

- color space

$$\begin{aligned} L^* &= 116 (Y/Y_n)^{1/3} - 16 \\ a^* &= 500 [(X/X_n)^{1/3} - (Y/Y_n)^{1/3}] \\ b^* &= 200 [(Y/Y_n)^{1/3} - (Z/Z_n)^{1/3}] \\ X &= X_n [(L^* + 16) / 116 + a^*/500]^3 \\ Y &= Y_n [(L^* + 16) / 116]^3 \\ Z &= Z_n [(L^* + 16) / 116 - b^*/200]^3 \end{aligned}$$

Q -function changes; transition from light- to color metrics
scaling function of **light metrics**:
 $Q[k(x - u)] = Q[k(\log L - \log L_u)]$
 $\log L \rightarrow \log P$ **for color metrics**:
 $Q[k(\log P - \log L_u)]$
 $= Q[k(\log L - \log L_u + \log P - \log L)]$
with saturation $p = \log P - \log L$
for color metrics: $Q[k(x - u + p)]$

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}
definition for display output in IEC 61966–2–1	40 +/- 4 40 +/- 8	103 +/- 4 103 +/- 8	136 +/- 4 136 +/- 8	306 +/- 8 306 +/- 16	1 x v_{SD} 2 x v_{SD} data see [1], Tab. B.2
measurement of printer output <i>rgb</i> in file	34 $N(-2)$ 34 Y	100 Y 100 Y	146 $N(+8)$ 146 $N(+2)$	264 $N(-34)$ 264 $N(-26)$	1 x v_{SD} ; 1 x Y 2 x v_{SD} ; 2 x Y data see [1], Fig. 32
measurement of printer output <i>cmy0</i> in file	34 $N(-2)$ 34 Y	100 Y 100 Y	153 $N(+15)$ 153 $N(+9)$	300 Y 300 Y	1 x v_{SD} ; 2 x Y 2 x v_{SD} ; 3 x Y data see [1], Fig. 33
	reference: elementary colours				NOTES
	R_e	Y_e	G_e	B_e	visual standard deviation v_{SD}
definition for any output in CIE R1–47	26 +/- 4 26 +/- 8	92 +/- 4 92 +/- 8	162 +/- 4 162 +/- 8	272 +/- 8 272 +/- 16	1 x v_{SD} 2 x v_{SD} data see CIE R1–47
measurement of printer output <i>rgb</i> in file	34 $N(+4)$ 34 Y	100 $N(+4)$ 100 Y	146 $N(-12)$ 146 $N(-8)$	264 $N(-4)$ 264 Y	1 x v_{SD} ; 0 x Y 2 x v_{SD} ; 3 x Y data see [1], Fig. 32
measurement of printer output <i>cmy0</i> in file	34 $N(+4)$ 34 Y	100 $N(+4)$ 100 Y	153 $N(-5)$ 153 $N(-1)$	300 $N(+20)$ 300 $N(+12)$	1 x v_{SD} ; 0 x Y 2 x v_{SD} ; 2 x Y data see [1], Fig. 33

Multifunctional device

with the following modes:

- copier
- scanner
- printer

high colour fidelity in copier mode

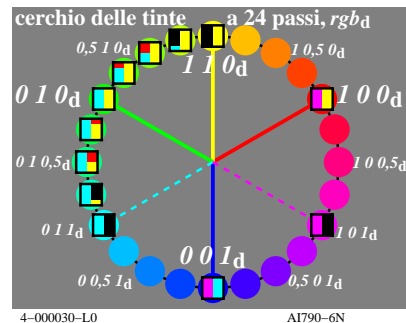
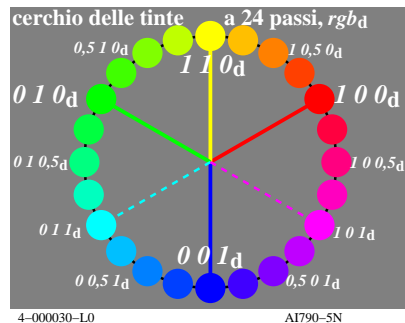
$$LCh^* \rightarrow rgb \rightarrow rgb^* \rightarrow rgb^* \rightarrow L$$
[illegible]

user wish

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user wis

AI790-3N

Offset *rgb** input data and *LCh** output data

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

(data according to test chart DIN 33872-2, p. 9-12,
(CIELAB hue angles according to CIE R1-47)

9 step offset colours in CIELAB colour space

ICC encoding space

$LCh^*_W = 95, 0, 0$ $(C^*_{ab}, L^*) = (142, 100)$

$rgb^*_W = 1, 1, 1$ $h_{ab} = 26$

White W

CIELAB lightness L^*

$I^* = 75$

9 steps

9 steps

red R

$LCh^*_R = 47, 74, 26$

$rgb^*_R = 1, 0, 0$

Black N

$LCh^*_N = 18, 0, 0$

$rgb^*_N = 0, 0, 0$

$C^*_{ab} = 37$

100

CIELAB chroma C^*_{ab}

$rgb^*_F = 0.75, 0.25, 0$

AI790-7N

Output – Input – Output: A loop for relative colour fidelity

**ISO reference file
with 729 rgb data
device output
linearization**

image processing
digital → analog
hardware
printer, offset
display, projector
*rgb** → *LCh*

LCh*
visual test
elementary hue (Y
equal spacing (Y/N
use colours in
column *b* to *j*

 rgb^*

image process
digital -> digital
software
ICC Look_Up
table or similar
*rgb -> rgb**

input
linearization
 $rgb \rightarrow rgb^*$

immettere: w/rgb/cmyk -> w/rgb/cmyk
uscita: nessun cambiamento

grafico TUB-AI79; Examples of colour metric
User coordinates and device calibration