

COLOR MANAGEMENT CONFERENCE

Advancing Graphic Communications



PRINTING
INDUSTRIES
OF AMERICA

FOUNDATION OF



CGATS CGATS.2I-2
New Standards I2647-5
ISO I2647-3 I2647-4 I2647-2 I2647-6 I2647-1
I5339-2 I2647-7

Ray Cheydleur, X-Rite Inc, CGATS chair



Too fast or too slow?



Who prints to 12647?

- Which version
- Which edition
- What do you ***Really*** print to?

CGATS CGATS.2I-2
New Standards I2647-5
ISO I2647-8 I2647-4 I2647-2 I2647-6 I2647-1
I5339-2 I2647-7 I2647-3

Lots of numbers, Lots of confusion

- Many changes: Let's focus on 2
- 12647 Series
 - *Graphic technology — Process control for the production of half-tone colour separations, proof and production prints*
 - *Part 2: Offset lithographic processes*
- 15339 series equivalent to CGATS.21
 - *Graphic technology — Printing from digital data across multiple technologies*
 - *Part 1: Principles*
 - *Part 2: Characterized reference printing Conditions*

A bit of history

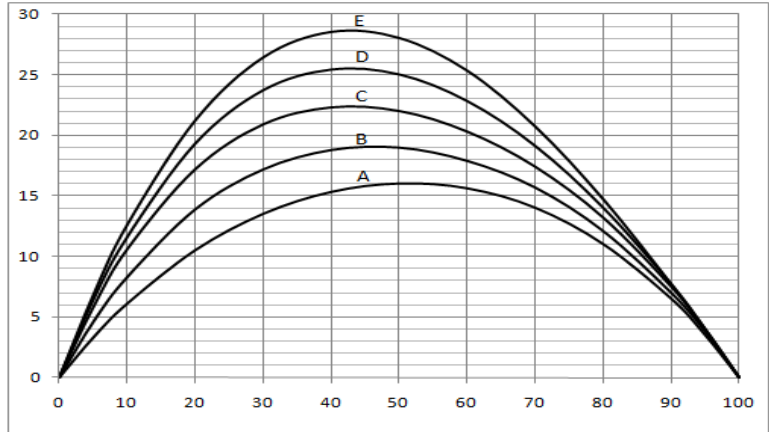
- 12647-2 1996
 - 5 paper types
 - PT1/2 Glossy or matte coated paper
 - PT3 Light weight coated paper
 - PT4 Uncoated white paper
 - PT5 Uncoated yellowish paper
 - Focused on TVI and Solid color aims
 - A great beginning

A bit of history continued

- 12647-2 2004
 - Primarily updated:
 - LAB values of primary and secondary colors
- 12647-2 2014
 - Major revision
 - Replaces film with CTP curves
 - New paper types
 - New measurement requirements
 - PDF/X-4 workflow
 - More

What is “natural” about a TVI curve?

- New CTP curves based on “natural TVI curves” from practical printing
- Same curves for all colors
- Don’t confuse with previous curves





8 New paper types

- Based on input from European Paperdam Group
- Represent 8 groups of paper types
- Includes stocks with higher OBA amounts

	PS1	PS2	PS3	PS4	PS5	PS6	PS7	PS8
Type of surface	Premium coated	Improved coated	Standard coated glossy	Standard coated matte	Wood-free uncoated	Super calendered	Improved uncoated	Standard uncoated
Typical process	Sheet fed offset, Heat set web offset	Heat set web offset	Heat set web offset	Heat set web offset	Sheet fed offset, Heat set web offset	Heat set web offset	Heat set web offset	Heat set web offset
Typical DPMs	Wood-free coated (WFC), High weight coated (HWC), Medium weight coated (MWC), glossy/semi-matte/matte	Medium weight coated, Light weight coated (LWC improved)	Light weight coated (LWC), glossy/semi-matte	Machine finished coated, LWC, semi-matte	Wood-free uncoated (NFU)	Super calendered (SC-A, SC-B)	Uncoated mechanical improved (IM), Improved newsprint (IP)	Standard newsprint (SNP)

The magic 8



8 paper types x 2 screening types



Printing Conditions

8 paper types x 2 = 16 Printing conditions

Printing Condition	Print Substrate	Colorant Description	Screening Description			
			Periodic		Non-periodic	
			TVI Curve	Frequency in cm ⁻¹	TVI Curve	Spot size in μm
PC1	PS1	CD1	A	60-80	E	20(25)
PC2	PS2	CD2	B	48-70	E	25
PC3	PS3	CD3	B	48-60	E	30
PC4	PS4	CD4	B	48-60	E	30
PC5	PS5	CD5	C	52-70	E	30(35)
PC6	PS6	CD6	B	48-60	E	35
PC7	PS7	CD7	C	48-60	E	35
PC8	PS8	CD8	C	48-60	E	35

But wait, there's more!

- New measurement conditions
 - Should be M1
 - Can be M0, maybe



What's the difference: ΔE

- Failed to adopt ΔE_{00}
 - Only provides “informative” values

Process color	Deviation tolerance		Variation tolerance		
	OK print		Production print		
	ΔE_{ab}	ΔE_{00}	ΔE_{ab}	ΔE_{00}	ΔH
Black	5	5	4	4	-
Cyan	5	3,5	4	2,8	3
Magenta	5	3,5	4	2,8	3
Yellow	5	3,5	5	3,5	3

- Section 4.2.1
- Data delivery should be exchanged using PDF/X
 - If the characterization data or ICC output profile provided conflicts with the printing conditions defined in this part of ISO 12647 one of the methods defined in ISO/TS 10128 shall be used for data adjustment prior to print production. The aims for process control should be taken from characterization data, if agreed between all parties. Where this is done, densitometric tone values are not usually available and colorimetric tone values should be used.



12647-2 and 15339



What really is going on: 12647 and 15339

- Fundamentally coming at defining print from two different perspectives
- Look at the titles:
 - 12647 - *Process control for the production of half-tone colour separations, proof and production prints*
 - 15339 - *Printing from digital data across multiple technologies*
- 12647-2 is press centric (traditional press aims)
- 15339 is product centric (design and pre-press)

15339 the “process agnostic” standard

- 15339 series *Graphic technology — Printing from digital data across multiple technologies*
 - *Part 1: Principles*
 - *Part 2: Characterized reference printing conditions*
- Focuses on defining print based on:
 - Standardizing characterization data not process control data
 - General categories of printing conditions that differ in gamut
 - Attempts to ease the burden of how to define the design print space
 - Uses CGATS TR015 approach to establish aims based on a shared near-neutral gray-scale appearance for initial data sets

What's a CRPC?

- Characterized reference printing conditions
 - Not ICC profiles
 - Look for Industry supplied profiles at the ICC website in the ICC profile registry: <http://color.org/registry/index.xalter>

ICC Profile Registry

Profiles which have been registered with the ICC are listed in the table below.

More information about the profile, and the link to download the profile can be obtained by clicking on the profile name.

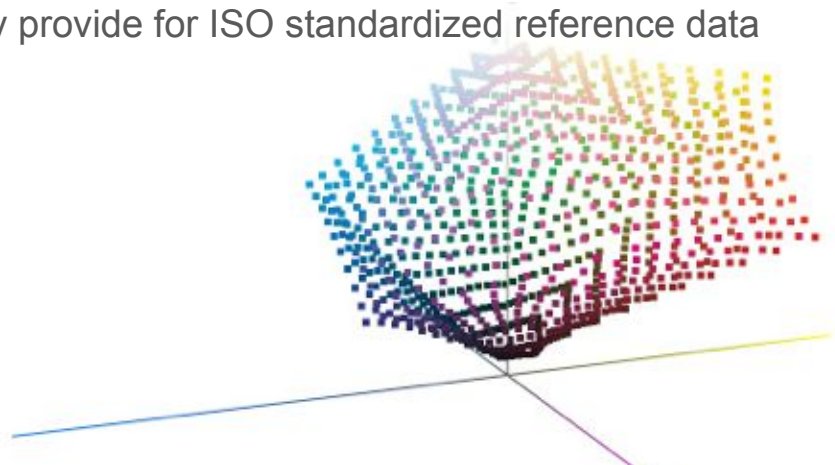
All registered profiles correspond to a standard printing condition and a publicly available characterization data set. Note that more than one profile may be generated from a data set, using different separation methods such as the level of black generation.

The ICC Profile Registry is maintained by the ICC as a service to the color management community. The ICC is unable to recommend profiles for particular applications, or to provide information on the construction or performance of the profiles registered. The ICC accepts no responsibility for the performance of these profiles, and users should take care to ensure that profiles are suitable for their requirements.

Standard printing condition	Characterization data reference	Paper type	Profile	Provider	Separation
D50 D15 15339-2	CGATS21-2-CRPC7	N/A	CGATS21_CRPC7.icc	IDEAlliance	TAC: 340% GCR: Medium+ Max K: 100% TVI: CMY 16%, K15%
D50 D15 15339-2	CGATS21-2-CRPC6	N/A	CGATS21_CRPC6.icc	IDEAlliance	TAC: 320% GCR: Medium+ Max K: 100% TVI: CMY 18%, K15%
D50 D15 15339-2	CGATS21-2-CRPC8	N/A	BRACvL2013_CRPC8.icc	IDEAlliance	TAC: 320% GCR: Medium+ Max K: 100% TVI: CMY 18%, K15-16%
D50 D15 15339-2	CGATS21-2-CRPC9	N/A	BRACvL2013_CRPC9.icc	IDEAlliance	TAC: 310% GCR: Medium+ Max K: 100% TVI: CMY 18%, K15-16%

Why CRPC's

- There is no standard reference data for 12647-2 standard
 - Lot's of industry supplied data with little or no oversight.
 - Often wrapped in the form of an ICC profile
- CRPC's finally provide for ISO standardized reference data



How many CRPC's

- Today there are 7
 - In theory that is all that you need until higher gamut devices/inksets require a larger gamut reference printing condition
 - Not likely to be the case



CRPC	Name	Typical use
1	Universal ColdsetNews	Small gamut printing (newsprint)
2	Universal HeatsetNews	Moderate gamut printing on improved newsprint type paper
3	Universal PremUncoated	Utility printing on a matt uncoated type paper
4	Universal SuperCal	General printing on super-calendared paper
5	Universal PubCoated	Typical publication printing
6	Universal PremCoated	Large gamut (typically commercial) printing
7	Universal Extra Large	Extra large gamut printing processes

M1 all the time

- New measurement conditions

- Shall be M1

- Procedure to convert from M0 to M1 with M1 measurements of substrate



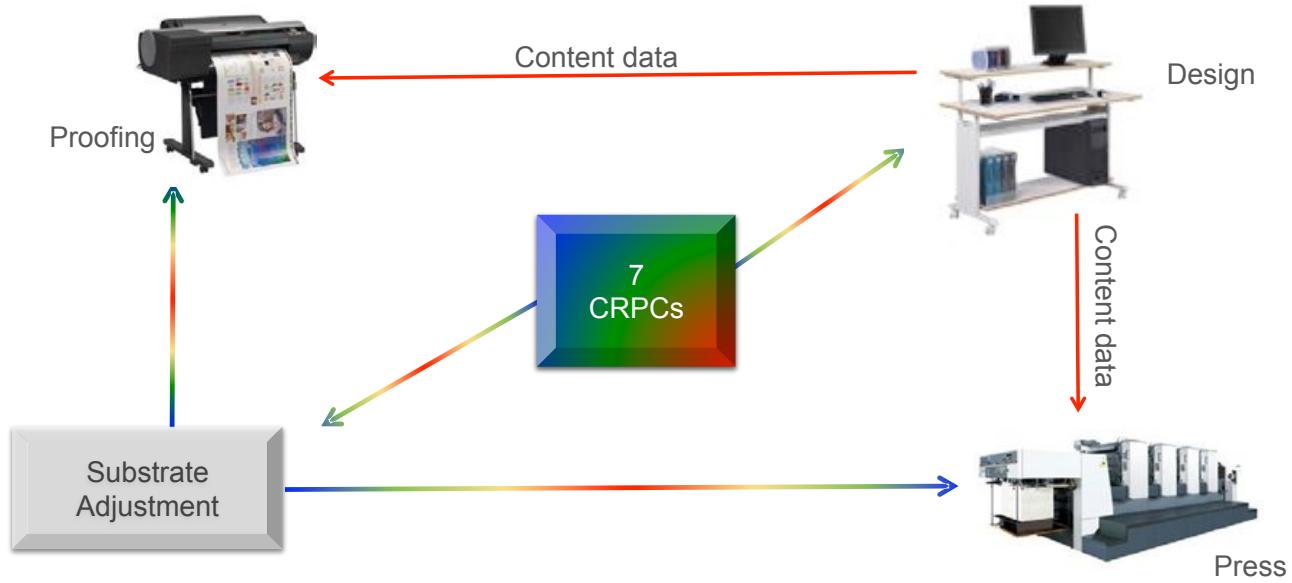
Substrate adjustment

- Tristimulus correction method
 - Uses CIE XYZ Colorimetry of new substrate to adjust CIE XYZ values of reference characterization data for prediction match
 - Works reasonably well for both color shade and OBA differences
 - Provides new aims for all data points CMYK, neutrals, solids, paper
 - Does not correct for surface characteristics

Data preparation for press

- ISO TS 10128
 - *Graphic technology — Methods of adjustment of the colour reproduction of a printing system to match a set of characterization data*
- Adjusts within-gamut data by one of three methods
 - Matching of tone value curves to develop 4 1-D transforms
 - Use of near-neutral scales to develop 4 1-D transforms
 - Use of CMYK to CMYK multi-dimensional transforms (colour management device link transform)
- Used in both 15339 and 12647 based workflows

Workflow



Conclusion

- 12647-2 is an update for traditional press control processes while trying to incorporate the many changes that have occurred in processes and materials
 - It should be noted that this is essentially true for 12647-3 (news) and 12647-4 (gravure)
 - 12647-5 (screen print) and 12647-6 (flexo) are closer to a 15339 approach.
- 15339 and CGATS.21 Takes the approach common in digital printing today and takes it to all workflows
 - Incorporates full colorimetric process control
 - final process control methods are responsibility of the printer
 - Allows for adjustment for new materials

- ISO TS10128 *Graphic Technology – Methods of Adjustment of the Color Reproductions of a Printing System to match a Set of Characterization Data*
- CGATS.21 computational spreadsheet for substrate adjustment:
[http://www.npes.org/programs/standardsworkroom/
toolsbestpractices.aspx](http://www.npes.org/programs/standardsworkroom/toolsbestpractices.aspx) Look under “Computational Tools” sidebar
- Color.org CRPC profiles provided by IDEAlliance using X-Rite i1Profiler <http://color.org/registry/index.xalter>