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

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

$$X = X_n\,[\,(L^*+16)/116 + a^*/500\,]^3$$
$$Y = Y_n\,[\,(L^*+16)/116\,]^3$$
$$Z = Z_n\,[\,(L^*+16)/116 - b^*/200\,]^3$$

AS790−1N

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

scaling function of **light metrics:**
$\boldsymbol{Q\,[k(x-u]} = Q[k(\log L - \log L_u)]$

$\log L \to \log P$ **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: $\boldsymbol{Q\,[k(\,x - u + p)]}$

AS790−2N

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

	reference: device colours $R_{d,sRGB}$	$Y_{d,sRGB}$	$G_{d,sRGB}$	$B_{d,sRGB}$	NOTES 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 *rgb* 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 *cmy0* 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 R_e	Y_e	G_e	B_e	**NOTES 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 *rgb* 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 *cmy0* 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

3−000030−L0 AS791−3N

Multifunctional device

with the following modes:
- **copier**
- **scanner**
- **printer**

high colour fidelity in copier mode
LCh* −> rgb −> rgb* −> rgb* −> LCh*

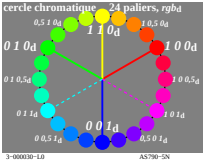
scanner → user wish: rgb−>rgb* → printer → user wish: rgb* −> LCh*

lower colour fidelity

File output rgb rgb* → File input rgb rgb*

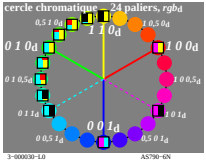
AS790−3N

cercle chromatique 24 paliers, *rgb*d



3−000030−L0 AS790−5N

cercle chromatique 24 paliers, *rgb*d



3−000030−L0 AS790−6N

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

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

*rgb**

image process digital −> analog **hardware** printer, offset, display, projector ***rgb* −> LCh****

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

LCh*

image process analog −> digital **hardware** colour scanner, colour camera ***LCh* −> rgb***

input linearization rgb−>rgb*

rgb

visual test elementary hue (Y/N)? equal spacing (Y/N)? use colours in colum *b* to *j*

AS791−7N

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

Color	*rgb**	*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)
(CIELAB hue angles according to CIE R1−47)

9 step offset colours in CIELAB colour space

ICC encoding space
$LCh^*_W = 95, 0, 0$
$rgb^*_W = 1, 1, 1$
CIELAB lightness L^* (C^*_{ab}, L^*) =(142, 100)
White *W* 100
h_{ab}= 26
$I^* = 75$
9 steps
9 steps
9 steps
red *R* $LCh^*_R = 47, 74, 26$
9 steps $rgb^*_R = 1, 0, 0$
Black *N* $LCh^*_N = 18, 0, 0$
$rgb^*_N = 0, 0, 0$
$C^*_{ab} = 37$
100
rgb^*_Y =0,75, 0,25, 0 CIELAB chroma C^*_{ab}

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entrée: *w/rgb/cmyk* −> *w/rgb/cmyk*_
sortie: aucun changement