ISO 13655 MEASUREMENT CONDITIONS

What they are and where they apply

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ISO STANDARDS FOR THE PRINTING INDUSTRY

ISO 3664:2009

- Viewing conditions
- D50/2º

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

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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)

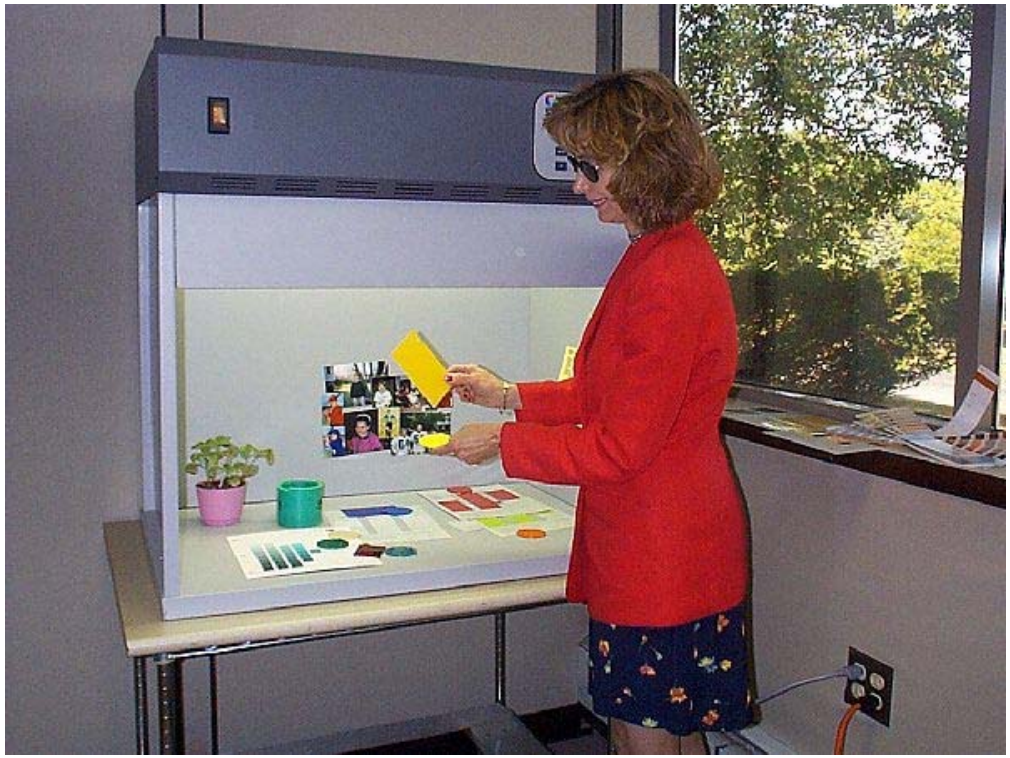
Two levels of light intensity conditions

- **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

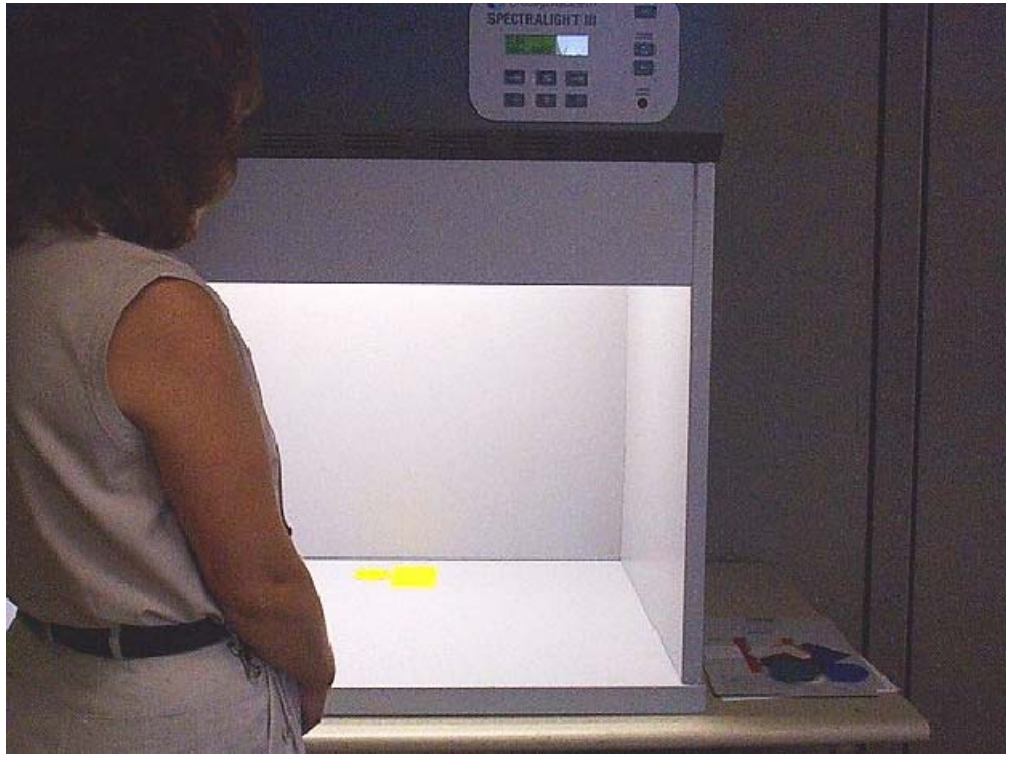
Further definitions

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

WHAT IS WRONG IN THIS SCENE?



THIS IS MUCH BETTER!



PAPER FLUORESCENCE (OBAS)

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DIFFERENT LIGHTING CREATES DIFFERENT RESULTS

A – Tungsten

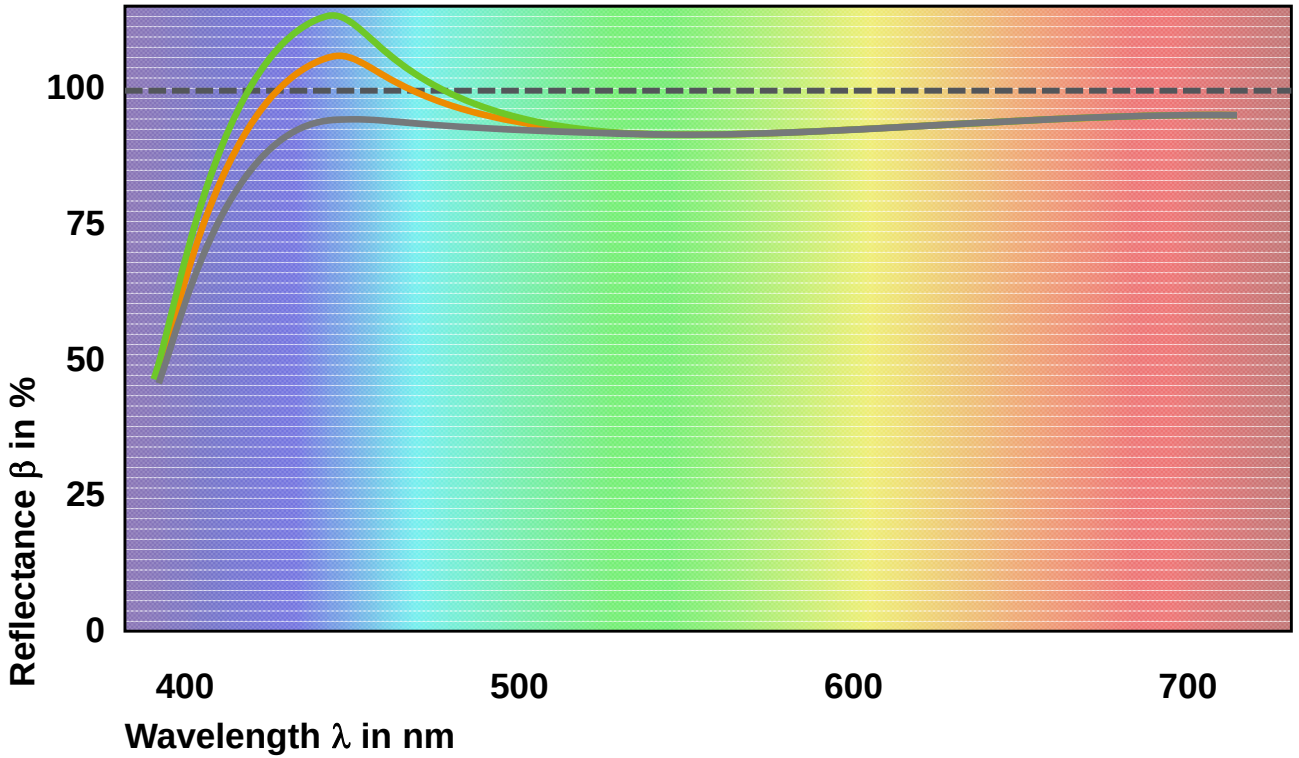
TL84 – Retail Store

Daylight D50

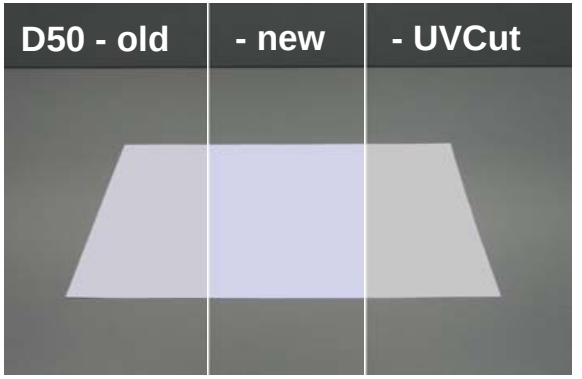
UV only

REFLECTANCE OF PAPER WITH OBA

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

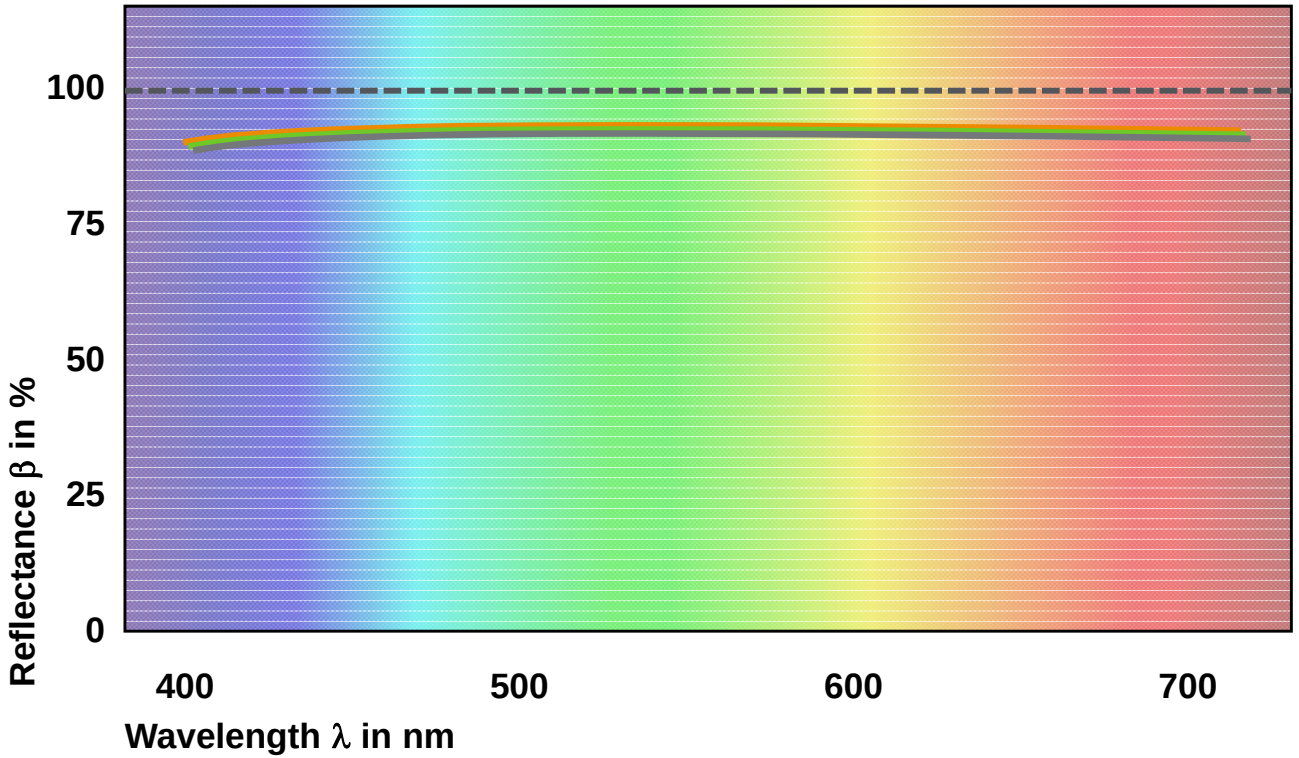


	M0	M1	M2
L*	94	94	94
a*	2,5	3	0,5
b*	-9	-12	-4

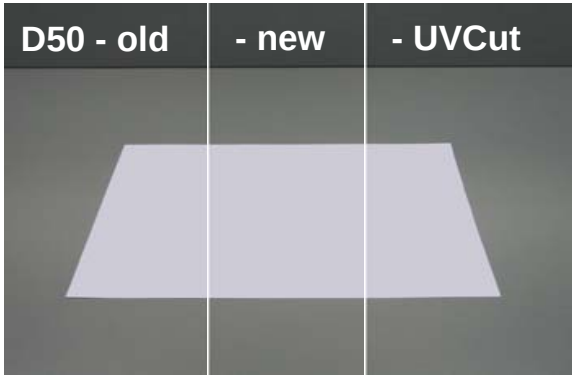


REFLECTANCE OF PAPER WITHOUT OBA

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



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**

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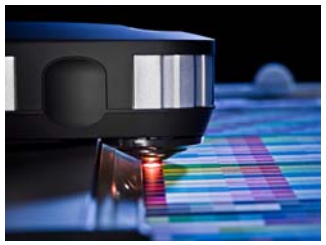
ISO 13655: 2009/2017 – MEASUREMENT CONDITIONS

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,$M1_1$,M2, M3



M0,$M1_2$,M2

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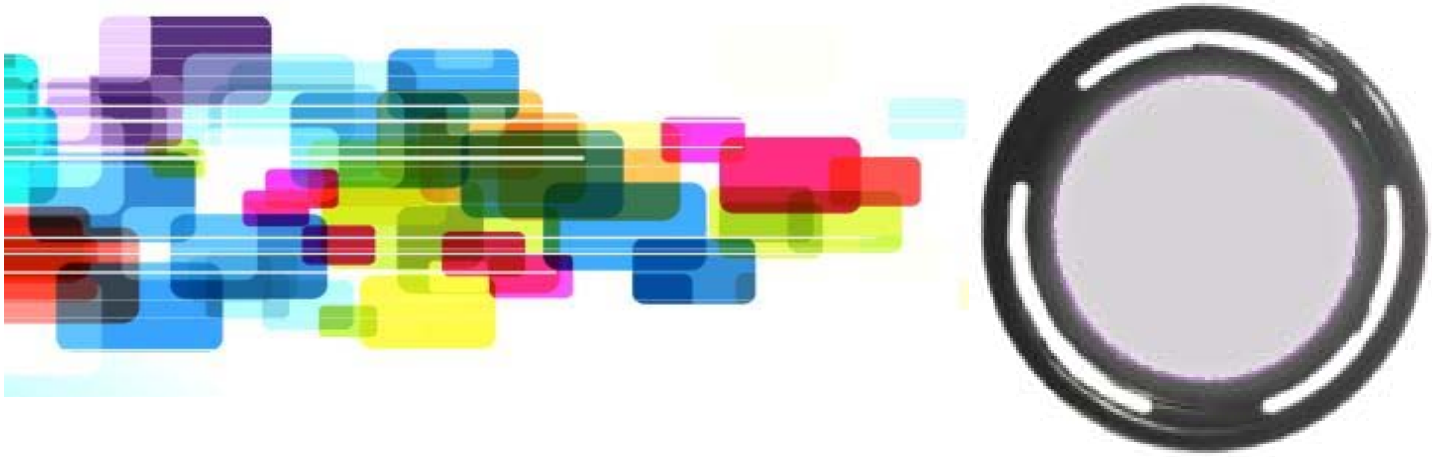
M3 – POLARIZATION

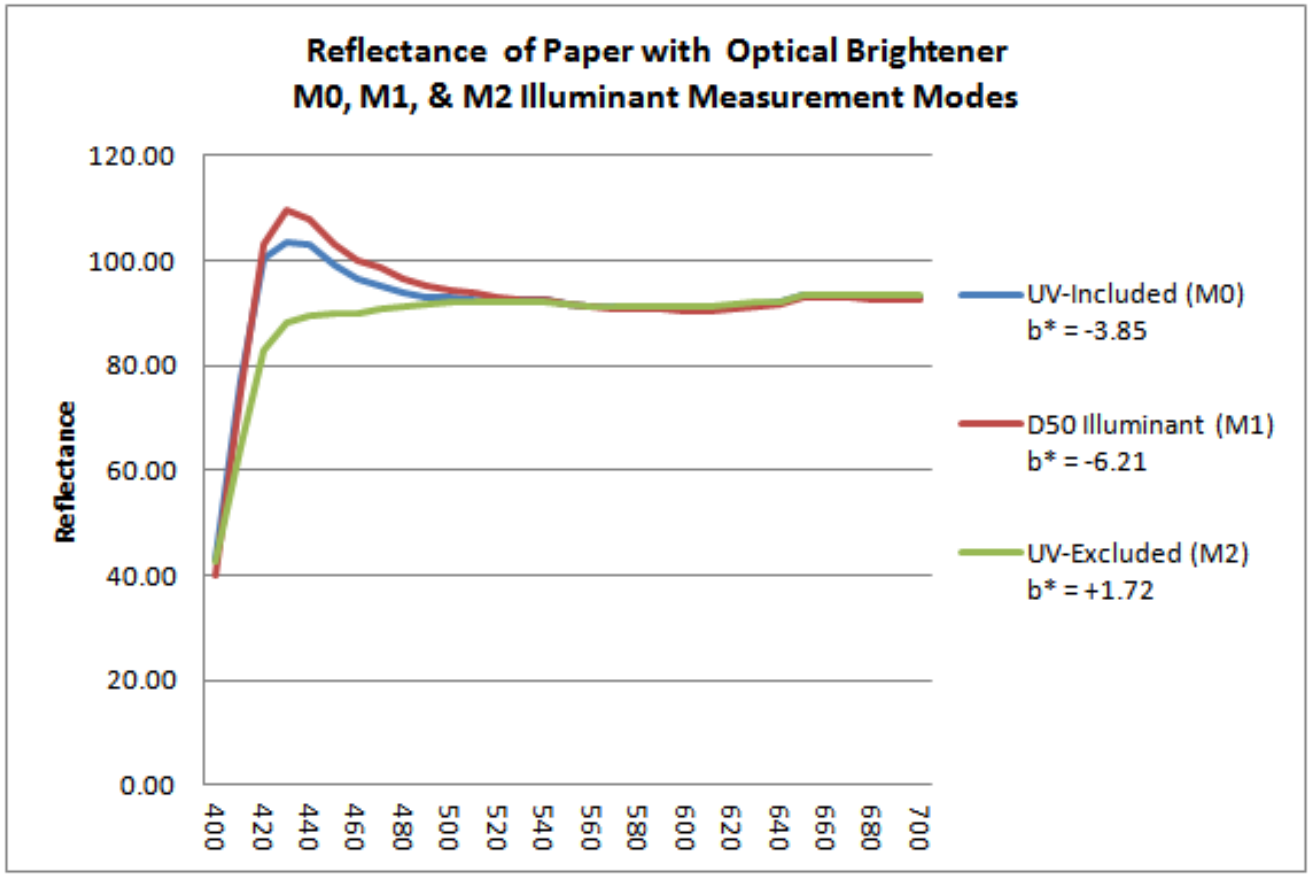
Colour Assessment independent of the surface

- 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



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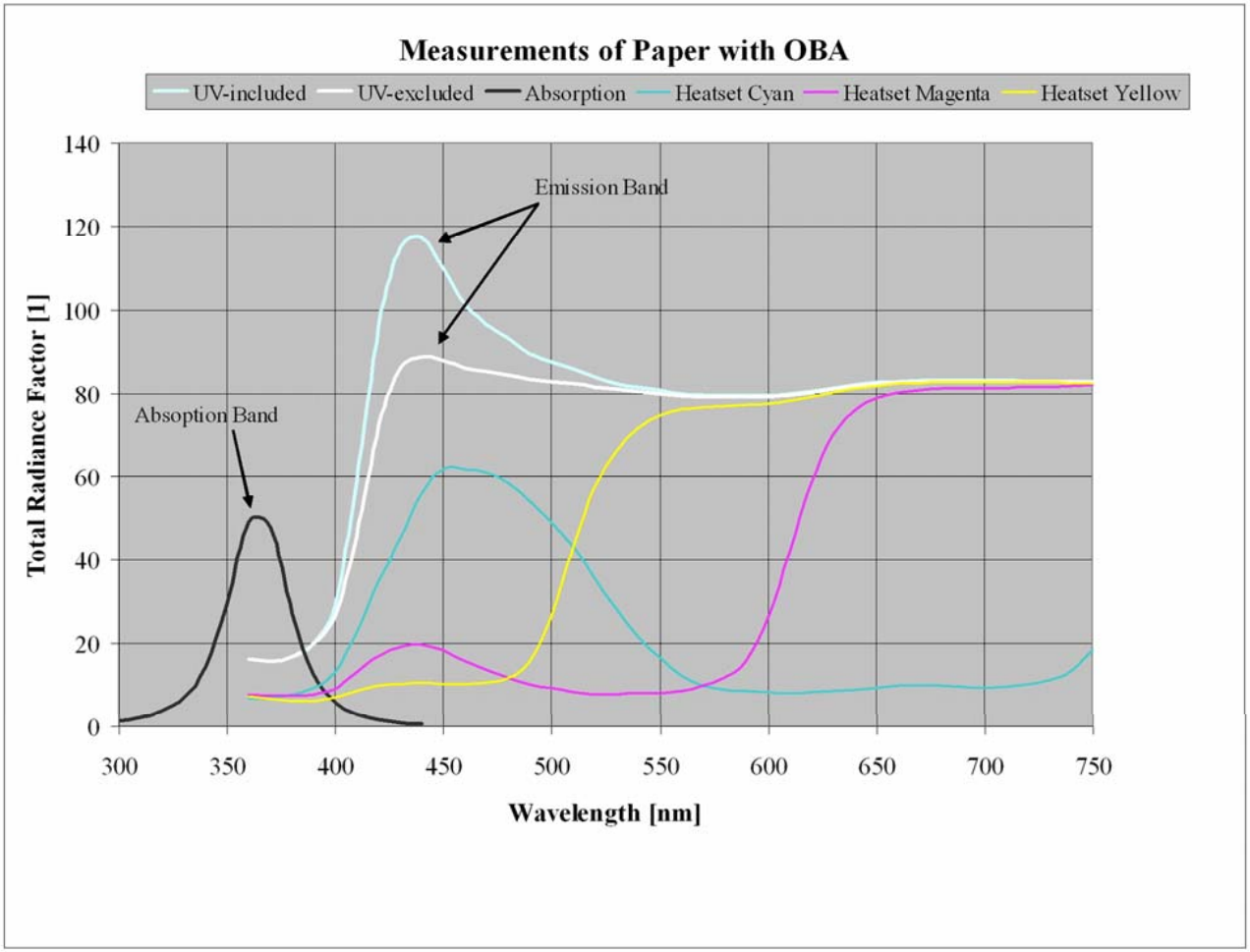
WHAT IT REALLY MEANS

Paper brighteners (OBA's)



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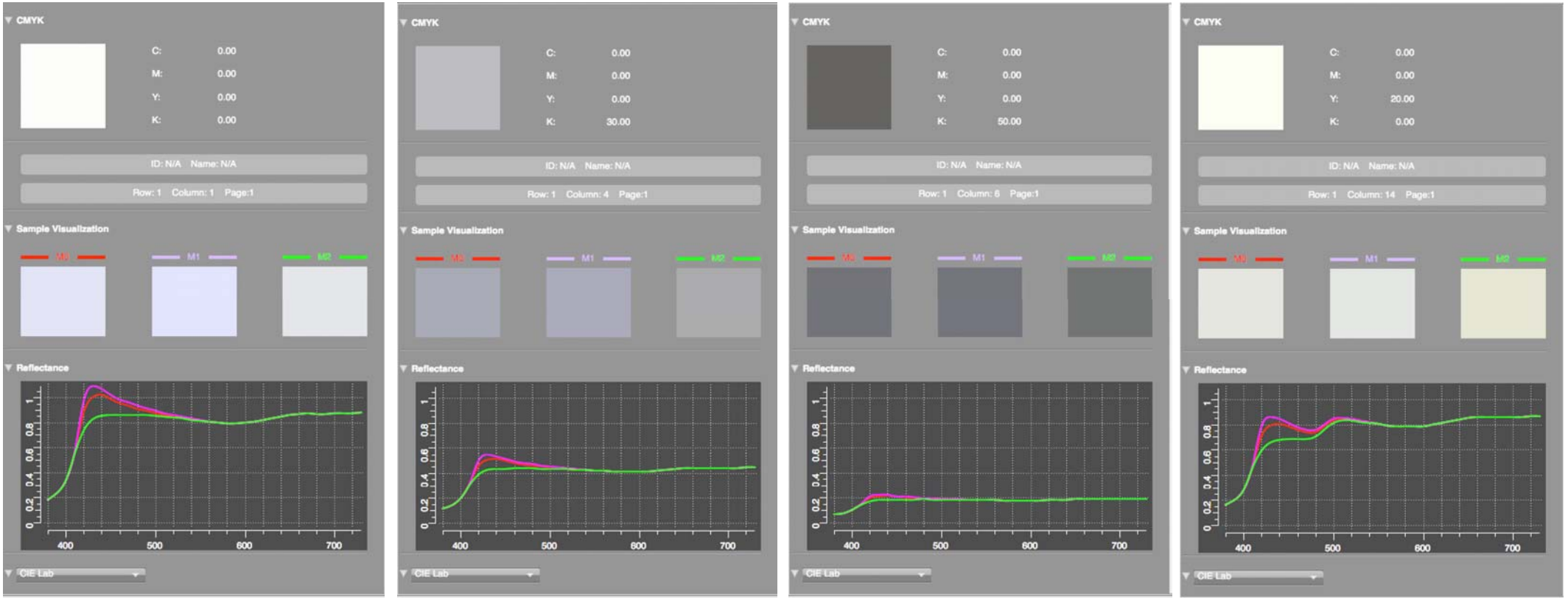
EFFECT OF INK COVERAGE



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THE RIGHT MEASUREMENT MODE TO HIT THE TARGET

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QUICK REVIEW

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M0 - INCANDESCENT OR UNDEFINED

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M1 - D50 OR SOMETHING LIKE IT

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M2 – UV CUT, UV EXCLUDED, UV…

M3 – POLARIZED (AND UV CUT)

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THANK YOU!

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