

ISO 13655 MEASUREMENT CONDITIONS

**What they are and where
they apply**



ISO STANDARDS FOR THE PRINTING INDUSTRY



ISO 3664:2009

- Viewing conditions
- D50/2°

ISO 5 Series:2009

- Densitometry

ISO 13655:2009

- Spectral Measurement and Colorimetric Computation for Graphic Arts Images
- M-Standards introduced



WHY MEASURE?

- Process setup
- Process control
- Print specification
- Spot color matching
- Reporting
- Independent reference
- Easy to share



Better agreement between visual assessment and measurements



ISO 3664:2009 – VIEWING CONDITIONS



Light source

- Relative spectral power distribution must match CIE illuminant D50
- UV energy must meet CIE illuminant D50 (correlates to M1 within ISO 13655)

Two levels of light intensity conditions

- **P1** Critical Comparison: e.g. two prints: illuminance 2000 ± 500 Lux
- **P2** Practical Appraisal: less critical comparisons e.g. hardcopy to softproof: 500 ± 125 Lux or exact illuminance adjustment of lightbooth to monitor

Further definitions

- Homogeneity
- Surrounding: neutral gray diffuse surface
- Viewing angle to avoid glare



WHAT IS WRONG IN THIS SCENE?





THIS IS MUCH BETTER!



PAPER FLUORESCENCE (OBAS)

DIFFERENT LIGHTING CREATES DIFFERENT RESULTS



A – Tungsten



TL84 – Retail Store



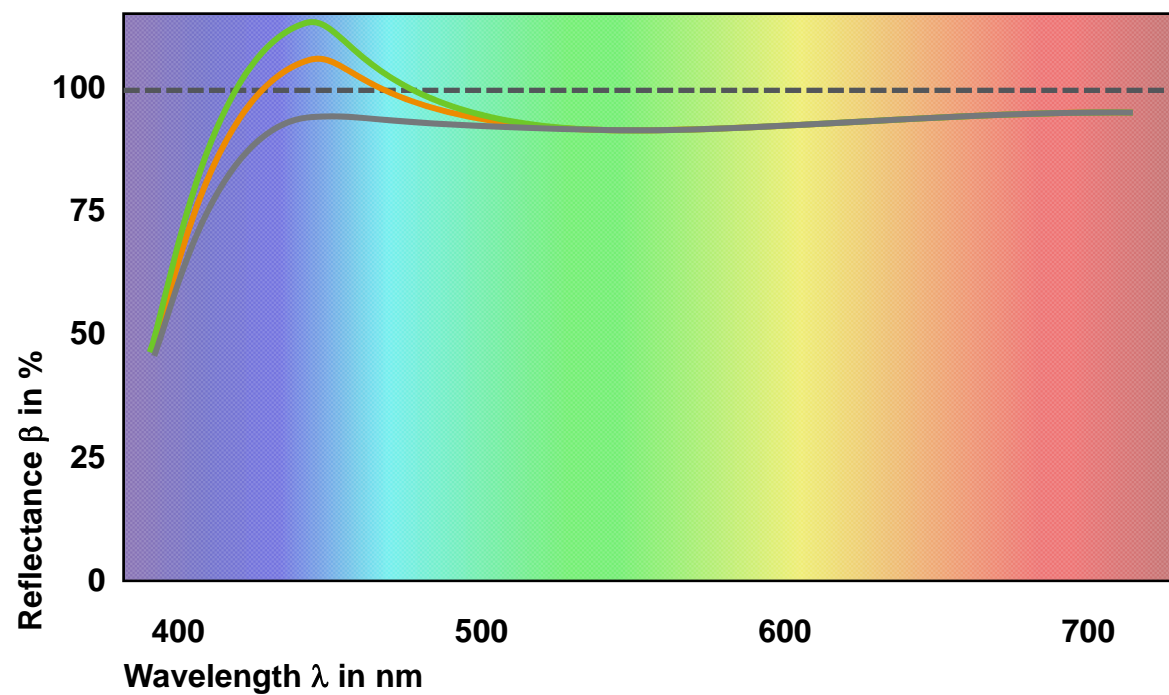
Daylight D50



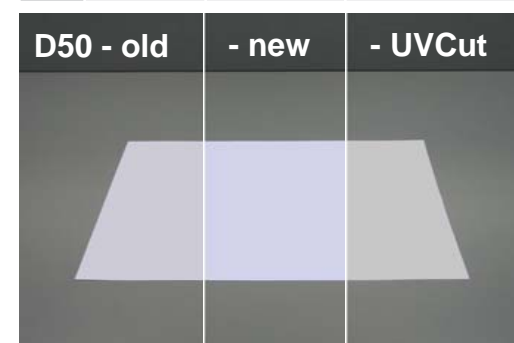
UV only

REFLECTANCE OF PAPER WITH OBA

Different UV Content in Light or Measurement Mode -> Different Result

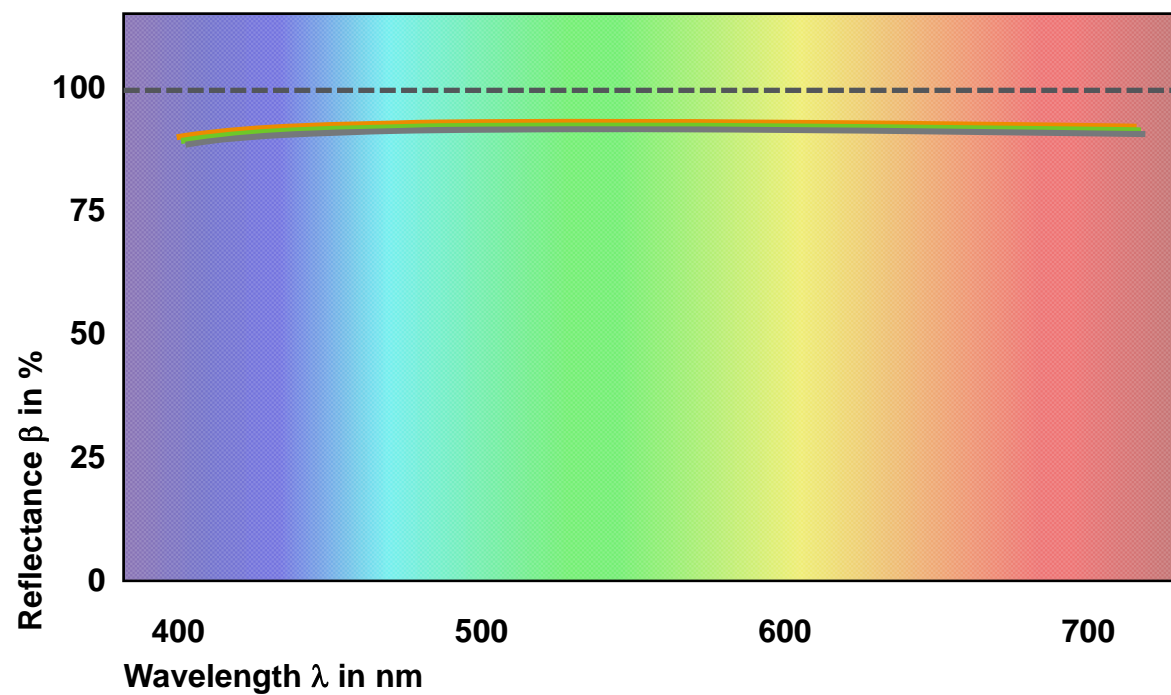


	M0	M1	M2
L*	94	94	94
a*	2,5	3	0,5
b*	-9	-12	-4



REFLECTANCE OF PAPER WITHOUT OBA

Different UV Content in Light or Measurement Mode -> Same Result



	M0	M1	M2
L*	95	95	95
a*	-0,5	-0,5	-0,5
b*	0	0	0

D50 - old	- new	- UVCut



WHAT'S NEW IN MEASUREMENT – ISO 5 SERIES

Density and Colorimetry requirements harmonized

- For Graphic Arts all illuminants defined in 13655 allowed

Spectral Calculation methods defined for Status Density





ISO 13655: 2009/2017 – MEASUREMENT CONDITIONS

Specifies spectral measurement conditions for graphic arts

- **Measurement geometry**
 - 0°/45° or 45°/0°
- **Backing**
 - Black Backing: Matte black substrate visual density 1.5 ± 0.2
 - White Backing: Matte white substrate w/o OBA,
 - 2009: L* between 92 and 96, C* below 3
 - 2017: C* below 3 and spectral curve defines reflectance (effectively lowering high end of L*)
- **Provides a mathematical formula for substrate compensation**
- **Applies to press characterization, pressroom control, proof-print verification**



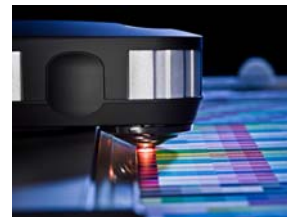
ISO 13655: 2009/2017 – MEASUREMENT CONDITIONS

Specifies spectral measurement conditions for graphic arts

- **Measurement illumination conditions**
 - M0: Should be CIE Illuminant A (many legacy spectrophotometers)
 - undefined UV amount
 - covers unknown illuminants as well
 - M1: CIE Illuminant D50, 1 for paper (OBA) only
 - Part 1 is D50 match use for all fluorescence (ink, papers, etc)
 - Part 2 Calculated UV response to emulate UV excitation of OBA's (for paper only)
 - M2: UV cut
 - Little energy below 420 nm, continuous illumination above
 - M3: Polarization Filter with UV cut equal to M2
 - Special use cases



M0,M1₁,M2, M3



M0,M1₂,M2

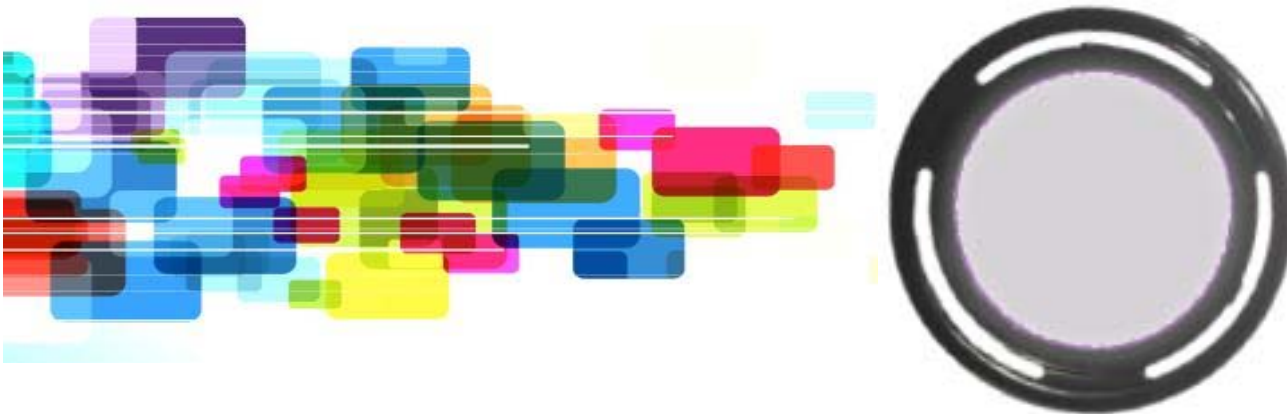


M3 – POLARIZATION

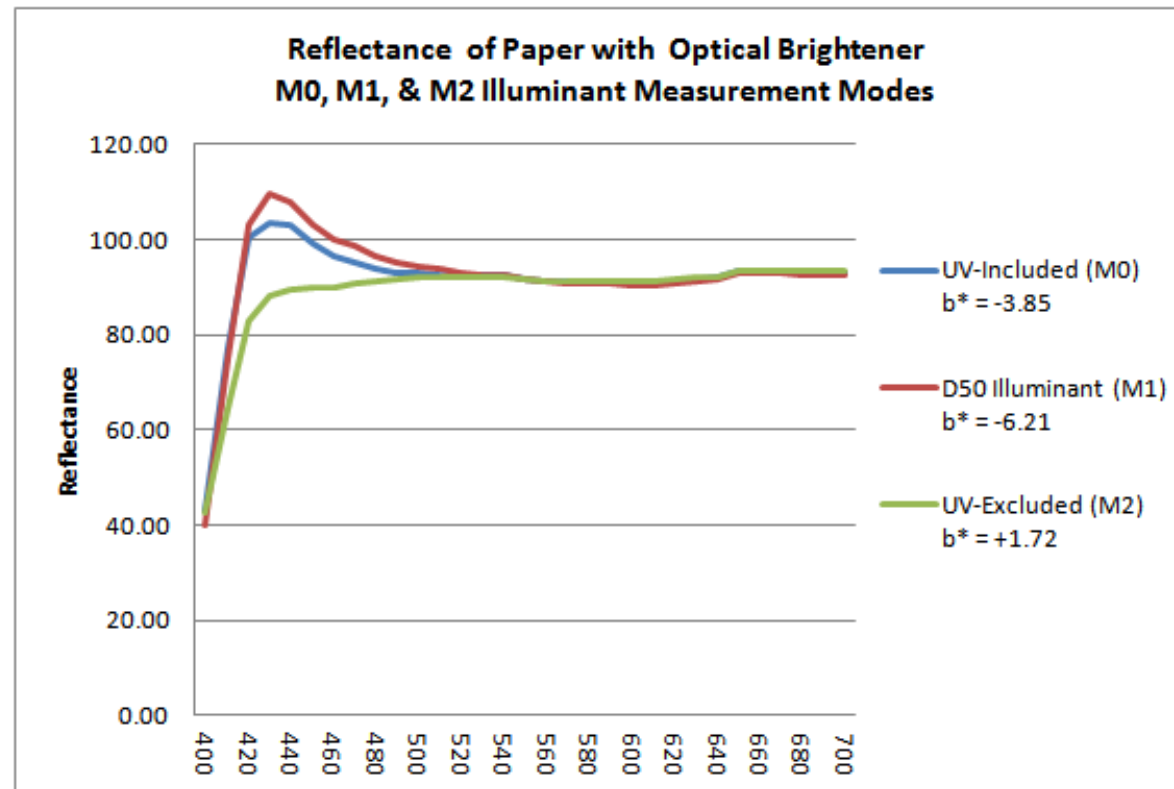
Colour Assessment independent of the surface

- Polarization reduces reflections caused by the surface reflection or bronzing
- On method of density comparison between wet and dry inks.
- It also removes UV equivalent to M2.
- Is used in ISO 12647 for as an option for density process control.

Attention: There is no viewing condition that matches this measurement condition

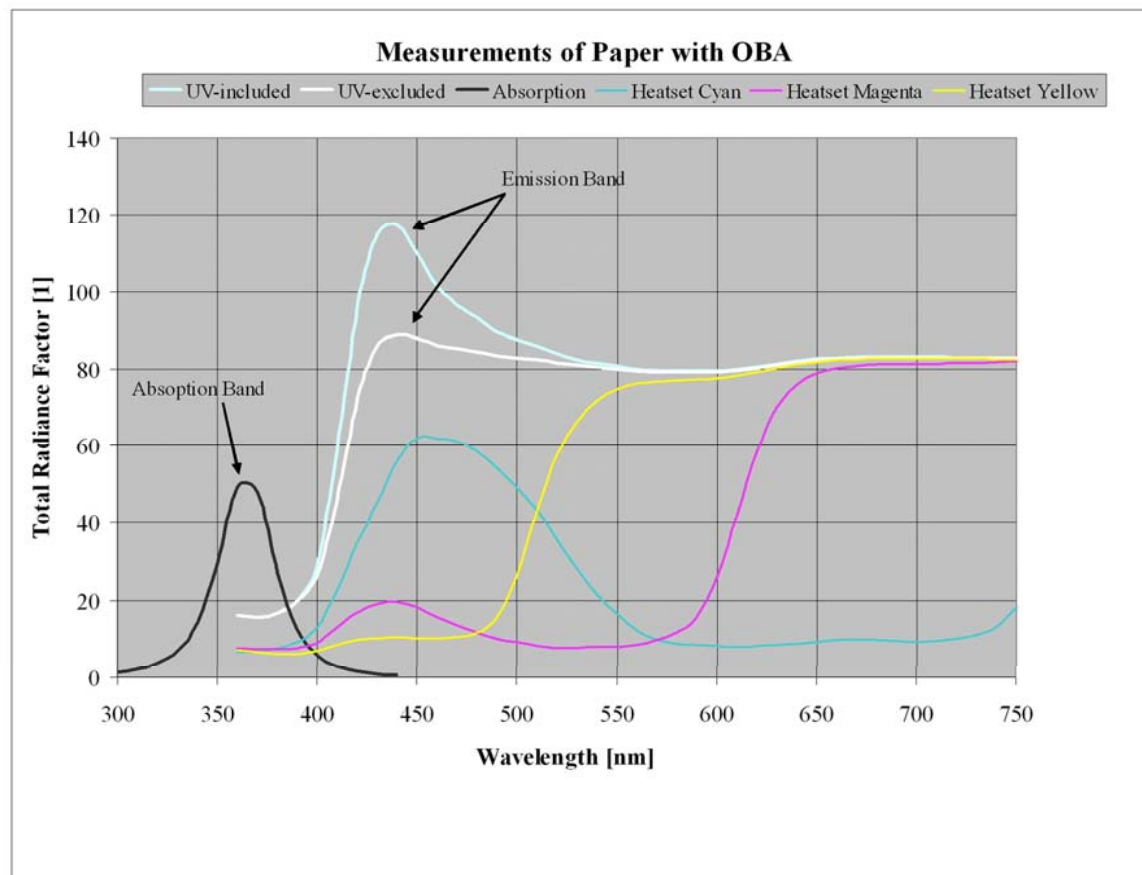


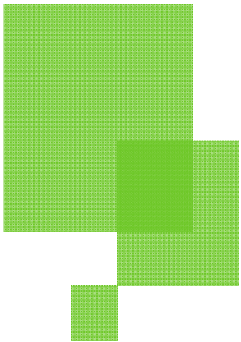
M'S THE GRAPHS



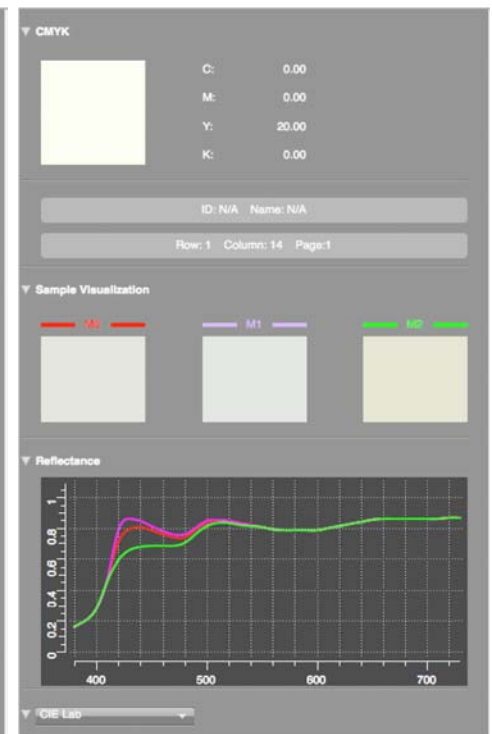
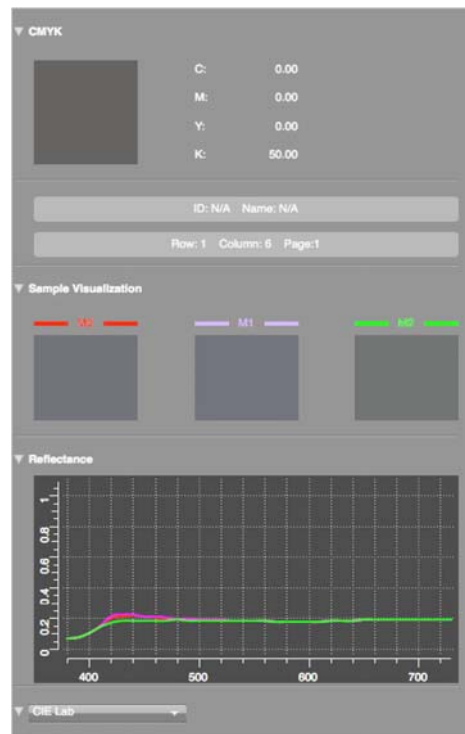
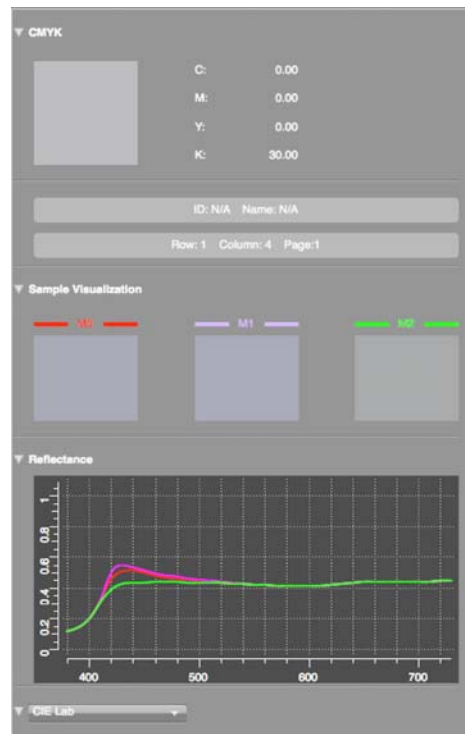
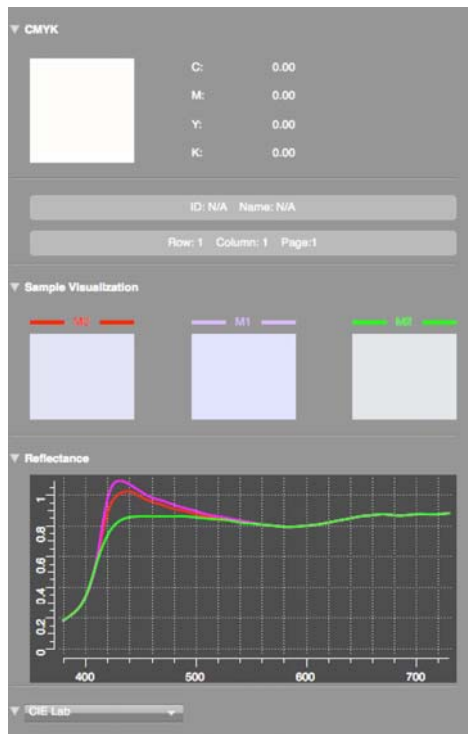
WHAT IT REALLY MEANS

Paper brighteners (OBA's)





EFFECT OF INK COVERAGE





THE RIGHT MEASUREMENT MODE TO HIT THE TARGET

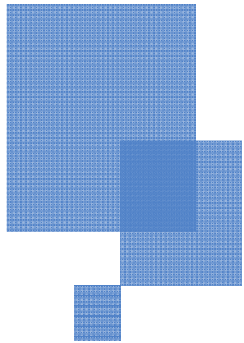


QUICK REVIEW



M0 - INCANDESCENT OR UNDEFINED





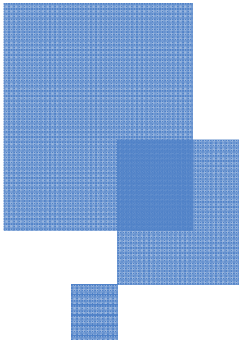
M1 - D50 OR SOMETHING LIKE IT





M2 – UV CUT, UV EXCLUDED, UV...





M3 – POLARIZED (AND UV CUT)



THANK YOU!