see similar files: http://farbe.li.tu-berlin.de/DE78/DE78.HTM
technical information: http://farbe.li.tu-berlin.de/ or http://130.149.60.45/~farbmetrik/

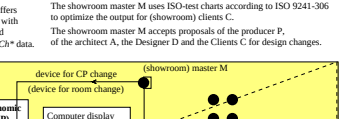
Designers and users: Ergonomic management of colour material in a virtual showroom
ISO-Ergonomics of human-systems interaction − Field assessment methods for electronic visual displays
For ISO-test charts according to ISO 9241-306:2018 see: http://standards.iso.org/iso/306/ed-2/index.html

● (material) producer (P)

For applications he offers a colour palette (CP) with the linearly connected *rgb** and CIELAB *LCh** data.

General goal of a visual showroom
The showroom master M uses ISO-test charts according to ISO 9241-306 to optimize the output for (showroom) clients C.

The showroom master M accepts proposals of the producer P, of the architect A, the Designer D and the Clients C for design changes.



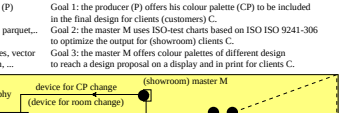
If the example is a house, the showroom master M shows his visual room view for the showroom clients.
The showroom master M can walk from room to room, and change a given wall paper or a given textile of a sofa.

DE780−3N

Ergonomic management of colour material in a virtual showroom based on ISO 9241-306:2018
Ergonomics of human-systems interaction − Field assessment methods for electronic visual displays
For ISO-test charts see: http://standards.iso.org/iso/306/ed-2/index.html

● (material) producer (P)
with texture:
textiles, wall paper, parquet,..
without texture:
color system samples, vector graphic, web design, ...

Goal 1: the producer (P) offers his colour palette (CP) to be included in the final design for clients (customers) C.
Goal 2: the master M uses ISO-test charts based on ISO ISO 9241-306 to optimize the output for (showroom) clients C.
Goal 3: the master M offers colour palettes of different design to reach a design proposal on a display and in print for clients C.



Goal:
ergonomic outputs

● (internet) observer (O) display
● (internet) observer (O) printer or print device

DE780−7N

Output linearization method *OLM16* for the *Ergonomic Colour Processor (ECP)* in a virtual showroom
Use test chart according to ISO 9241-306:2018: http://standards.iso.org/iso/306/ed-2/AE49/AE49F0PX_CY8_1.PDF
For example the display, the printer or the offset-print output of this ISO-test chart is measured in CIELAB *LAB**.

Example: An *Ergonomic Colour Processor ECP* has produced the *Relative Elementary Colour System RECS*.
The colour-image technology is based on PS operators of the *Adobe PostScript Language Reference Manuel, 1990*.

standard PS operators:
rgb setrgbcolor*
w setgray*
cmyn setcmykcolor*
000n setcmykcolor*
user defined PS operators:
LAB setcolor*
LCh setcolor*
nce setcolor*
standard image operators:
rgb colorimage*
cmyn colorimage*

visual relations: *"1-minus"*
$r^*=1-c^*$, $g^*=1-m^*$, $b^*=1-y^*$
if $(r^*=g^*=b^*)$ *then* $w^*=r^*$
if $(c^*=m^*=y^*$ *and* $n^*=0)$
then $(n^*=c^*)$
defined linear relations: $L_{1,2,3}$
$rgb^* = L_1(LAB^*$ or $LCh^*)$
$rgb^* = L_2(lab^*$ or $lch^*)$
$rgb^* = L_3(nce^*)$

Calculation by *OLM16*:
$rgb_d = F(rgb^*)$ *(d=device)*
$cmyk_d = G(rgb^*)$

Production file of the *RECS*, size A0=8xA4
http://farbe.li.tu-berlin.de/A/Fe46/10L/L46e00FP.PDF
http://farbe.li.tu-berlin.de/A/Fe46/10L/L46e00FP.PS
The *PostScript Frame File (PSFF)* steers the eight A4-graphic pages within the A0 page.
The *PSFF* includes in the PS program code:
1. the *LAB** measurement data of 1080 samples in line 76 to 1105.
2. the PS program code to calculate the device data rgb_d and $cmyn_d$.
3. all graphic files with 16-step colour scales.
The PDF output shows on 15 pages 16-step scales, separations, and colour data of table.

For relations of different colour data defined by *rgb* / nce** and *LAB* / LCh** according to DIN 33872-1 to -6, see
http://farbe.li.tu-berlin.de/A/D33872-AE.PDF and http://farbe.li.tu-berlin.de/A/33872E.html

Elementary colour *rgb**

	*rgb**	*nce**	*LAB**	*LCh**	rgb_d	$cmyn_d$	ΔE^*_{ab}
R_e Red	1,0 0,0 0,0	0,0 1,0 0,00	47 67 32	47 74 26	1,00 0,00 0,16	0,00 1,00 0,84 0,00	0,?
$R_{0,6}$ blackish Red	0,5 0,0 0,0	0,5 0,5 0,00	33 34 16	33 37 26	0,47 0,00 0,09	0,00 0,85 0,69 0,53	0,?
$R_{0,6}$ whitish Red	1,0 0,5 0,5	0,0 0,5 0,00	74 27 24	74 37 26	1,00 0,49 0,62	0,00 0,51 0,38 0,00	0,3?
Y_e Yellow	1,0 1,0 0,0	0,0 1,0 0,25	85 −3 84	85 84 92	1,00 0,91 0,00	0,00 0,09 1,00 0,00	0,?
W White	1,0 1,0 1,0	0,0 0,0 0,00	94 0 0	94 0 0	1,00 1,00 1,00	0,00 0,00 0,00 0,00	0,?
Z mean Grey	0,5 0,5 0,5	0,5 0,0 0,00	57 0 0	57 0 0	0,43 0,42 0,41	0,00 0,01 0,03 0,57	0,?

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Output − Input − Output: A loop for relative colour fidelity with the visual *rgb and *LCh** CIELAB data**

Produce a reference test chart with 729 CIELAB colours or buy one, or use PG4311L of *Colour and Colour Vision*, see http://standards.iso.org/iso/9241/306/ed-2/ES15.PDF

Example: Linearized output in offset print
Output linearization produces for 729=9·9·9*rgb* input data the 729 *LCh** CIELAB output colours. Use the file http://standards.iso.org/iso/9241/306/ed-2/AE49/AE49F0PX_CY8_1.PDF

Use the OLM16 method for output linearization, see
http://farbe.li.tu-berlin.de/OUTLIN16_01.PDF

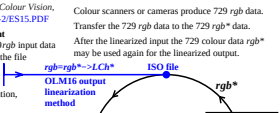
produce a Table *rgb* −> *rgb** for 729=9·9·9 colours
apply a method to transfer any value *rgb* −> *rgb** for 256·256·256 (16 million) colours

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

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)

Use reference test chart with 729 CIELAB colours
Colour scanners or cameras produce 729 *rgb* data.
Transfer the 729 *rgb* data to the 729 *rgb** data.
After the linearized input the 729 colour data *rgb** may be used again for the linearized output.



DE781−7N

TUB registration: 20190201-DE78/DE78L0N1.TXT /.PS
application for measurement of display or print output

TUB material: code=ha4ta

TUB-test chart DE78; Virtual showroom technology
Ergonomic colour processor ECP in applications

input: *w/rgb/cmyk* −> *w/rgb/cmyk*
output: no change