

The Interaction Between Color Standards and Production Tolerances: A Mismatch of Metrics

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Scope

- Profiling and verification
- Targets and specifications
- Analysis of potential issues
- Recommendations for practical implementation



Color management process

- Within North America many people will print to a G7 data set
 - Target one of the CRPC's
- Let's use the example of CRPC 6 – GRACoL 2013



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Profiling 101

- Optimize / linearize press
 - Many people forget this step
- Print a profiling target
 - Native state of press
- Measure using instrument
- Create profile using software
- Utilize the generated profile



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How do people check they are conforming?

- Use the TC1617
 - Or P2P51 if targeted or grayscale
- Use the ISO 12647-7 control strip?
 - Two or three strip versions
- Look at the sheet
- Don't do anything!!



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Targets and specifications



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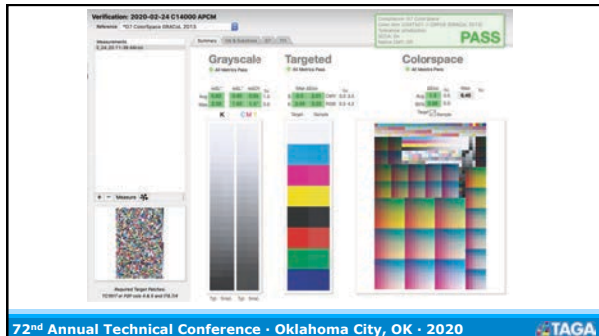
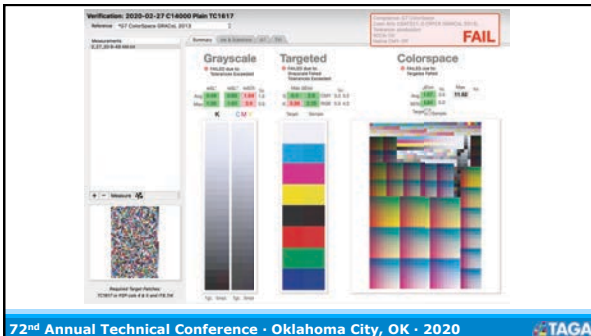
Does this cause an issue

- Two potential issues
 - Different measurement / validation criteria
 - Critical
 - Different measurement patches
 - Workable but can give issues if close to the pass

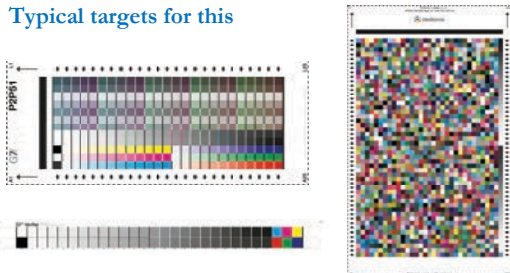


G7 Tolerances

- Grayscale
 - $w\Delta L^*$ avg K
 - $w\Delta L^*$ max K
 - $w\Delta L^*$ avg CMY
 - $w\Delta L^*$ max CMY
 - $w\Delta Ch$ avg CMY
 - $w\Delta Ch$ max CMY
- Targeted
 - ΔE_{00} paper
 - ΔE_{00} K
 - ΔE_{00} CMY
 - ΔE_{00} RGB
- Colorspace
 - ΔE_{00} avg all patches
 - ΔE_{00} 95% all patches

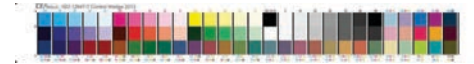


Typical targets for this



But what happens if you use other targets?

- Idealliance 12647-7 two and three row targets
- FOGRA validation wedge



- Why do people do this?

So we are using the three bar strip

- ISO 12467-7 Color Bar
 - ΔE_{00} paper
 - ΔE_{00} avg all patches
 - ΔE_{00} max all patches
 - ΔE_{00} max primaries (CMYK)
 - ΔH max, CMY
 - ΔCh avg CMY Gray
 - ΔCh max CMY Gray
- ISO 12467-8 Validation Print Bar
 - ΔE_{00} paper
 - ΔE_{00} avg all patches
 - ΔE_{00} max all patches
 - ΔH max, CMYRGB patches
 - ΔCh avg CMY Gray

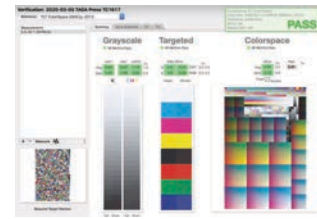
Other tolerance sets

- And to look at more
 - 12647-7 Color Bar – uses ΔE
- ISO 15311 PSD 2016 media relative
 - ΔE_{00} avg all patches
 - ΔE_{00} 95% all patches
- ISO 15311 PSD 2011 media relative
 - ΔE_{00} avg all patches
 - ΔE_{00} 95% all patches
 - ΔCh max CMY Gray

G7 Grayscale	G7 Targeted	G7 Colorspace	ISO 12467-7 Color Bar	ISO 12467-8 Validation Print Bar	ISO 15311 PSD 2016 media relative	ISO 15311 PSD 2011 media relative	GRACoL Digital Press	JPMA 2016
wL* avg K	wL* avg K	wL* avg K						
wL* max K	wL* max K	wL* max K						
wL* avg CMY	wL* avg CMY	wL* avg CMY						
wL* max CMY	wL* max CMY	wL* max CMY						
wCh avg CMY	wCh avg CMY	wCh avg CMY						
wCh max CMY	wCh max CMY	wCh max CMY						
ΔE_{00} paper	ΔE_{00} paper	ΔE_{00} paper						
ΔE_{00} K	ΔE_{00} K	ΔE_{00} K						
ΔE_{00} CMY	ΔE_{00} CMY	ΔE_{00} CMY						
ΔE_{00} RGB	ΔE_{00} RGB	ΔE_{00} RGB						
ΔE_{00} avg all patches	ΔE_{00} avg all patches	ΔE_{00} avg all patches						
ΔE_{00} max all patches	ΔE_{00} max all patches	ΔE_{00} max all patches						
ΔE_{00} max primaries (CMYK)	ΔE_{00} max primaries (CMYK)	ΔE_{00} max primaries (CMYK)						
ΔH max, CMY	ΔH max, CMY	ΔH max, CMY						
ΔCh max CMY Gray	ΔCh max CMY Gray	ΔCh max CMY Gray						
ΔCh max CMY Gray	ΔCh max CMY Gray	ΔCh max CMY Gray						

Verification to G7 colorspace

- Typically people use a TC1617 chart
 - Full data
 - See what is happening
- Reality
 - People don't like to measure!
 - Use different charts
 - And metrics



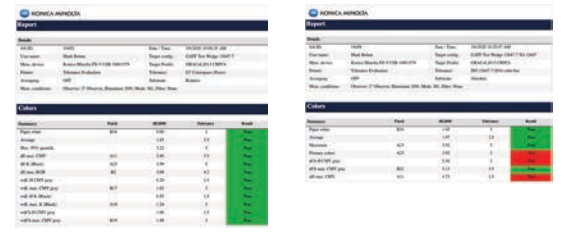
So what happens?



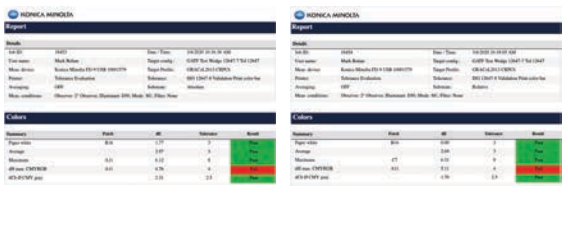
The impact of the different tolerance sets – 12647-7

Chart	Mean	Std	Min	Max	Pass
ISO 12467-7	1.8	0.2	1.5	2.1	Pass
ISO 12467-8	1.8	0.2	1.5	2.1	Pass
ISO 15311 PSD 2016	1.8	0.2	1.5	2.1	Pass
ISO 15311 PSD 2011	1.8	0.2	1.5	2.1	Pass
GRACoL Digital Press	1.8	0.2	1.5	2.1	Pass
JPMA 2016	1.8	0.2	1.5	2.1	Pass

The impact of the different tolerance sets – 12647-7



12647-8 tolerances



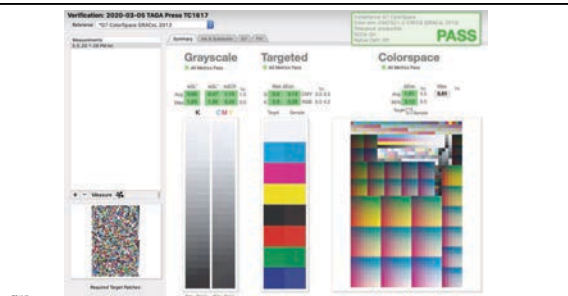
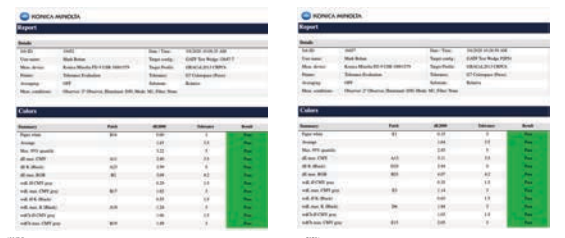
So what about the P2P51 alongside - targeted



P2P51 reverse targets



12647-7 and P2P51 targets



Closing thoughts

- The use of the full TC1617 is not sustainable in many production environments
 - *Using other targets and tolerance sets leads to inconsistencies, false positives and false negatives!*
- A simplified target set needs to be universally agreed upon for *verification* to a CRPC
 - *Essential the same tolerances be used for the reduced data set*
 - *Standard target would be preferable*



Questions

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