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Report prepared by: Dipl.-Ing. [FH] Peter Karp  
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Task: Conformance check of submitted charts  
according to ISO 12641

Submitted material: 1x IT8.7/1 chart  
1x IT8.7/2 chart

Documents enclosed:

## 1. Task:

The submitted test charts (one transmission target and one reflective target) are subject to an ISO 12641 [4] conformance check focussing on the colorimetric accuracy.

## 2. Bibliography:

- [1] Dolezalek, F.:  
ProzessStandard Offsetdruck  
Wiesbaden: Bundesverband Druck und Medien e. V., 2001  
und Ergänzung vom Mai 2003
- [2] ISO 13655:1996  
Graphic technology -- Spectral measurement and colorimetric  
computation for graphic arts images  
How to get: Beuth-Verlag, 10772 Berlin [[www.beuth.de](http://www.beuth.de)]
- [3] Norm ISO 12647-2:2004/ Amd 1  
Graphic technology -- Process control for the production of  
half-tone colour separations, proof and production prints -- Part  
2: Offset lithographic processes  
How to get: Beuth-Verlag, 10772 Berlin [[www.beuth.de](http://www.beuth.de)]
- [4] Norm ISO 12641:1997  
Graphic technology -- Prepress digital data exchange -- Colour  
targets for input scanner calibration  
How to get: Beuth-Verlag, 10772 Berlin [[www.beuth.de](http://www.beuth.de)]

### 3. Target Design

ISO 12641 defines requirements and tolerances for a specific target design, colorimetric aim values as well as for the designation (“Labelling”) for both reflective and transmissive targets. A typical design is illustrated in Fig. 1.

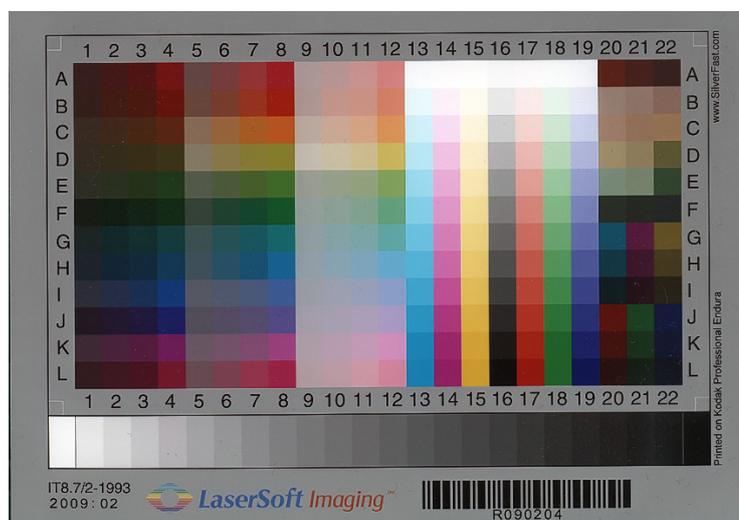


Fig. 1: Scan of the submitted reflection target (15 x 10 cm) – „R090204“.

The target is designed with 5 distinct sections. These are:

1. Sampled colour area [A1 to L12]
2. Colour dye scales [A13 to L19]
3. Neutral dye scale [Grey wedge at the bottom]
4. Dmin/Dmax area
5. Vendor-optional area

Subject of this scrutiny is the evaluation of the colorimetric accuracy with respect to the sections 1 and 3. In addition an informative evaluation comprising all patches will be conducted.

#### **4. Reference and Colour Measurement**

Depending on the nature of the given colour measurement data ISO 12641 differentiates two kinds of targets. Calibrated targets are test charts which have been whilst uncalibrated targets are usually accompanied by measurements reflecting the batch mean.

In this report both targets represent “uncalibrated targets” where the pertinent reference values (reflecting the batch mean) have been downloaded from <http://www.silverfast.com/it8calibration/>. Here the ID “R090204” have been used for the reflection target and ID „T080209“ for the transmission one).

Both targets have been measured according to [2] with the measurement device SpectraScan T (X-RITE). The aperture was 2 mm and the geometry d:0°. The reflection target was measured under 45°:0° and an aperture of 4,5 mm.

#### **5. Normative Requirements**

##### **5.1 Target layout and physical characteristics**

###### **5.1.1 Transmissive Target**

Both the target size (ca. 9,9 cm x 12,6 cm) and the patch dimensions 4,5 mm x 4,5 mm are in conformance with the required aim values for “ISO 12641 Type 1”.

All non-image areas of the target shall be approximately neutral and shall have a lightness ( $L^*$ ) of approximately 50. This can be confirmed with a measured CIELAB values of 56; 0; -1 [2°].

It could be further attested that the non-image area do extend at least 4,5 mm beyond the row and column borders on the top and sides and at least 10 mm on the bottom to provide for identification information. The remaining requirements such as fiducial marks are also in conformance with ISO 12641. It should be mentioned here that the required label of “ISO 12641:1997“ is missing. Instead the informal designation „IT.8.7/1-1993“ has been used. But this is not a

substantial issue since targets bearing the designation IT8.7/1-1993 are prepared in accordance with ANSI ITS.7/1-1993 whose technical requirements are identical to ISO 12641 [see Note 6 of ISO 12641].

### **5.1.2 Reflection Target**

The requirements have been met both for the target size (12,5 mm x 17,8 mm) and the patch size (6,5 mm x 6,5 mm). The non-image parts can be attested to being neutral while having a CIELAB value of 56; 0; -2 [D50/2°].

## **5.2 Colour accuracy [„Colour Gamut Mapping“]**

The hue angle, lightness, and chroma of the target patches contained in the sampled colour area portion of the target, Rows A through L and Columns 1 through 12 (category 1), shall be in accordance with [4]. There are no aim values for the patches in column 4, 8 and 12. For uncalibrated targets, as tested in this report, for the patches contained within A1 through L3, A5 through L7, and A9 through L2, 99% shall be within  $\Delta E^*_{ab} = 10$  of the aim values specified in [4]. In addition it is required that for each manufacturing batch 99% of the patches within the manufacturing batch (contrary to the requirement before the reference here is the measurement file from the manufacturer) shall be within  $\Delta E^*_{ab} \leq 5$  of the reference.

In addition and for information only the requirements for calibrated targets should be mentioned here. In this case the measured values for each patch shall be provided together with a certificate as to the degree of conformance of the measuring laboratory to an accredited measurement assurance program (MAP) sponsored by a recognized national standardizing laboratory. The goal is that all measurements will be accurate within  $\Delta E^*_{ab} \leq 2$ .

### 5.2.1 Results: Transmissive Target

The results of the colorimetric evaluation are given in Tab. 1. The individual measurement values will be provided separately by means of a spreadsheet. In addition the results of the modern CIEDE2000 colour difference formula is illustrated. The results show an excellent conformance to the required aim values.

	$\Delta E_{ab}^*$	Tol.	Result
<b>Mean</b>	1,3	-	
<b>Maximum</b>	4,0	-	
<b>99% Quantile</b>	3,4	10	OK
	$\Delta E_{00}$	Informative	
<b>Mean</b>		1,0	
<b>Maximum</b>		3,6	
<b>99% Quantile</b>		3,2	

Tab. 1: Colorimetric evaluation of the transmissive target.

### 5.2.2 Results: Reflective Target

The results of the colorimetric evaluation are given in Tab. 2. The individual measurement values will be provided separately by means of a spreadsheet. In addition the results of the modern CIEDE2000 colour difference formula is illustrated. The results show an excellent conformance to the required aim values.

	$\Delta E^*_{ab}$	Tol.	Result
<b>Mean</b>	1,7	-	
<b>Maximum</b>	4,9	-	
<b>99% Quantile</b>	4,2	10	OK
	$\Delta E_{00}$	Informative	
<b>Mean</b>		1,1	
<b>Maximum</b>		2,4	
<b>99% Quantile</b>		2,3	

Tab. 2: Colorimetric evaluation of the reflective target.

### 5.3 Dye Scale Values

From the given requirements (Clause 4.2.4) the following requirements can be deduced.

#### 5.3.1 Transmittance Target

The patches B16 through K16 shall be equally spaced in CIEL\* between the L\* values of patches B16 and K16. The positive result is depicted in Fig. 2.

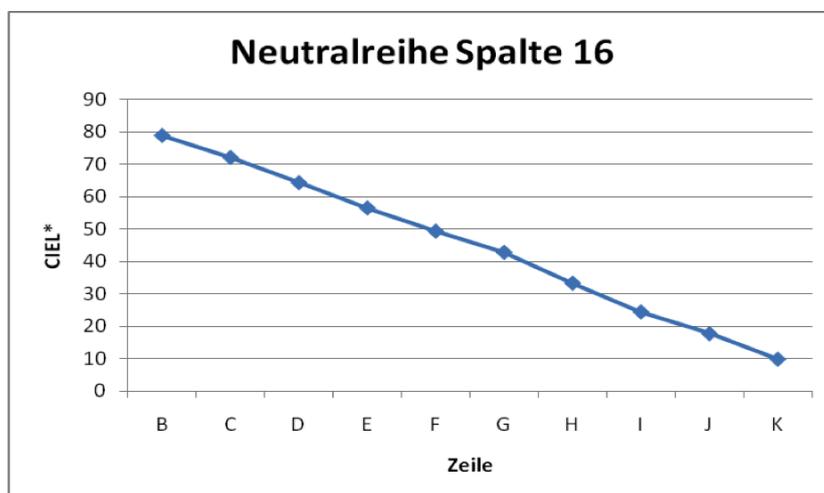


Fig. 2: Evaluation of CIEL\*-spacing of the patches in columns B16 until K16.

### 5.3.2 Reflection Target

The patches B16 through K16 shall be equally spaced in CIEL\* between the L\* values of patches B16 and K16. The positive result is depicted in Fig. 3.

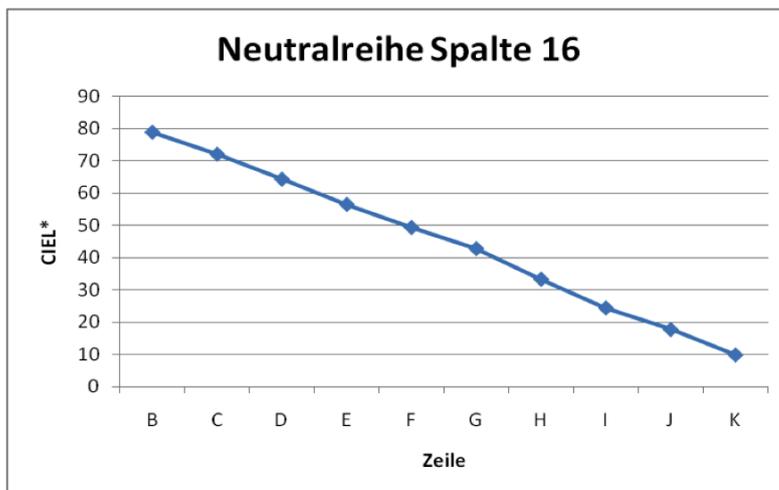


Fig. 3: Evaluation of CIEL\*-spacing of the patches in columns B16 until K16.

### 5.4 Neutral Scale Values

#### 5.4.1 Transmittance Target

The evaluation of the neutral scale values was conducted by means of the CIEL\* and CIEC\* (being zero) values, see Fig. 4. The requirements are well fulfilled.

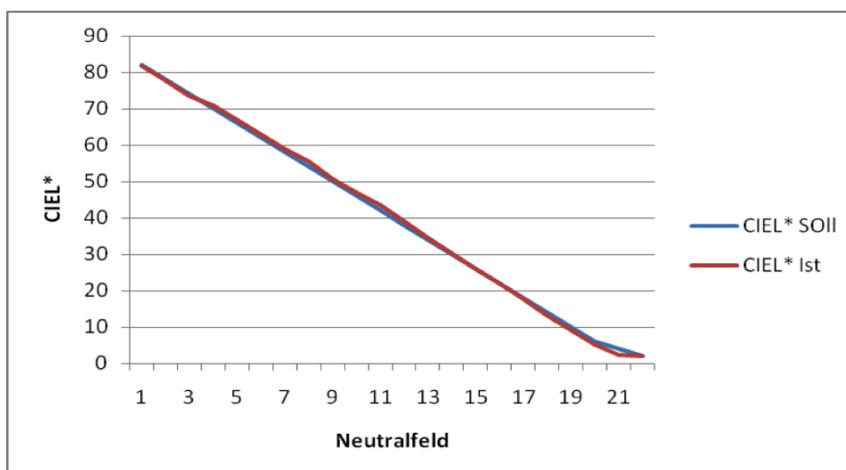


Fig 4: Colour accuracy of neutral scale values (reference: blue and measurement: red).

### 5.4.2 Reflection Target

The evaluation of the neutral scale values was conducted by means of the CIEL\* and CIEC\* (being zero) values, see Fig. 5. The requirements are very well fulfilled.

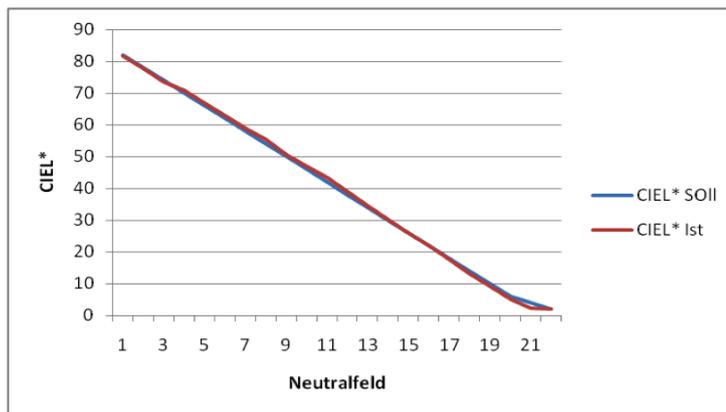


Fig. 5: Colour accuracy of neutral scale values (reference: blue and measurement: red).

## 6. Conclusion

The evaluation shows an excellent conformance of the tested transmissive and reflection targets with respect to ISO 12641. The tested targets furthermore exceed the demand criteria for uncalibrated targets by fulfilling the rigorous tolerances of calibrated targets.

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