

http://farbe.li.tu-berlin.de/AN87/AN87L0N1.TXT/.PS; start output
N: no 3D-linearization (OL) in file (F) or PS-startup (S), page 1/1



CIELAB 1976 $L^*a^*b^*$ -color space definition and reversal

$$L^* = 116 \left(Y/Y_n \right)^{1/3} - 16$$

$$a^* = 500 \left[(X/X_n)^{1/3} - (Y/Y_n)^{1/3} \right]$$

$$b^* = 200 \left[(Y/Y_n)^{1/3} - (Z/Z_n)^{1/3} \right]$$

$$X = X_n \left[(L^* + 16) / 116 + a^*/500 \right]^3$$

$$Y = Y_n \left[(L^* + 16) / 116 \right]^3$$

$$Z = Z_n \left[(L^* + 16) / 116 - b^*/200 \right]^3$$

AN870-1N

Q -function changes; transition from light- to color metrics

scaling function of light metrics:
 $Q(\mathbf{k}(\mathbf{x} - \mathbf{u})) = Q(\mathbf{k}(\log L - \log L_u))$

$\log L \rightarrow \log P$ for color metrics:

$$Q[\mathbf{k}(\log P - \log L_u)]$$

$$= Q[\mathbf{k}(\log L - \log L_u + \log P - \log L)]$$

with saturation $p = \log P - \log L$
 for color metrics: $Q(\mathbf{k}(\mathbf{x} - \mathbf{u} + \mathbf{p}))$

AN870-2N

Multifunctional device
with the following modes:

- copier
- scanner
- printer

high colour fidelity with function copier

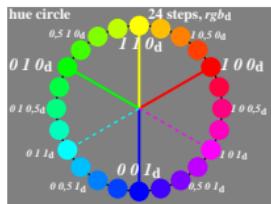
$$LCh^* \rightarrow rgb \rightarrow rgbd \rightarrow rgb^* \rightarrow LCh^*$$

scanner printer

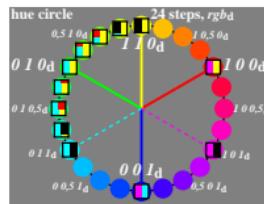
user wish:
 $rgb \rightarrow rgbd$ user wish:
 $rgb^* \rightarrow LCh^*$

File output
 $rgb \rightarrow rgbd$? File input
 $rgb \rightarrow rgbd$?

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AN870-5N



AN870-6N

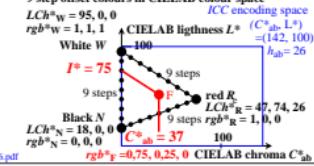
Offset rgbd input data and LCh* output data

Color	rgbd*	LCh*
R, elementary red	1 0 0	47, 74, 26
Y, elementary yellow	1 1 0	86, 88, 92
G, elementary green	0 1 0	53, 57, 164
B, elementary blue	0 0 1	42, 45, 271
N, black	0 0 0	18, 0, 0
W, white	1 1 1	95, 0, 0

Data according to test chart DIN 33872-2, p.9-12
<http://farbe.li.tu-berlin.de/A33872.html>
 Elementary-hue angles of CIE R1-47, see
<http://web.archive.org/web/20160304130704/http://files.cie.co.at/526.pdf>

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9 step offset colours in CIELAB colour space



AN870-8N

TUB-test chart AN87; Examples of colour metric User coordinates and device calibration

Agreement (Y/N) of CIELAB h_{ab} with IEC 61966-2-1 and CIE R1-47

reference: device colours				NOTES
$R_{d,sRGB}$	$Y_{d,sRGB}$	$G_{d,sRGB}$	$B_{d,sRGB}$	visual standard deviation v_{SD}
40 +/- 4	103 +/- 4	136 +/- 4	306 +/- 8	1 x v _{SD} 2 x v _{SD} data see [1], Tab. B.2
40 +/- 8	103 +/- 8	136 +/- 8	306 +/- 16	
measurement of printer output in IEC 61966-2-1	34 N(-2)	100 Y	146 N(+8)	264 N(-34)
rgb^* in file	34 Y	100 Y	146 N(+2)	264 N(-26)
measurement of printer output $cmyk$ in file	34 N(-2)	100 Y	153 N(+15)	300 Y
	34 Y	100 Y	153 N(+9)	1 x v _{SD} 2 x v _{SD} 3 x Y data see [1], Fig. 33
measurement of printer output $cmyk$ in file	34 N(+4)	100 Y	146 N(-12)	264 N(-4)
	34 Y	100 Y	146 N(-8)	1 x v _{SD} 0 x Y 2 x v _{SD} 3 x Y data see [1], Fig. 32
measurement of printer output $cmyk$ in file	34 N(+4)	100 Y	153 N(-5)	300 N(+20)
	34 Y	100 Y	153 N(-1)	2 x v _{SD} 0 x Y 300 N(+12)
measurement of printer output $cmyk$ in file	34 N(+4)	100 Y	153 N(-1)	1 x v _{SD} 0 x Y 2 x v _{SD} 3 x Y data see [1], Fig. 33

AN871-3N

ISO reference file
with 729 rgbd data,
device output linearization

image process
digital -> analog
hardware
printer, offset,
display, projector
 $rgb^* \rightarrow LCh^*$

visual test
elementary hue (Y/N)?
equal spacing (Y/N)?
use colours in
column b to f

$LCh^* \rightarrow rgbd$

rgb^*

image process
digital -> digital
software
 $ICC\ Look_Up$
table or similar
 $rgb \rightarrow rgbd$

input
linearization
 $rgb \rightarrow rgbd$

LCh^*

input: w/rgb/cmyk -> w/rgb/cmyk
output: no change compared

