font Size</b>			
C, M, K Positive Sans Serif	2 point	OK	✓
C, M, K Negative Sans Serif	8 point	OK	✓
<b>Abrasion/Rub Resistance</b>			
Density loss	50%	38%	✓
<b>Gloss</b>			
$\Delta$ Gloss between print sample and white of unprinted sheet		46%	Informational only
$\Delta$ Gloss between print sample and white of printed sheet		38%	Informational only
<b>Registration of CMYK cross hairs</b>			
Deviation	$< 0.1$ mm	0.06	✓
<b>Visual evaluation</b>			
Vignettes, flesh tones, memory colors, highlight and shadow detail, etc.			✓

Idealliance hereby certifies that the above system has successfully passed all test criterion and is therefore officially awarded Idealliance Digital Press Certification