REFERENCE DATA ACCURACY

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1 OUTLINE

This document serves as information that the measurement accuracy described below has been inspected and tested to be in accordance with the mentioned specifications.

During production, specific regions of test charts are measured to qualify the production process or to additionally create individual reference data to accompany a test chart. Measured regions can be color or gray tones.

The measurement devices are calibrated regularly and checked before use.

This document refers to test targets, transparent and reflective, produced and respectively measured by Image Engineering GmbH & Co. KG.

2 COLOR MEASUREMENT OF REFLECTIVE CHARTS

Method:	Spectrophotometer (X-Rite eXact*)
Spectral resolution:	10 nm
Spectral range:	400 - 700 nm
Reported value:	X, Y, Z if not otherwise identified

Accuracy:
(D50, 2°, 12 BCRA tiles, 23°C +/- 1°C, 40-60% RH)

Average:	0.35 ΔEab (non-polarized), 0.42 ΔEab (polarized)
Maximum:	0.63 ΔEab (non-polarized), 0.70 ΔEab (polarized)

Short term repeatability (White): 0.05 ΔEab, (standard deviation), white BCRA ceramic
(Error compared to mean value of 10 measurements every 5 seconds)*

3 DENSITOMETRIC MEASUREMENT OF REFLECTIVE GRAY SCALES

Method:	Densitometer for reflective materials (X-Rite eXact*)
Mode:	Status A
Measurement range:	0.0 – 3.0 OD
Reported value:	OD (optical densities) if not otherwise identified

Short term repeatability (Density): +/- 0.01 OD for CMYK
(Status E or Status T measurements, maximum error compared to mean value of 10 measurements every 5 seconds at 2.0 OD except for M3 Yellow at 1.7 OD)

*https://www.xrite.com/categories/portable-spectrophotometers/exact

4 DENSITOMETRIC MEASUREMENT OF TRANSPARENT GRAY SCALES

Method:	Densitometer for transmissive materials (X-Rite 361T**)
Mode:	Status A
Measurement range:	0 -> 6.0 OD (optical densities) Densities > 4 are compounded by multiple layers of film; the stated density is the sum of the measured densities of each layer.
Reported value:	OD if not otherwise identified
Repeatability:	Ortho,Visual (2 mm and 3 mm aperture): 0.0 D to 5.0 D: ± 0.01 D 5.0 D to 5.5 D: ± 2 % 5.5 D to 6.0 D: ± 3 % Ortho,Visual (1mm aperture): (0.0D to 4.5D): ±0.01D (4.5D to 5.0D): ±1%

** https://www.xrite.com/categories/densitometers/361t

The densitometer uses directed light. Changing the illumination geometry to diffuse light can lead to a different contrast of the photographic film. This effect is known as the Callier effect.
Please note: not every film material is affected in the same way.
For the most accurate measurements, we recommend determining the luminance data with an appropriate luminance meter (confer with iQ-Analyzer manual). Using the luminance reference data, if determined with light source of test setup, will prevent potential inaccuracy based on density data.

5 SPECTRAL MEASUREMENT OF REFLECTIVE AND TRANSMISSIVE CHARTS

Method:	Spectrometer Avantes AvaSpec Mini2048CL***-IMG11
Principle:	Direct measuring via optical fiber opening (~25° FOV)
Spectral range:	200 – 1100 nm
Signal/noise:	330:1
Pixel resolution:	Sensor: 2048 pixel / FWHM: 2.5 nm
Calibration:	NIST traceable calibrated
Reported value:	Reflection or Transmission in % Density (calculated from reflection or transmission) XYZ, xy, L*a*b* (calculated from spectrum, D65 Whitepoint)

*** https://www.avantes.com/products/spectrometers/compactline/avantes-spectrometer-mini-2048cl/