

Input: Colorimetric Television Luminous System TLS00a

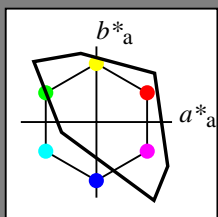
with *rgb* data of the  
four elementary hues

1 0 0 = Red  $R_e$

1 1 0 = Yellow  $Y_e$

0 1 0 = Green  $G_e$

0 0 1 = Blue  $B_e$



	$L^*=L^*_a$	$a^*_a$	$b^*_a$	$C^*_{ab,a}$	$h^*_{ab,a}$
O <sub>Ma</sub>	50.5	76.92	64.55	100.42	40
Y <sub>Ma</sub>	92.66	-20.69	90.75	93.08	103
L <sub>Ma</sub>	83.63	-82.75	79.9	115.04	136
C <sub>Ma</sub>	86.88	-46.16	-13.55	48.12	196
V <sub>Ma</sub>	30.39	76.06	-103.59	128.52	306
M <sub>Ma</sub>	57.3	94.35	-58.41	110.97	328
N <sub>Ma</sub>	0.01	0.0	0.0	0.0	0
W <sub>Ma</sub>	95.41	0.0	0.0	0.0	0
R <sub>CIE</sub>	39.92	58.74	27.99	65.07	25
J <sub>CIE</sub>	81.26	-2.88	71.56	71.62	92
G <sub>CIE</sub>	52.23	-42.41	13.6	44.55	162
B <sub>CIE</sub>	30.57	1.41	-46.46	46.49	272

Output: Colorimetric Television Luminous System TLS00a

with hue number

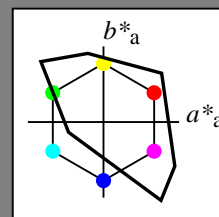
$n = 00$  to 19

00 = Red  $R_e$

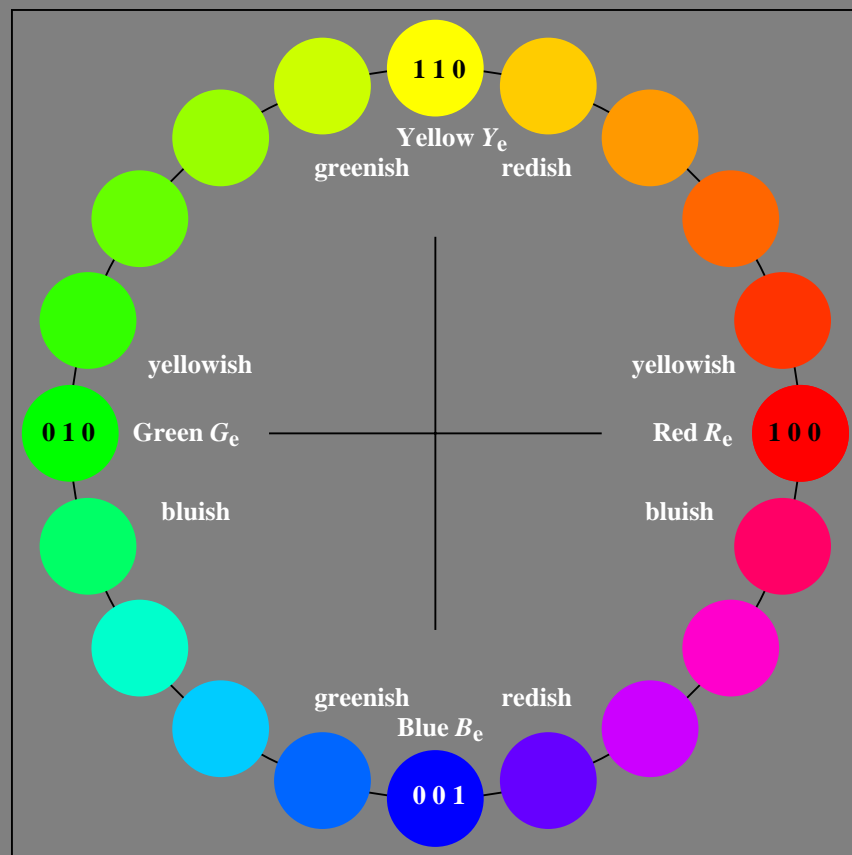
05 = Yellow  $Y_e$

10 = Green  $G_e$

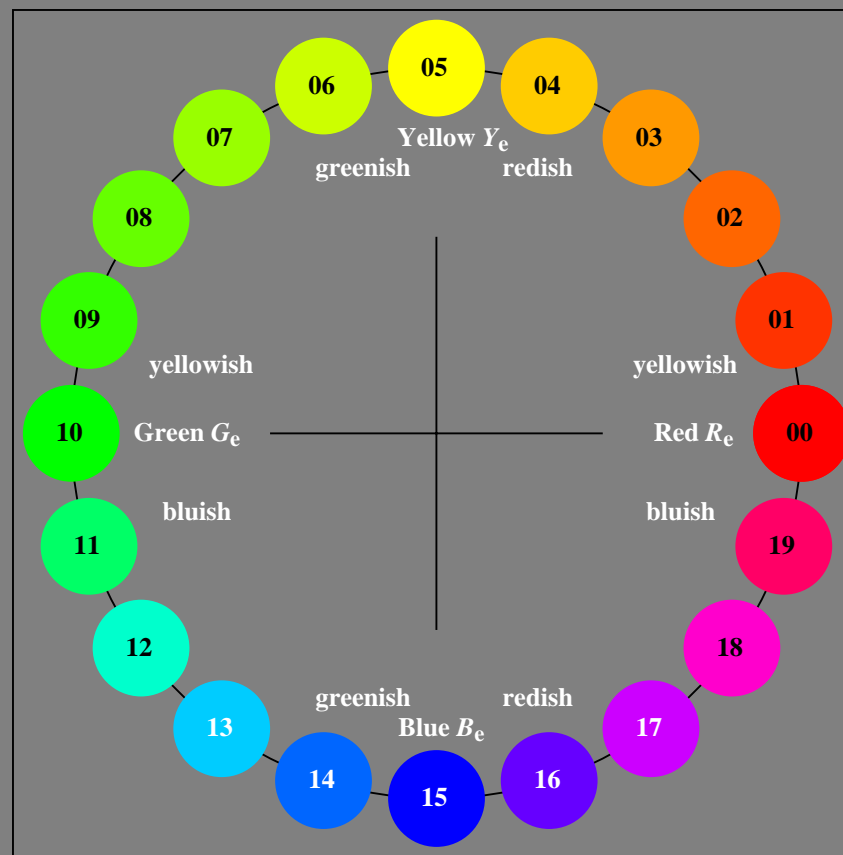
15 = Blue  $B_e$



	$L^*=L^*_a$	$a^*_a$	$b^*_a$	$C^*_{ab,a}$	$h^*_{ab,a}$
O <sub>Ma</sub>	50.5	76.92	64.55	100.42	40
Y <sub>Ma</sub>	92.66	-20.69	90.75	93.08	103
L <sub>Ma</sub>	83.63	-82.75	79.9	115.04	136
C <sub>Ma</sub>	86.88	-46.16	-13.55	48.12	196
V <sub>Ma</sub>	30.39	76.06	-103.59	128.52	306
M <sub>Ma</sub>	57.3	94.35	-58.41	110.97	328
N <sub>Ma</sub>	0.01	0.0	0.0	0.0	0
W <sub>Ma</sub>	95.41	0.0	0.0	0.0	0
R <sub>CIE</sub>	39.92	58.74	27.99	65.07	25
J <sub>CIE</sub>	81.26	-2.88	71.56	71.62	92
G <sub>CIE</sub>	52.23	-42.41	13.6	44.55	162
B <sub>CIE</sub>	30.57	1.41	-46.46	46.49	272



AE390-7N-100-0: 20 step hue circle with 4 elementary colours  $R_e$ ,  $Y_e$ ,  $G_e$ ,  $B_e$  (left)



20 step hue circle with 4 elementary colours  $R_e$ ,  $Y_e$ ,  $G_e$ ,  $B_e$  (right)

Test chart AE39 similar to test chart 1 of DIN 33872-5

20 step elementary hue circle; Test chart according to DIN 33872-5

input: *rgb/cmy0/000n/w set...*

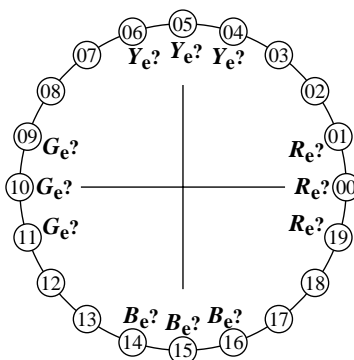
output: *->rgb<sub>dd</sub> setrgbcolor*

TUB Registration: 20190301-AE39/AE39L0FA.TXT /.PS  
application for measurement or viewing of display and print output

TUB material: code=rha4ta

### Agreement with elementary hues (Yes/No decision)

Layout example: Agreement with elementary hues.



There are four elementary hues on each page:  
Red  $R_e$ , Yellow  $Y_e$ , Green  $G_e$ , and Blue  $B_e$

Input data 1 0 0 may produce: Red  $R_e$ .  
Input data 0 1 0 may produce: Green  $G_e$ .  
Input data 0 0 1 may produce: Blue  $B_e$ .  
Input data 1 1 0 may produce: Yellow  $Y_e$ .

The elementary hues Red  $R_e$  and Green  $G_e$   
should locate on the horizontal axis.

The elementary hues Yellow  $Y_e$  and Blue  $B_e$   
should locate on the vertical axis.

This test uses a hue circle with 20 hues.

No. 00 and 10 should be Red  $R_e$  and Green  $G_e$ .  
No. 05 and 15 should be Yellow  $Y_e$  and Blue  $B_e$ .

Are no. 00, 05, 10, and 15 the four elementary hues  $R_e$ ,  $Y_e$ ,  $G_e$  and  $B_e$ ? underline: Yes/No  
Only in case of "No":

Elementary Red  $R_e$  is hue step no. (e. g. 00, 01, 19) ..... (neither yellowish nor blueish)  
Elementary Yellow  $Y_e$  is hue step no. (e. g. 05, 04, 06) ..... (neither reddish nor greenish)  
Elementary Green  $G_e$  is hue step no. (e. g. 10, 09, 11) ..... (neither yellowish nor blueish)  
Elementary Blau  $B_e$  is hue step no. (e. g. 15, 14, 16) ..... (neither reddish nor greenish)

**Result:** Of the 4 elementary hues (e.g. three) ..... are at the intended location.

part 1,

AE390-3dd: 01001

### Documentation of file format, hardware and software for this test:

#### PDF file:

[http://farbe.li.tu-berlin.de/AE39/AE39F0PX\\_CY8\\_1.PDF](http://farbe.li.tu-berlin.de/AE39/AE39F0PX_CY8_1.PDF)

underline: Yes/No

#### PS file:

[http://farbe.li.tu-berlin.de/AE39/AE39F0PX\\_CY8\\_1.PS](http://farbe.li.tu-berlin.de/AE39/AE39F0PX_CY8_1.PS)

underline: Yes/No

#### Used computer operating system:

either one of Windows/Mac/Unix/other and version:.....

This evaluation is for the output: underline: monitor/data projector/printer

Device model, driver and version:.....

#### output with PDF/PS-file:

underline: PDF/PS file

#### For output with PDF file AE39F0PX\_CY8\_1.PDF

either PDF-file transfer "download, copy" to PDF device.....  
or with computer system interpretation by "Display-PDF":.....  
or with software e. g. Adobe-Reader/-Acrobat and version:.....  
or with software e. g. Ghostscript and version:.....

#### For output with PS file AE39F0PX\_CY8\_1.PS

either PS-file transfer "download, copy" to PS device.....  
or with computer system interpretation by "Display-PS":.....  
or with software e. g. Ghostscript and version:.....  
or with software e. g. Mac-Yap and version:.....

Special remarks: e. g. output of Landscape (L)

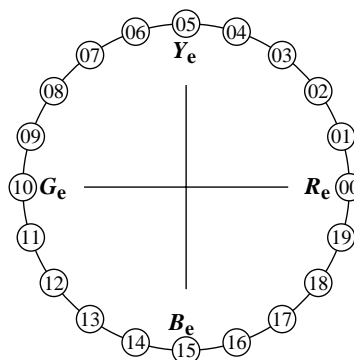
.....  
.....  
.....

part 3,

AE390-7dd: 01001

### Discriminability of colours with 20 hues (Yes/No decision)

Layout example: Discriminability of colours with 20 hues.



There are four elementary hues on each page:  
Red  $R_e$ , Yellow  $Y_e$ , Green  $G_e$ , and Blue  $B_e$

Input data 1 0 0 may produce: Red  $R_e$ .  
Input data 0 1 0 may produce: Green  $G_e$ .  
Input data 0 0 1 may produce: Blue  $B_e$ .  
Input data 1 1 0 may produce: Yellow  $Y_e$ .

Four hue steps are between:  
Red  $R_e$  and Yellow  $Y_e$ , Yellow  $Y_e$  and Green  $G_e$ .  
Green  $G_e$  and Blue  $B_e$ , Blue  $B_e$  and Red  $R_e$ .

This test uses a hue circle with 20 hues.  
All 20 hues should be distinguishable.

For this test it is **not** necessary:

1. All 20 differences are visually equal.
2. Elementary hues locate at 00, 05, 10, and 15.

Are all 20 colours of the 20 hues distinguishable?

underline: Yes/No

Only in case of "No":

The colours of the two hue steps no. (e. g. 00 and 01) .....are not distinguishable.  
The colours of the two hue steps no. (e. g. 14 and 15) .....are not distinguishable.  
The colours of the two hue steps no. (e. g. 15 and 16) .....are not distinguishable.  
List other pairs: .....

**Result:** Of the 20 hue differences are (e.g. 18) ..... differences visible.

part 2,

AE391-3dd: 01001

### Documentation of assessor colour-vision properties for visual assessment

The assessor has **normal** colour vision according to one test:  
either according to DIN 6160:1996 with Anomaloskop of Nagel  
or with test charts using colour points according to Ishihara  
or tested with, please specify: .....

underline: Yes/No

underline: Yes/unknown

underline: Yes/unknown

underline: Yes/unknown

### For visual evaluation of the display (Monitor, data projector) output

Office workplace illumination is daylight (clouded/north sky)

underline: Yes/No

PDF file: [http://farbe.li.tu-berlin.de/AE39/AE39F0PX\\_CY8\\_3.PDF](http://farbe.li.tu-berlin.de/AE39/AE39F0PX_CY8_3.PDF)

underline: Yes/No

PS file: [http://farbe.li.tu-berlin.de/AE39/AE39F0PX\\_CY8\\_3.PS](http://farbe.li.tu-berlin.de/AE39/AE39F0PX_CY8_3.PS)

underline: Yes/No

picture A7dd contrast range: (>F:0) (F:0) (E:0) (D:0) (C:0) (A:0) (9:0) (7:0) (5:0) (3:0) (<3:0)

compare standard print output according to ISO/IEC 15775 with range F:0

underline: Yes/No

Remark: In daylighted offices the contrast range is in many cases:

on display between: >F:0 and E:0 (monitor), D:0 and 3:0 (data projector)

### Only for optional colorimetric specification with PDF/PS file output

PDF file: [http://farbe.li.tu-berlin.de/AE39/AE39F0PX\\_CY8\\_3.PDF](http://farbe.li.tu-berlin.de/AE39/AE39F0PX_CY8_3.PDF)

underline: Yes/No

picture A7dd

underline: Yes/No

PS file: [http://farbe.li.tu-berlin.de/AE39/AE39F0PX\\_CY8\\_3.PS](http://farbe.li.tu-berlin.de/AE39/AE39F0PX_CY8_3.PS)

underline: Yes/No

picture A7dd

or underline: Yes/No

### colour measurement and specification for:

CIE standard illuminant D65, 2 degree observer, CIE 45/0 geometry:

underline: Yes/No

If No, please give other parameters: .....

Colorimetric specification for 17 step colours of <http://farbe.li.tu-berlin.de/OE70/OE70L1NP.PDF>

Exchange of CIELAB data in file <http://farbe.li.tu-berlin.de/AE82/AE82L0NP.TXT> and transfer

of the PS file AE82L0NP.PS (= .TXT) to the PDF-file AE82L0NP.PDF

underline: Yes/No

If No, please describe other method: .....

part 4,

AE391-7dd: 01001

Form A: Test chart AE39 similar to test chart 1 of DIN 33872-5  
20 step elementary hue circle; Test chart according to DIN 33872-5

input: *rgb/cmy0/000n/w set...*  
output: *->rgb<sub>dd</sub> setrgbcolor*

TUB Registration: 20190301-AE39/AE39L0FA.TXT /.PS  
application for measurement or viewing of display and print output

TUB material: code=th4ta

see similar files: <http://farbe.li.tu-berlin.de/AE39/AE39F0PX.PDF> / .PS; 3D-linearization, page 3/24  
technical information: <http://farbe.li.tu-berlin.de/AE39/AE39LF0PX.PDF> / .PS in file (F)

TUB Registration: 20190301-AE39/AE39L0FA.TXT /.PS  
application for measurement or viewing of display and print output  
TUB material: code=th4ta

i	LAB* <sub>ref</sub>	L* <sub>out</sub>	LAB* <sub>out</sub>	LAB* <sub>out-ref</sub>	ΔE*
1	0,00	0,00	0,00	0,00	0,01
2	6,36	0,00	0,06	0,00	0,01
3	12,72	0,00	0,13	0,00	0,01
4	19,08	0,00	0,20	0,00	0,01
5	25,44	0,00	0,26	0,00	0,01
6	31,80	0,00	0,33	0,00	0,01
7	38,16	0,00	0,40	0,00	0,01
8	44,52	0,00	0,46	0,00	0,01
9	50,88	0,00	0,53	0,00	0,01
10	57,24	0,00	0,60	0,00	0,01
11	63,60	0,00	0,66	0,00	0,01
12	69,96	0,00	0,73	0,00	0,01
13	76,32	0,00	0,80	0,00	0,01
14	82,68	0,00	0,86	0,00	0,01
15	89,04	0,00	0,93	0,00	0,01
16	95,41	0,00	1,00	0,00	0,01
17	0,00	0,00	0,00	0,00	0,01
18	23,85	0,00	0,25	0,00	0,01
19	47,70	0,00	0,50	0,00	0,01
20	71,55	0,00	0,75	0,00	0,01
21	95,41	0,00	1,00	0,00	0,01

**Start output S1**  
**Specification according to**  
**ISO/IEC 15775 Annex G**  
**and DIN 33866-1 Annex G**

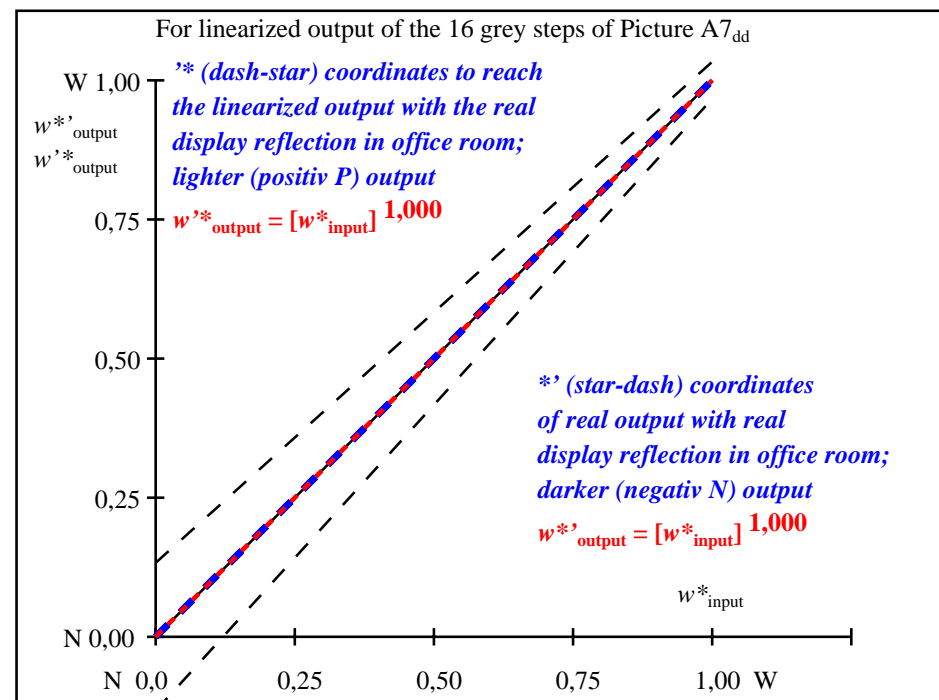
**Mean lightness difference**  
**(16 steps)**  
**ΔE\*<sub>CIELAB</sub> = 0,0**

**Mean lightness difference**  
**(5 steps)**  
**ΔL\*<sub>CIELAB</sub> = 0,0**

**Mean colour reproduction index: R\*<sub>ab,m</sub> = 99,9**

part 1,

AE390-3dd: 01002



part 2,

AE391-3dd: 01002

L*/Y <sub>intended</sub> (absolute)	0,0/0,0	6,3/0,7	12,7/1,5	19,0/2,7	25,4/4,5	31,8/6,9	38,1/10,1	44,5/14,2	50,8/19,1	57,2/25,1	63,6/32,3	69,9/40,7	76,3/50,4	82,6/61,5	89,0/74,2	95,4/88,5
0 0 0 n* setcmyk gp=1,000 No. and Hex code	00;F	01;E	02;D	03;C	04;B	05;A	06;9	07;8	08;7	09;6	10;5	11;4	12;3	13;2	14;1	15;0
w* = l* CIELAB, r (relative)	0,000	0,067	0,133	0,200	0,267	0,333	0,400	0,467	0,533	0,600	0,667	0,733	0,800	0,867	0,933	1,000
w* <sub>intended</sub>	0,000	0,067	0,133	0,200	0,267	0,333	0,400	0,467	0,533	0,600	0,667	0,733	0,800	0,867	0,933	1,000
w* <sub>output</sub>	0,000	0,067	0,133	0,200	0,267	0,333	0,400	0,467	0,533	0,600	0,667	0,733	0,800	0,867	0,933	1,000

part 3, picture A7<sub>dd</sub>: 16 visual equidistant L\*-grey steps; PS operator: 0 0 0 n\* setcmykcolor

AE390-7dd: 01002

In-out: Test chart AE39 similar to test chart 1 of DIN 33872-5  
Viewing Y contrast Y<sub>W</sub>:Y<sub>N</sub>=88,9:0,31; Y<sub>N</sub>-range 0,0 to <0,46

input: rgb/cmy0/000n/w set...  
output: ->rgb<sub>dd</sub> setrgbcolor

Input: Colorimetric Television Luminous System TLS00a

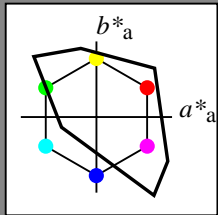
with *rgb* data of the  
four elementary hues

1 0 0 = Red  $R_e$

1 1 0 = Yellow  $Y_e$

0 1 0 = Green  $G_e$

0 0 1 = Blue  $B_e$



TLS00a; adapted (a) CIELAB data					
	$L^*=L^*_a$	$a^*_a$	$b^*_a$	$C^*_{ab,a}$	$h^*_{ab,a}$
O <sub>Ma</sub>	50.5	76.92	64.55	100.42	40
Y <sub>Ma</sub>	92.66	-20.69	90.75	93.08	103
L <sub>Ma</sub>	83.63	-82.75	79.9	115.04	136
C <sub>Ma</sub>	86.88	-46.16	-13.55	48.12	196
V <sub>Ma</sub>	30.39	76.06	-103.59	128.52	306
M <sub>Ma</sub>	57.3	94.35	-58.41	110.97	328
N <sub>Ma</sub>	0.01	0.0	0.0	0.0	0
W <sub>Ma</sub>	95.41	0.0	0.0	0.0	0
R <sub>CIE</sub>	39.92	58.74	27.99	65.07	25
J <sub>CIE</sub>	81.26	-2.88	71.56	71.62	92
G <sub>CIE</sub>	52.23	-42.41	13.6	44.55	162
B <sub>CIE</sub>	30.57	1.41	-46.46	46.49	272

Output: Colorimetric Television Luminous System TLS00a

with hue number

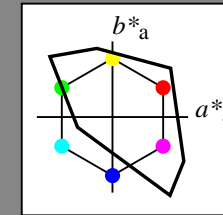
$n = 00$  to 19

00 = Red  $R_e$

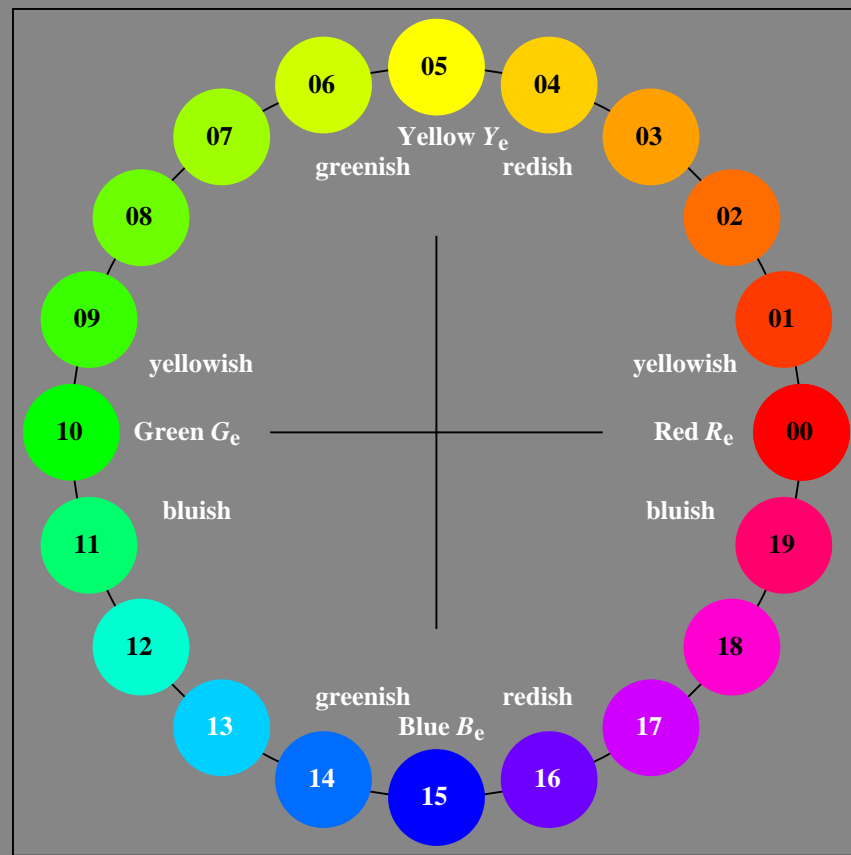
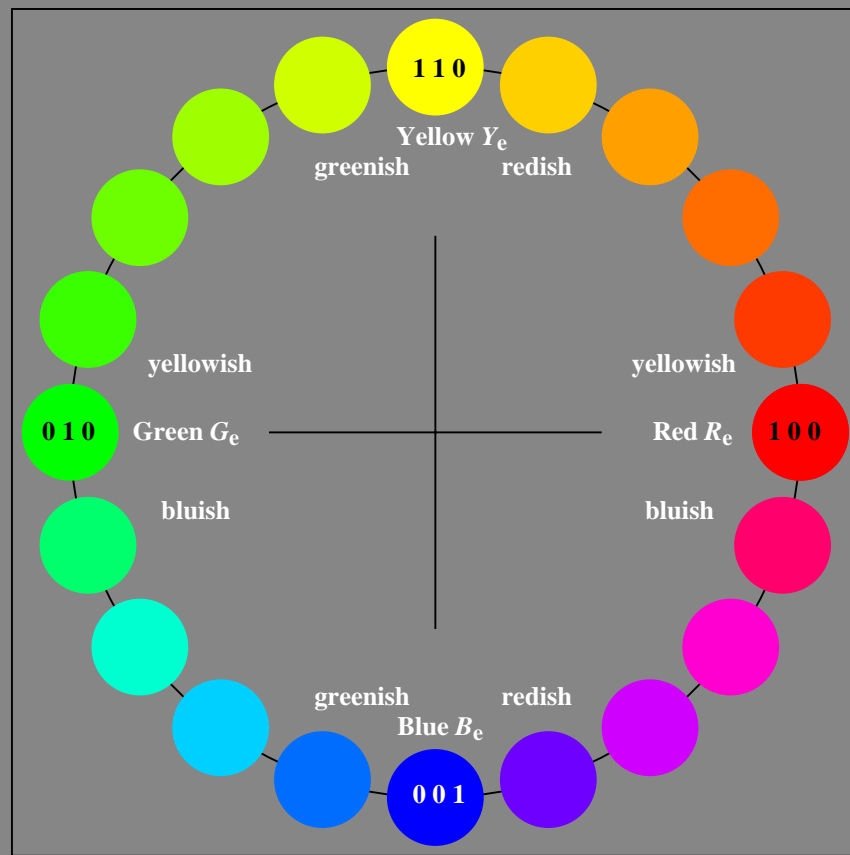
05 = Yellow  $Y_e$

10 = Green  $G_e$

15 = Blue  $B_e$



TLS00a; adapted (a) CIELAB data					
	$L^*=L^*_a$	$a^*_a$	$b^*_a$	$C^*_{ab,a}$	$h^*_{ab,a}$
O <sub>Ma</sub>	50.5	76.92	64.55	100.42	40
Y <sub>Ma</sub>	92.66	-20.69	90.75	93.08	103
L <sub>Ma</sub>	83.63	-82.75	79.9	115.04	136
C <sub>Ma</sub>	86.88	-46.16	-13.55	48.12	196
V <sub>Ma</sub>	30.39	76.06	-103.59	128.52	306
M <sub>Ma</sub>	57.3	94.35	-58.41	110.97	328
N <sub>Ma</sub>	0.01	0.0	0.0	0.0	0
W <sub>Ma</sub>	95.41	0.0	0.0	0.0	0
R <sub>CIE</sub>	39.92	58.74	27.99	65.07	25
J <sub>CIE</sub>	81.26	-2.88	71.56	71.62	92
G <sub>CIE</sub>	52.23	-42.41	13.6	44.55	162
B <sub>CIE</sub>	30.57	1.41	-46.46	46.49	272



AE390-7N-101-0: 20 step hue circle with 4 elementary colours  $R_e$ ,  $Y_e$ ,  $G_e$ ,  $B_e$  (left)

20 step hue circle with 4 elementary colours  $R_e$ ,  $Y_e$ ,  $G_e$ ,  $B_e$  (right)

Test chart AE39 similar to test chart 1 of DIN 33872-5

20 step elementary hue circle; Test chart according to DIN 33872-5

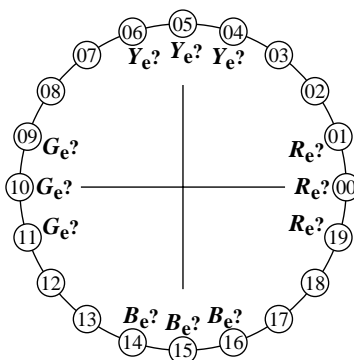
input: *rgb/cmy0/000n/w* set...

output:  $\rightarrow$  *rgb<sub>dd</sub> setrgbcolor*



### Agreement with elementary hues (Yes/No decision)

Layout example: Agreement with elementary hues.



There are four elementary hues on each page:  
Red  $R_e$ , Yellow  $Y_e$ , Green  $G_e$ , and Blue  $B_e$

Input data 1 0 0 may produce: Red  $R_e$ .  
Input data 0 1 0 may produce: Green  $G_e$ .  
Input data 0 0 1 may produce: Blue  $B_e$ .  
Input data 1 1 0 may produce: Yellow  $Y_e$ .

The elementary hues Red  $R_e$  and Green  $G_e$   
should locate on the horizontal axis.

The elementary hues Yellow  $Y_e$  and Blue  $B_e$   
should locate on the vertical axis.

This test uses a hue circle with 20 hues.

No. 00 and 10 should be Red  $R_e$  and Green  $G_e$ .  
No. 05 and 15 should be Yellow  $Y_e$  and Blue  $B_e$ .

Are no. 00, 05, 10, and 15 the four elementary hues  $R_e$ ,  $Y_e$ ,  $G_e$  and  $B_e$ ? underline: Yes/No  
Only in case of "No":

Elementary Red  $R_e$  is hue step no. (e. g. 00, 01, 19) ..... (neither yellowish nor blueish)  
Elementary Yellow  $Y_e$  is hue step no. (e. g. 05, 04, 06) ..... (neither reddish nor greenish)  
Elementary Green  $G_e$  is hue step no. (e. g. 10, 09, 11) ..... (neither yellowish nor blueish)  
Elementary Blau  $B_e$  is hue step no. (e. g. 15, 14, 16) ..... (neither reddish nor greenish)

**Result:** Of the 4 elementary hues (e.g. three) ..... are at the intended location.

part 1,

AE390-3dd: 01011

### Documentation of file format, hardware and software for this test:

#### PDF file:

[http://farbe.li.tu-berlin.de/AE39/AE39F0PX\\_CY7\\_1.PDF](http://farbe.li.tu-berlin.de/AE39/AE39F0PX_CY7_1.PDF)

underline: Yes/No

#### PS file:

[http://farbe.li.tu-berlin.de/AE39/AE39F0PX\\_CY7\\_1.PS](http://farbe.li.tu-berlin.de/AE39/AE39F0PX_CY7_1.PS)

underline: Yes/No

#### Used computer operating system:

either one of Windows/Mac/Unix/other and version:.....

This evaluation is for the output: underline: monitor/data projector/printer

Device model, driver and version:.....

#### output with PDF/PS-file:

underline: PDF/PS file

#### For output with PDF file AE39F0PX\_CY7\_1.PDF

either PDF-file transfer "download, copy" to PDF device.....  
or with computer system interpretation by "Display-PDF":.....  
or with software e. g. Adobe-Reader/-Acrobat and version:.....  
or with software e. g. Ghostscript and version:.....

#### For output with PS file AE39F0PX\_CY7\_1.PS

either PS-file transfer "download, copy" to PS device.....  
or with computer system interpretation by "Display-PS":.....  
or with software e. g. Ghostscript and version:.....  
or with software e. g. Mac-Yap and version:.....

Special remarks: e. g. output of Landscape (L)

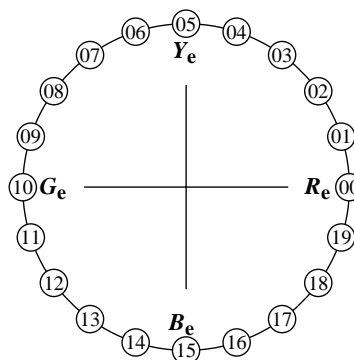
.....  
.....  
.....

part 3,

AE390-7dd: 01011

### Discriminability of colours with 20 hues (Yes/No decision)

Layout example: Discriminability of colours with 20 hues.



There are four elementary hues on each page:  
Red  $R_e$ , Yellow  $Y_e$ , Green  $G_e$ , and Blue  $B_e$

Input data 1 0 0 may produce: Red  $R_e$ .  
Input data 0 1 0 may produce: Green  $G_e$ .  
Input data 0 0 1 may produce: Blue  $B_e$ .  
Input data 1 1 0 may produce: Yellow  $Y_e$ .

Four hue steps are between:  
Red  $R_e$  and Yellow  $Y_e$ , Yellow  $Y_e$  and Green  $G_e$ ,  
Green  $G_e$  and Blue  $B_e$ , Blue  $B_e$  and Red  $R_e$ .

This test uses a hue circle with 20 hues.  
All 20 hues should be distinguishable.

For this test it is **not** necessary:

1. All 20 differences are visually equal.
2. Elementary hues locate at 00, 05, 10, and 15.

Are all 20 colours of the 20 hues distinguishable?

underline: Yes/No

Only in case of "No":

The colours of the two hue steps no. (e. g. 00 and 01) .....are not distinguishable.  
The colours of the two hue steps no. (e. g. 14 and 15) .....are not distinguishable.  
The colours of the two hue steps no. (e. g. 15 and 16) .....are not distinguishable.  
List other pairs: .....

**Result:** Of the 20 hue differences are (e.g. 18) ..... differences visible.

part 2,

AE391-3dd: 01011

### Documentation of assessor colour-vision properties for visual assessment

The assessor has **normal** colour vision according to one test:  
either according to DIN 6160:1996 with Anomaloskop of Nagel  
or with test charts using colour points according to Ishihara  
or tested with, please specify: .....

underline: Yes/No

underline: Yes/unknown

underline: Yes/unknown

underline: Yes/unknown

### For visual evaluation of the display (Monitor, data projector) output

Office workplace illumination is daylight (clouded/north sky)

underline: Yes/No

PDF file: [http://farbe.li.tu-berlin.de/AE39/AE39F0PX\\_CY7\\_3.PDF](http://farbe.li.tu-berlin.de/AE39/AE39F0PX_CY7_3.PDF)

underline: Yes/No

PS file: [http://farbe.li.tu-berlin.de/AE39/AE39F0PX\\_CY7\\_3.PS](http://farbe.li.tu-berlin.de/AE39/AE39F0PX_CY7_3.PS)

underline: Yes/No

picture A7dd contrast range: (>F:0) (F:0) (E:0) (D:0) (C:0) (A:0) (9:0) (7:0) (5:0) (3:0) (<3:0)

compare standard print output according to ISO/IEC 15775 with range F:0

underline: Yes/No

Remark: In daylighted offices the contrast range is in many cases:

on display between: >F:0 and E:0 (monitor), D:0 and 3:0 (data projector)

### Only for optional colorimetric specification with PDF/PS file output

PDF file: [http://farbe.li.tu-berlin.de/AE39/AE39F0PX\\_CY7\\_3.PDF](http://farbe.li.tu-berlin.de/AE39/AE39F0PX_CY7_3.PDF)

underline: Yes/No

picture A7dd

underline: Yes/No

PS file: [http://farbe.li.tu-berlin.de/AE39/AE39F0PX\\_CY7\\_3.PS](http://farbe.li.tu-berlin.de/AE39/AE39F0PX_CY7_3.PS)

underline: Yes/No

picture A7dd

or underline: Yes/No

### colour measurement and specification for:

CIE standard illuminant D65, 2 degree observer, CIE 45/0 geometry:

underline: Yes/No

If No, please give other parameters: .....

Colorimetric specification for 17 step colours of <http://farbe.li.tu-berlin.de/OE70/OE70L1NP.PDF>

Exchange of CIELAB data in file <http://farbe.li.tu-berlin.de/AE82/AE82L0NP.TXT> and transfer

of the PS file AE82L0NP.PS (= .TXT) to the PDF-file AE82L0NP.PDF

underline: Yes/No

If No, please describe other method: .....

part 4,

AE391-7dd: 01011

Form A: Test chart AE39 similar to test chart 1 of DIN 33872-5  
20 step elementary hue circle; Test chart according to DIN 33872-5

input:  $rgb/cmy0/000n/w$  set...  
output:  $->rgb_{dd}$  set $rgbc$ olor

see similar files: <http://farbe.li.tu-berlin.de/AE39/AE39F0PX.PDF> / .PS; 3D-linearization, page 6/24  
technical information: <http://farbe.li.tu-berlin.de/AE39/AE39LF0PX.PDF> / .PS in file (F)

i	LAB* <sub>ref</sub>	L* <sub>out</sub>	LAB* <sub>out</sub>	LAB* <sub>out-ref</sub>	ΔE*
1	5,69 0,00 0,00	0,00	5,69 0,00 0,00	0,00 0,00 0,00	0,01
2	11,67 0,00 0,00	0,10	14,73 0,00 0,00	3,05 0,00 0,00	3,05
3	17,65 0,00 0,00	0,18	21,95 0,00 0,00	4,30 0,00 0,00	4,30
4	23,63 0,00 0,00	0,25	28,62 0,00 0,00	4,99 0,00 0,00	4,99
5	29,61 0,00 0,00	0,32	34,96 0,00 0,00	5,34 0,00 0,00	5,34
6	35,59 0,00 0,00	0,39	41,05 0,00 0,00	5,45 0,00 0,00	5,45
7	41,57 0,00 0,00	0,46	46,96 0,00 0,00	5,38 0,00 0,00	5,38
8	47,55 0,00 0,00	0,52	52,72 0,00 0,00	5,16 0,00 0,00	5,16
9	53,54 0,00 0,00	0,58	58,35 0,00 0,00	4,81 0,00 0,00	4,81
10	59,52 0,00 0,00	0,64	63,88 0,00 0,00	4,36 0,00 0,00	4,36
11	65,50 0,00 0,00	0,70	69,31 0,00 0,00	3,81 0,00 0,00	3,81
12	71,48 0,00 0,00	0,76	74,67 0,00 0,00	3,18 0,00 0,00	3,18
13	77,46 0,00 0,00	0,82	79,95 0,00 0,00	2,48 0,00 0,00	2,48
14	83,44 0,00 0,00	0,88	85,16 0,00 0,00	1,71 0,00 0,00	1,71
15	89,42 0,00 0,00	0,94	90,31 0,00 0,00	0,88 0,00 0,00	0,88
16	95,41 0,00 0,00	1,00	95,41 0,00 0,00	0,00 0,00 0,00	0,01
17	5,69 0,00 0,00	0,00	5,69 0,00 0,00	0,00 0,00 0,00	0,01
18	28,12 0,00 0,00	0,30	33,40 0,00 0,00	5,28 0,00 0,00	5,28
19	50,55 0,00 0,00	0,55	55,55 0,00 0,00	5,00 0,00 0,00	5,00
20	72,98 0,00 0,00	0,78	75,99 0,00 0,00	3,01 0,00 0,00	3,01
21	95,41 0,00 0,00	1,00	95,41 0,00 0,00	0,00 0,00 0,00	0,01

**Start output S1**  
**Specification according to**  
**ISO/IEC 15775 Annex G**  
**and DIN 33866-1 Annex G**

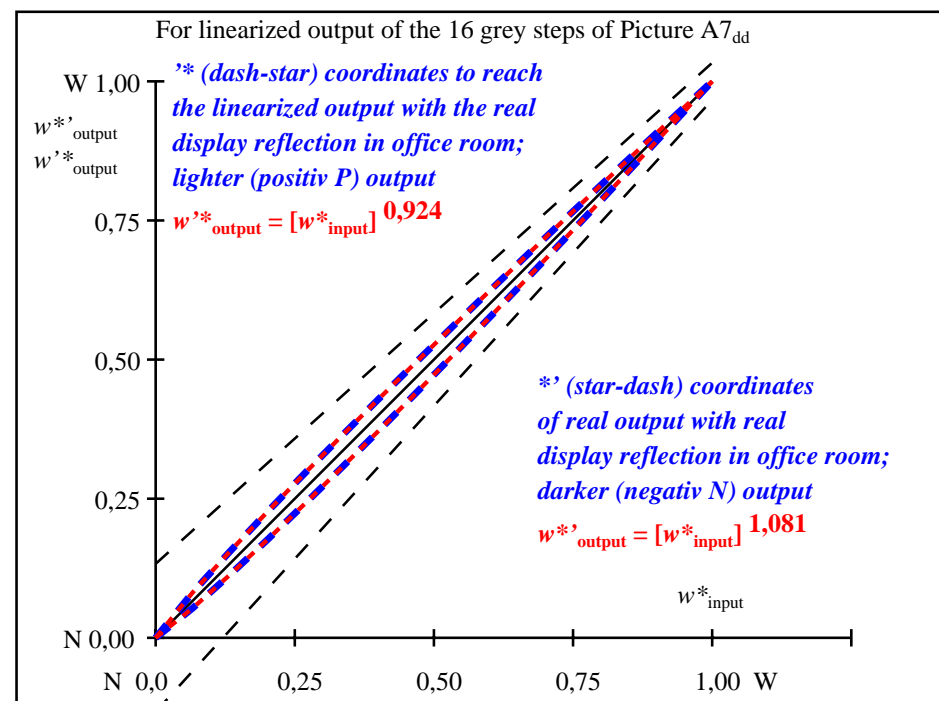
**Mean lightness difference**  
**(16 steps)**  
 $\Delta E^*_{\text{CIELAB}} = 3,4$

**Mean lightness difference**  
**(5 steps)**  
 $\Delta L^*_{\text{CIELAB}} = 2,6$

**Mean colour reproduction index:  $R^*_{\text{ab,m}} = 85,0$**

part 1,

AE390-3dd: 01012



part 2,

AE391-3dd: 01012

$L^*/Y_{\text{intended}}$ (absolute)	5,6/0,6	11,6/1,3	17,6/2,4	23,6/3,9	29,6/6,0	35,5/8,8	41,5/12,2	47,5/16,4	53,5/21,5	59,5/27,5	65,5/34,6	71,4/42,8	77,4/52,3	83,4/63,0	89,4/75,0	95,4/88,5
0 0 0 n*																
setcmyk																
gp=0,924																
No. and																
Hex code																
$w^* = l^*_{\text{CIELAB}, r}$ (relative)																
$w^*_{\text{intended}}$	0,000	0,067	0,133	0,200	0,267	0,333	0,400	0,467	0,533	0,600	0,667	0,733	0,800	0,867	0,933	1,000
$w^*_{\text{output}}$	0,000	0,082	0,154	0,225	0,294	0,361	0,428	0,494	0,558	0,623	0,687	0,750	0,813	0,876	0,937	1,000

part 3, picture A7<sub>dd</sub>: 16 visual equidistant  $L^*$ -grey steps; PS operator: 0 0 0 n\* setcmykcolor

AE390-7dd: 01012

In-out: Test chart AE39 similar to test chart 1 of DIN 33872-5  
Viewing  $Y$  contrast  $Y_W:Y_N=88,9:0,62$ ;  $Y_N$ -range 0,46 to <0,93

input:  $rgb/cmy0/000n/w$  set...  
output:  $\rightarrow rgb_{\text{dd}}$  setrgbcolor

TUB Registration: 20190301-AE39/AE39L0FA.TXT /.PS  
application for measurement or viewing of display and print output  
TUB material: code=th4ta

Input: Colorimetric Television Luminous System TLS00a

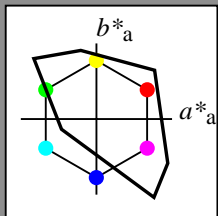
with *rgb* data of the  
four elementary hues

1 0 0 = Red  $R_e$

1 1 0 = Yellow  $Y_e$

0 1 0 = Green  $G_e$

0 0 1 = Blue  $B_e$



TLS00a; adapted (a) CIELAB data					
$L^*=L^*_a$	$a^*_a$	$b^*_a$	$C^*_{ab,a}$	$h^*_{ab,a}$	
O <sub>Ma</sub> 50.5	76.92	64.55	100.42	40	
Y <sub>Ma</sub> 92.66	-20.69	90.75	93.08	103	
L <sub>Ma</sub> 83.63	-82.75	79.9	115.04	136	
C <sub>Ma</sub> 86.88	-46.16	-13.55	48.12	196	
V <sub>Ma</sub> 30.39	76.06	-103.59	128.52	306	
M <sub>Ma</sub> 57.3	94.35	-58.41	110.97	328	
N <sub>Ma</sub> 0.01	0.0	0.0	0.0	0	
W <sub>Ma</sub> 95.41	0.0	0.0	0.0	0	
R <sub>CIE</sub> 39.92	58.74	27.99	65.07	25	
J <sub>CIE</sub> 81.26	-2.88	71.56	71.62	92	
G <sub>CIE</sub> 52.23	-42.41	13.6	44.55	162	
B <sub>CIE</sub> 30.57	1.41	-46.46	46.49	272	

Output: Colorimetric Television Luminous System TLS00a

with hue number

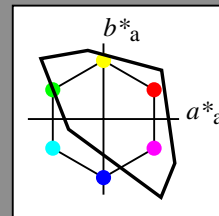
$n = 00$  to 19

00 = Red  $R_e$

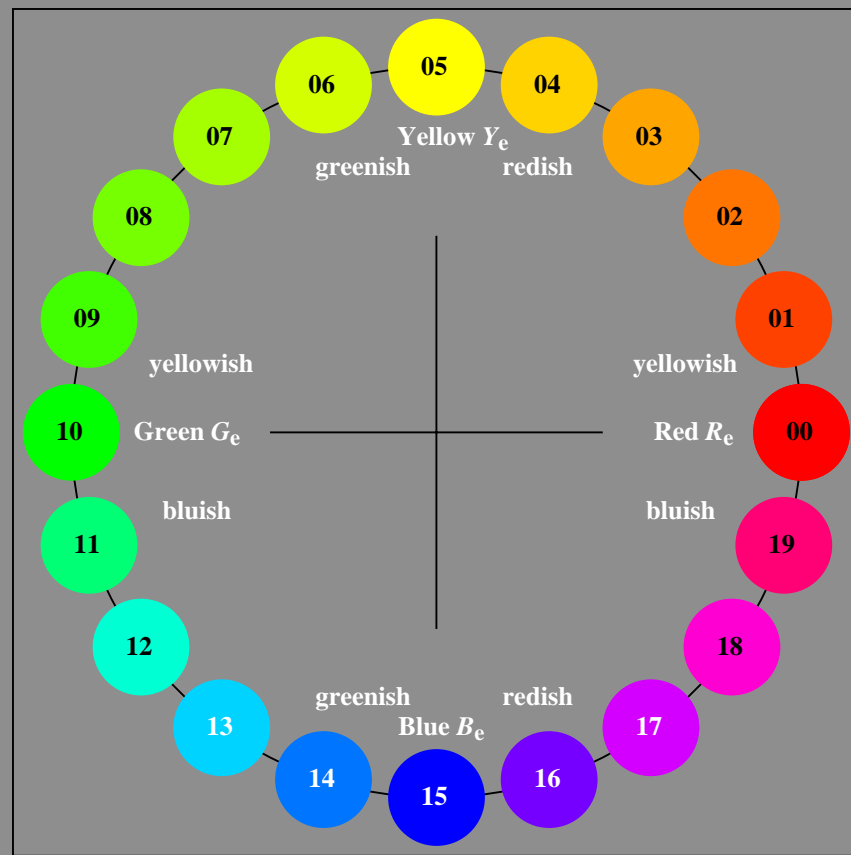
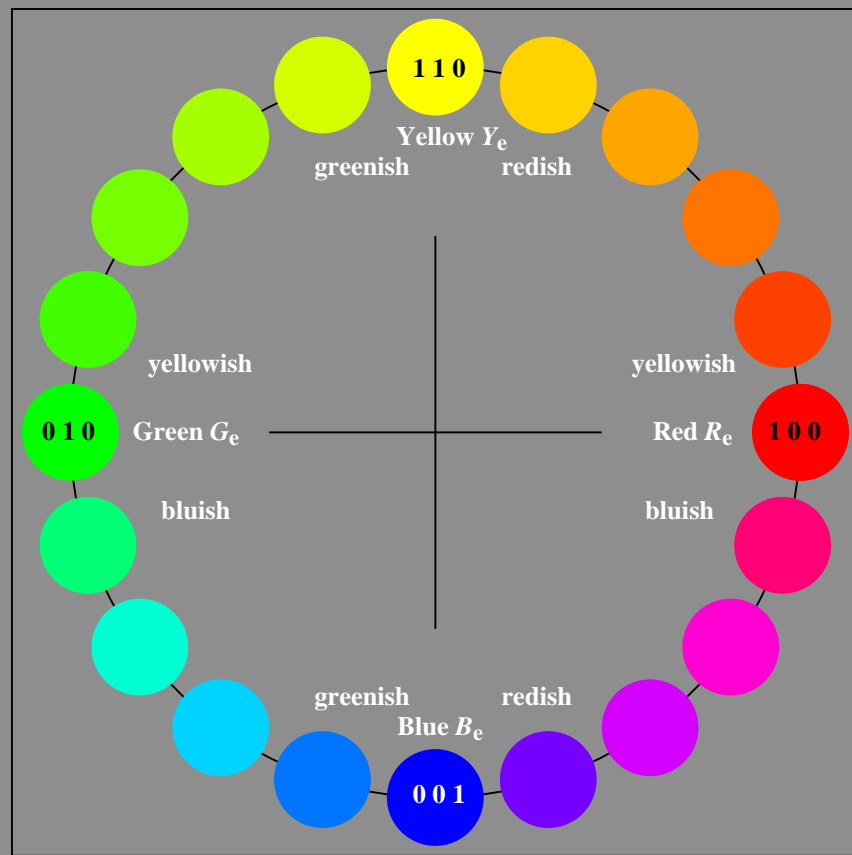
05 = Yellow  $Y_e$

10 = Green  $G_e$

15 = Blue  $B_e$



TLS00a; adapted (a) CIELAB data					
$L^*=L^*_a$	$a^*_a$	$b^*_a$	$C^*_{ab,a}$	$h^*_{ab,a}$	
O <sub>Ma</sub> 50.5	76.92	64.55	100.42	40	
Y <sub>Ma</sub> 92.66	-20.69	90.75	93.08	103	
L <sub>Ma</sub> 83.63	-82.75	79.9	115.04	136	
C <sub>Ma</sub> 86.88	-46.16	-13.55	48.12	196	
V <sub>Ma</sub> 30.39	76.06	-103.59	128.52	306	
M <sub>Ma</sub> 57.3	94.35	-58.41	110.97	328	
N <sub>Ma</sub> 0.01	0.0	0.0	0.0	0	
W <sub>Ma</sub> 95.41	0.0	0.0	0.0	0	
R <sub>CIE</sub> 39.92	58.74	27.99	65.07	25	
J <sub>CIE</sub> 81.26	-2.88	71.56	71.62	92	
G <sub>CIE</sub> 52.23	-42.41	13.6	44.55	162	
B <sub>CIE</sub> 30.57	1.41	-46.46	46.49	272	



AE390-7N-102-0: 20 step hue circle with 4 elementary colours  $R_e$ ,  $Y_e$ ,  $G_e$ ,  $B_e$  (left)

20 step hue circle with 4 elementary colours  $R_e$ ,  $Y_e$ ,  $G_e$ ,  $B_e$  (right)

Test chart AE39 similar to test chart 1 of DIN 33872-5

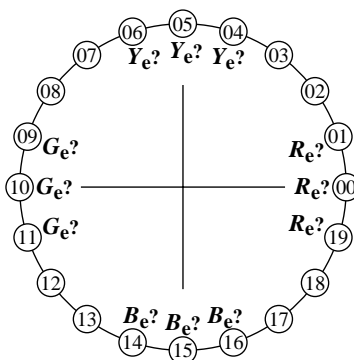
20 step elementary hue circle; Test chart according to DIN 33872-5

input: *rgb/cmy0/000n/w set...*

output: *->rgb<sub>dd</sub> setrgbcolor*

### Agreement with elementary hues (Yes/No decision)

Layout example: Agreement with elementary hues.



There are four elementary hues on each page:  
Red  $R_e$ , Yellow  $Y_e$ , Green  $G_e$ , and Blue  $B_e$

Input data 1 0 0 may produce: Red  $R_e$ .  
Input data 0 1 0 may produce: Green  $G_e$ .  
Input data 0 0 1 may produce: Blue  $B_e$ .  
Input data 1 1 0 may produce: Yellow  $Y_e$ .

The elementary hues Red  $R_e$  and Green  $G_e$   
should locate on the horizontal axis.

The elementary hues Yellow  $Y_e$  and Blue  $B_e$   
should locate on the vertical axis.

This test uses a hue circle with 20 hues.

No. 00 and 10 should be Red  $R_e$  and Green  $G_e$ .  
No. 05 and 15 should be Yellow  $Y_e$  and Blue  $B_e$ .

Are no. 00, 05, 10, and 15 the four elementary hues  $R_e$ ,  $Y_e$ ,  $G_e$  and  $B_e$ ? underline: Yes/No  
Only in case of "No":

Elementary Red  $R_e$  is hue step no. (e. g. 00, 01, 19) ..... (neither yellowish nor blueish)  
Elementary Yellow  $Y_e$  is hue step no. (e. g. 05, 04, 06) ..... (neither reddish nor greenish)  
Elementary Green  $G_e$  is hue step no. (e. g. 10, 09, 11) ..... (neither yellowish nor blueish)  
Elementary Blau  $B_e$  is hue step no. (e. g. 15, 14, 16) ..... (neither reddish nor greenish)

**Result:** Of the 4 elementary hues (e.g. three) ..... are at the intended location.

part 1,

AE390-3dd: 01021

### Documentation of file format, hardware and software for this test:

#### PDF file:

[http://farbe.li.tu-berlin.de/AE39/AE39F0PX\\_CY6\\_1.PDF](http://farbe.li.tu-berlin.de/AE39/AE39F0PX_CY6_1.PDF)

underline: Yes/No

#### PS file:

[http://farbe.li.tu-berlin.de/AE39/AE39F0PX\\_CY6\\_1.PS](http://farbe.li.tu-berlin.de/AE39/AE39F0PX_CY6_1.PS)

underline: Yes/No

#### Used computer operating system:

either one of Windows/Mac/Unix/other and version:.....

This evaluation is for the output: underline: monitor/data projector/printer

Device model, driver and version:.....

#### output with PDF/PS-file:

underline: PDF/PS file

#### For output with PDF file AE39F0PX\_CY6\_1.PDF

either PDF-file transfer "download, copy" to PDF device.....  
or with computer system interpretation by "Display-PDF":.....  
or with software e. g. Adobe-Reader/-Acrobat and version:.....  
or with software e. g. Ghostscript and version:.....

#### For output with PS file AE39F0PX\_CY6\_1.PS

either PS-file transfer "download, copy" to PS device.....  
or with computer system interpretation by "Display-PS":.....  
or with software e. g. Ghostscript and version:.....  
or with software e. g. Mac-Yap and version:.....

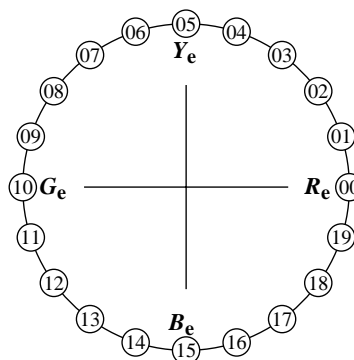
Special remarks: e. g. output of Landscape (L)

part 3,

AE390-7dd: 01021

### Discriminability of colours with 20 hues (Yes/No decision)

Layout example: Discriminability of colours with 20 hues.



There are four elementary hues on each page:  
Red  $R_e$ , Yellow  $Y_e$ , Green  $G_e$ , and Blue  $B_e$

Input data 1 0 0 may produce: Red  $R_e$ .  
Input data 0 1 0 may produce: Green  $G_e$ .  
Input data 0 0 1 may produce: Blue  $B_e$ .  
Input data 1 1 0 may produce: Yellow  $Y_e$ .

Four hue steps are between:  
Red  $R_e$  and Yellow  $Y_e$ , Yellow  $Y_e$  and Green  $G_e$ ,  
Green  $G_e$  and Blue  $B_e$ , Blue  $B_e$  and Red  $R_e$ .

This test uses a hue circle with 20 hues.  
All 20 hues should be distinguishable.

For this test it is **not** necessary:

1. All 20 differences are visually equal.
2. Elementary hues locate at 00, 05, 10, and 15.

Are all 20 colours of the 20 hues distinguishable?

underline: Yes/No

Only in case of "No":

The colours of the two hue steps no. (e. g. 00 and 01) .....are not distinguishable.  
The colours of the two hue steps no. (e. g. 14 and 15) .....are not distinguishable.  
The colours of the two hue steps no. (e. g. 15 and 16) .....are not distinguishable.  
List other pairs: .....

**Result:** Of the 20 hue differences are (e.g. 18) ..... differences visible.

part 2,

AE391-3dd: 01021

### Documentation of assessor colour-vision properties for visual assessment

The assessor has **normal** colour vision according to one test:  
either according to DIN 6160:1996 with Anomaloskop of Nagel  
or with test charts using colour points according to Ishihara  
or tested with, please specify: .....

underline: Yes/No

underline: Yes/unknown

underline: Yes/unknown

underline: Yes/unknown

### For visual evaluation of the display (Monitor, data projector) output

Office workplace illumination is daylight (clouded/north sky)

underline: Yes/No

PDF file: [http://farbe.li.tu-berlin.de/AE39/AE39F0PX\\_CY6\\_3.PDF](http://farbe.li.tu-berlin.de/AE39/AE39F0PX_CY6_3.PDF)

underline: Yes/No

PS file: [http://farbe.li.tu-berlin.de/AE39/AE39F0PX\\_CY6\\_3.PS](http://farbe.li.tu-berlin.de/AE39/AE39F0PX_CY6_3.PS)

underline: Yes/No

picture A7dd contrast range: (>F:0) (F:0) (E:0) (D:0) (C:0) (A:0) (9:0) (7:0) (5:0) (3:0) (<3:0)

compare standard print output according to ISO/IEC 15775 with range F:0

underline: Yes/No

Remark: In daylighted offices the contrast range is in many cases:

on display between: >F:0 and E:0 (monitor), D:0 and 3:0 (data projector)

### Only for optional colorimetric specification with PDF/PS file output

PDF file: [http://farbe.li.tu-berlin.de/AE39/AE39F0PX\\_CY6\\_3.PDF](http://farbe.li.tu-berlin.de/AE39/AE39F0PX_CY6_3.PDF)

underline: Yes/No

picture A7dd

underline: Yes/No

PS file: [http://farbe.li.tu-berlin.de/AE39/AE39F0PX\\_CY6\\_3.PS](http://farbe.li.tu-berlin.de/AE39/AE39F0PX_CY6_3.PS)

or underline: Yes/No

picture A7dd

or underline: Yes/No

### colour measurement and specification for:

CIE standard illuminant D65, 2 degree observer, CIE 45/0 geometry:

underline: Yes/No

If No, please give other parameters: .....

Colorimetric specification for 17 step colours of <http://farbe.li.tu-berlin.de/OE70/OE70L1NP.PDF>

Exchange of CIELAB data in file <http://farbe.li.tu-berlin.de/AE82/AE82L0NP.TXT> and transfer

of the PS file AE82L0NP.PS (= .TXT) to the PDF-file AE82L0NP.PDF

underline: Yes/No

If No, please describe other method: .....

part 4,

AE391-7dd: 01021

Form A: Test chart AE39 similar to test chart 1 of DIN 33872-5  
20 step elementary hue circle; Test chart according to DIN 33872-5

input: *rgb/cmy0/000n/w set...*  
output: *->rgb<sub>dd</sub> setrgbcolor*



see similar files: <http://farbe.li.tu-berlin.de/AE39/AE39F0PX.PDF> / .PS; 3D-linearization, page 9/24  
technical information: <http://farbe.li.tu-berlin.de/AE39/AE39LF0PX.PDF> / .PS in file (F)

i	LAB <sup>*</sup> <sub>ref</sub>	L <sup>*</sup> <sub>out</sub>	LAB <sup>*</sup> <sub>out</sub>	LAB <sup>*</sup> <sub>out-ref</sub>	ΔE <sup>*</sup>	Start output S1
1	10,99 0,00 0,00	0,00	10,99 0,00 0,00	0,00 0,00 0,00	0,01	Specification according to
2	16,62 0,00 0,00	0,13	22,51 0,00 0,00	5,89 0,00 0,00	5,89	ISO/IEC 15775 Annex G
3	22,24 0,00 0,00	0,22	30,17 0,00 0,00	7,93 0,00 0,00	7,93	and DIN 33866-1 Annex G
4	27,87 0,00 0,00	0,30	36,84 0,00 0,00	8,96 0,00 0,00	8,96	
5	33,50 0,00 0,00	0,37	42,93 0,00 0,00	9,42 0,00 0,00	9,42	
6	39,13 0,00 0,00	0,44	48,62 0,00 0,00	9,49 0,00 0,00	9,49	
7	44,75 0,00 0,00	0,50	54,02 0,00 0,00	9,26 0,00 0,00	9,26	
8	50,38 0,00 0,00	0,57	59,19 0,00 0,00	8,80 0,00 0,00	8,80	
9	56,01 0,00 0,00	0,62	64,16 0,00 0,00	8,15 0,00 0,00	8,15	
10	61,64 0,00 0,00	0,68	68,97 0,00 0,00	7,33 0,00 0,00	7,33	
11	67,27 0,00 0,00	0,74	73,64 0,00 0,00	6,37 0,00 0,00	6,37	
12	72,89 0,00 0,00	0,79	78,19 0,00 0,00	5,29 0,00 0,00	5,29	
13	78,52 0,00 0,00	0,84	82,63 0,00 0,00	4,10 0,00 0,00	4,10	
14	84,15 0,00 0,00	0,90	86,97 0,00 0,00	2,82 0,00 0,00	2,82	
15	89,78 0,00 0,00	0,95	91,23 0,00 0,00	1,45 0,00 0,00	1,45	
16	95,41 0,00 0,00	1,00	95,41 0,00 0,00	0,00 0,00 0,00	0,01	
17	10,99 0,00 0,00	0,00	10,99 0,00 0,00	0,00 0,00 0,00	0,01	
18	32,09 0,00 0,00	0,36	41,45 0,00 0,00	9,35 0,00 0,00	9,35	
19	53,20 0,00 0,00	0,60	61,70 0,00 0,00	8,50 0,00 0,00	8,50	
20	74,30 0,00 0,00	0,80	79,31 0,00 0,00	5,00 0,00 0,00	5,00	
21	95,41 0,00 0,00	1,00	95,41 0,00 0,00	0,00 0,00 0,00	0,01	

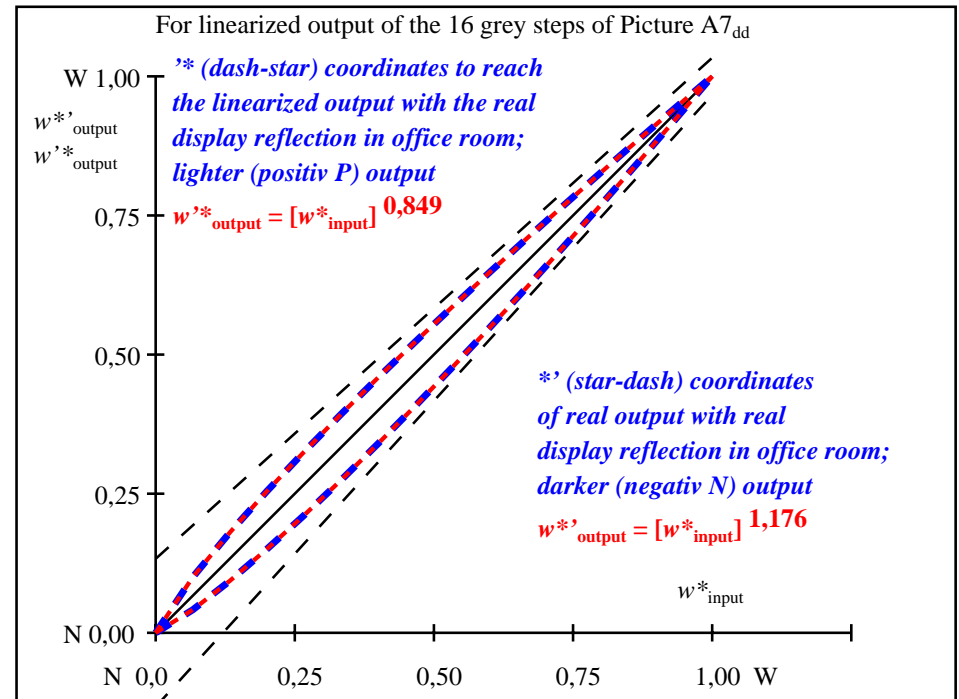
Mean lightness difference (16 steps)  
 $\Delta E^*_{\text{CIELAB}} = 5,9$

Mean lightness difference (5 steps)  
 $\Delta L^*_{\text{CIELAB}} = 4,5$

Mean colour reproduction index:  $R^*_{\text{ab,m}} = 74,1$

part 1,

AE390-3dd: 01022



AE391-3dd: 01022

$L^*/Y_{\text{intended}}$ (absolute)	10,9/1,2	16,6/2,2	22,2/3,5	27,8/5,4	33,5/7,7	39,1/10,7	44,7/14,3	50,3/18,7	56,0/23,9	61,6/29,9	67,2/36,9	72,8/45,0	78,5/54,1	84,1/64,3	89,7/75,8	95,4/88,5
0 0 0 n <sup>*</sup> setcmyk gp=0,849 No. and Hex code	00;F	01;E	02;D	03;C	04;B	05;A	06;9	07;8	08;7	09;6	10;5	11;4	12;3	13;2	14;1	15;0
$w^* = l^*_{\text{CIELAB}, r}$ (relative)	0,000	0,067	0,133	0,200	0,267	0,333	0,400	0,467	0,533	0,600	0,667	0,733	0,800	0,867	0,933	1,000
$w^*_{\text{intended}}$ $w^*_{\text{output}}$	0,000 0,000	0,067 0,100	0,133 0,180	0,200 0,254	0,267 0,325	0,333 0,392	0,400 0,458	0,467 0,523	0,533 0,585	0,600 0,647	0,667 0,708	0,733 0,767	0,800 0,827	0,867 0,885	0,933 0,942	1,000 1,000

part 3, picture A7<sub>dd</sub>: 16 visual equidistant  $L^*$ -grey steps; PS operator: 0 0 0 n<sup>\*</sup> setcmykcolor

AE390-7dd: 01022

In-out: Test chart AE39 similar to test chart 1 of DIN 33872-5  
Viewing  $Y$  contrast  $Y_W:Y_N=88,9:1,25$ ;  $Y_N$ -range 0,93 to <1,87

input:  $rgb/cmy0/000n/w$  set...  
output:  $->rgb_{\text{dd}}$  setrgbcolor

TUB Registration: 20190301-AE39/AE39L0FA.TXT /.PS  
application for measurement or viewing of display and print output  
TUB material: code=th4ta

Input: Colorimetric Television Luminous System TLS00a

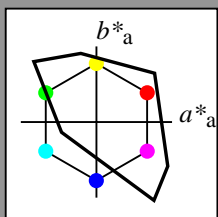
with *rgb* data of the  
four elementary hues

1 0 0 = Red  $R_e$

1 1 0 = Yellow  $Y_e$

0 1 0 = Green  $G_e$

0 0 1 = Blue  $B_e$



TLS00a; adapted (a) CIELAB data					
	$L^*=L^*_a$	$a^*_a$	$b^*_a$	$C^*_{ab,a}$	$h^*_{ab,a}$
O <sub>Ma</sub>	50.5	76.92	64.55	100.42	40
Y <sub>Ma</sub>	92.66	-20.69	90.75	93.08	103
L <sub>Ma</sub>	83.63	-82.75	79.9	115.04	136
C <sub>Ma</sub>	86.88	-46.16	-13.55	48.12	196
V <sub>Ma</sub>	30.39	76.06	-103.59	128.52	306
M <sub>Ma</sub>	57.3	94.35	-58.41	110.97	328
N <sub>Ma</sub>	0.01	0.0	0.0	0.0	0
W <sub>Ma</sub>	95.41	0.0	0.0	0.0	0
R <sub>CIE</sub>	39.92	58.74	27.99	65.07	25
J <sub>CIE</sub>	81.26	-2.88	71.56	71.62	92
G <sub>CIE</sub>	52.23	-42.41	13.6	44.55	162
B <sub>CIE</sub>	30.57	1.41	-46.46	46.49	272

Output: Colorimetric Television Luminous System TLS00a

with hue number

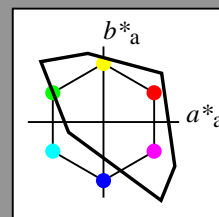
$n = 00$  to 19

00 = Red  $R_e$

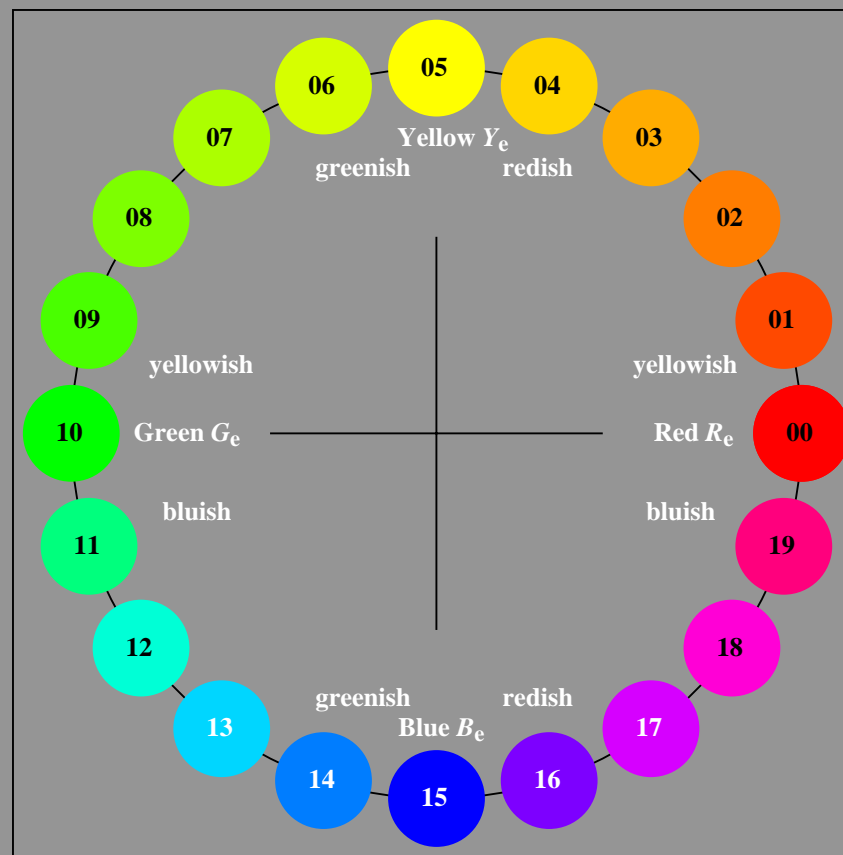
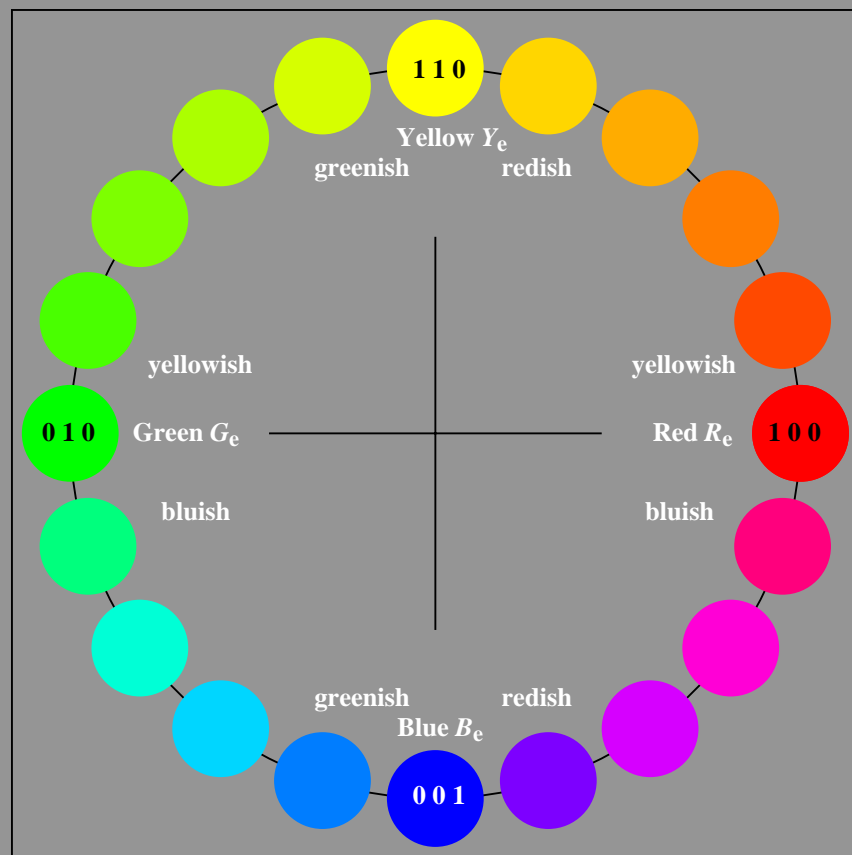
05 = Yellow  $Y_e$

10 = Green  $G_e$

15 = Blue  $B_e$



TLS00a; adapted (a) CIELAB data					
	$L^*=L^*_a$	$a^*_a$	$b^*_a$	$C^*_{ab,a}$	$h^*_{ab,a}$
O <sub>Ma</sub>	50.5	76.92	64.55	100.42	40
Y <sub>Ma</sub>	92.66	-20.69	90.75	93.08	103
L <sub>Ma</sub>	83.63	-82.75	79.9	115.04	136
C <sub>Ma</sub>	86.88	-46.16	-13.55	48.12	196
V <sub>Ma</sub>	30.39	76.06	-103.59	128.52	306
M <sub>Ma</sub>	57.3	94.35	-58.41	110.97	328
N <sub>Ma</sub>	0.01	0.0	0.0	0.0	0
W <sub>Ma</sub>	95.41	0.0	0.0	0.0	0
R <sub>CIE</sub>	39.92	58.74	27.99	65.07	25
J <sub>CIE</sub>	81.26	-2.88	71.56	71.62	92
G <sub>CIE</sub>	52.23	-42.41	13.6	44.55	162
B <sub>CIE</sub>	30.57	1.41	-46.46	46.49	272



AE390-7N-103-0: 20 step hue circle with 4 elementary colours  $R_e$ ,  $Y_e$ ,  $G_e$ ,  $B_e$  (left)

20 step hue circle with 4 elementary colours  $R_e$ ,  $Y_e$ ,  $G_e$ ,  $B_e$  (right)

Test chart AE39 similar to test chart 1 of DIN 33872-5

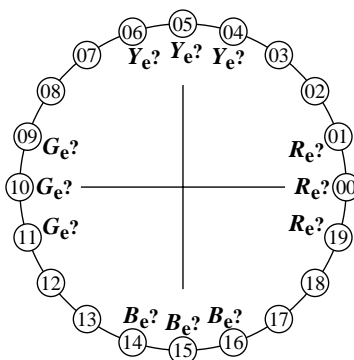
20 step elementary hue circle; Test chart according to DIN 33872-5

input: *rgb/cmy0/000n/w set...*

output: *->rgb<sub>dd</sub> setrgbcolor*

### Agreement with elementary hues (Yes/No decision)

Layout example: Agreement with elementary hues.



There are four elementary hues on each page:  
Red  $R_e$ , Yellow  $Y_e$ , Green  $G_e$ , and Blue  $B_e$

Input data 1 0 0 may produce: Red  $R_e$ .  
Input data 0 1 0 may produce: Green  $G_e$ .  
Input data 0 0 1 may produce: Blue  $B_e$ .  
Input data 1 1 0 may produce: Yellow  $Y_e$ .

The elementary hues Red  $R_e$  and Green  $G_e$   
should locate on the horizontal axis.

The elementary hues Yellow  $Y_e$  and Blue  $B_e$   
should locate on the vertical axis.

This test uses a hue circle with 20 hues.

No. 00 and 10 should be Red  $R_e$  and Green  $G_e$ .  
No. 05 and 15 should be Yellow  $Y_e$  and Blue  $B_e$ .

Are no. 00, 05, 10, and 15 the four elementary hues  $R_e$ ,  $Y_e$ ,  $G_e$  and  $B_e$ ? underline: Yes/No  
Only in case of "No":

Elementary Red  $R_e$  is hue step no. (e. g. 00, 01, 19) ..... (neither yellowish nor blueish)  
Elementary Yellow  $Y_e$  is hue step no. (e. g. 05, 04, 06) ..... (neither reddish nor greenish)  
Elementary Green  $G_e$  is hue step no. (e. g. 10, 09, 11) ..... (neither yellowish nor blueish)  
Elementary Blau  $B_e$  is hue step no. (e. g. 15, 14, 16) ..... (neither reddish nor greenish)

**Result:** Of the 4 elementary hues (e.g. three) ..... are at the intended location.

part 1,

AE390-3dd: 01031

### Documentation of file format, hardware and software for this test:

#### PDF file:

[http://farbe.li.tu-berlin.de/AE39/AE39F0PX\\_CY5\\_1.PDF](http://farbe.li.tu-berlin.de/AE39/AE39F0PX_CY5_1.PDF)

underline: Yes/No

#### PS file:

[http://farbe.li.tu-berlin.de/AE39/AE39F0PX\\_CY5\\_1.PS](http://farbe.li.tu-berlin.de/AE39/AE39F0PX_CY5_1.PS)

underline: Yes/No

#### Used computer operating system:

either one of Windows/Mac/Unix/other and version:.....

This evaluation is for the output: underline: monitor/data projector/printer

Device model, driver and version:.....

#### output with PDF/PS-file:

underline: PDF/PS file

#### For output with PDF file AE39F0PX\_CY5\_1.PDF

either PDF-file transfer "download, copy" to PDF device.....  
or with computer system interpretation by "Display-PDF":.....  
or with software e. g. Adobe-Reader/-Acrobat and version:.....  
or with software e. g. Ghostscript and version:.....

#### For output with PS file AE39F0PX\_CY5\_1.PS

either PS-file transfer "download, copy" to PS device.....  
or with computer system interpretation by "Display-PS":.....  
or with software e. g. Ghostscript and version:.....  
or with software e. g. Mac-Yap and version:.....

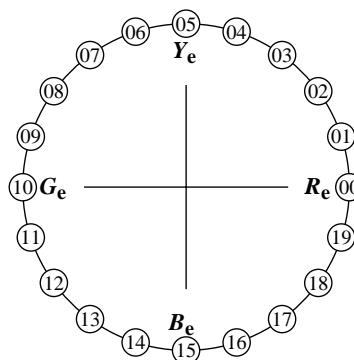
Special remarks: e. g. output of Landscape (L)

part 3,

AE390-7dd: 01031

### Discriminability of colours with 20 hues (Yes/No decision)

Layout example: Discriminability of colours with 20 hues.



There are four elementary hues on each page:  
Red  $R_e$ , Yellow  $Y_e$ , Green  $G_e$ , and Blue  $B_e$

Input data 1 0 0 may produce: Red  $R_e$ .  
Input data 0 1 0 may produce: Green  $G_e$ .  
Input data 0 0 1 may produce: Blue  $B_e$ .  
Input data 1 1 0 may produce: Yellow  $Y_e$ .

Four hue steps are between:  
Red  $R_e$  and Yellow  $Y_e$ , Yellow  $Y_e$  and Green  $G_e$ ,  
Green  $G_e$  and Blue  $B_e$ , Blue  $B_e$  and Red  $R_e$ .

This test uses a hue circle with 20 hues.  
All 20 hues should be distinguishable.

For this test it is **not** necessary:

1. All 20 differences are visually equal.
2. Elementary hues locate at 00, 05, 10, and 15.

Are all 20 colours of the 20 hues distinguishable?

underline: Yes/No

Only in case of "No":

The colours of the two hue steps no. (e. g. 00 and 01) .....are not distinguishable.  
The colours of the two hue steps no. (e. g. 14 and 15) .....are not distinguishable.  
The colours of the two hue steps no. (e. g. 15 and 16) .....are not distinguishable.  
List other pairs: .....

**Result:** Of the 20 hue differences are (e.g. 18) ..... differences visible.

part 2,

AE391-3dd: 01031

### Documentation of assessor colour-vision properties for visual assessment

The assessor has **normal** colour vision according to one test:  
either according to DIN 6160:1996 with Anomaloskop of Nagel  
or with test charts using colour points according to Ishihara  
or tested with, please specify: .....

underline: Yes/No

underline: Yes/unknown

underline: Yes/unknown

underline: Yes/unknown

### For visual evaluation of the display (Monitor, data projector) output

Office workplace illumination is daylight (clouded/north sky)

underline: Yes/No

PDF file: [http://farbe.li.tu-berlin.de/AE39/AE39F0PX\\_CY5\\_3.PDF](http://farbe.li.tu-berlin.de/AE39/AE39F0PX_CY5_3.PDF)

underline: Yes/No

PS file: [http://farbe.li.tu-berlin.de/AE39/AE39F0PX\\_CY5\\_3.PS](http://farbe.li.tu-berlin.de/AE39/AE39F0PX_CY5_3.PS)

underline: Yes/No

picture A7dd contrast range: (>F:0) (F:0) (E:0) (D:0) (C:0) (A:0) (9:0) (7:0) (5:0) (3:0) (<3:0)

compare standard print output according to ISO/IEC 15775 with range F:0

underline: Yes/No

Remark: In daylighted offices the contrast range is in many cases:

on display between: >F:0 and E:0 (monitor), D:0 and 3:0 (data projector)

### Only for optional colorimetric specification with PDF/PS file output

PDF file: [http://farbe.li.tu-berlin.de/AE39/AE39F0PX\\_CY5\\_3.PDF](http://farbe.li.tu-berlin.de/AE39/AE39F0PX_CY5_3.PDF)

underline: Yes/No

picture A7dd

underline: Yes/No

PS file: [http://farbe.li.tu-berlin.de/AE39/AE39F0PX\\_CY5\\_3.PS](http://farbe.li.tu-berlin.de/AE39/AE39F0PX_CY5_3.PS)

underline: Yes/No

picture A7dd

or underline: Yes/No

### colour measurement and specification for:

CIE standard illuminant D65, 2 degree observer, CIE 45/0 geometry:

underline: Yes/No

If No, please give other parameters: .....

Colorimetric specification for 17 step colours of <http://farbe.li.tu-berlin.de/OE70/OE70L1NP.PDF>

Exchange of CIELAB data in file <http://farbe.li.tu-berlin.de/AE82/AE82L0NP.TXT> and transfer

of the PS file AE82L0NP.PS (= .TXT) to the PDF-file AE82L0NP.PDF

underline: Yes/No

If No, please describe other method: .....

part 4,

AE391-7dd: 01031

Form A: Test chart AE39 similar to test chart 1 of DIN 33872-5  
20 step elementary hue circle; Test chart according to DIN 33872-5

input:  $rgb/cmy0/000n/w$  set...  
output:  $->rgb_{dd}$  set $rgbcolor$

see similar files: <http://farbe.li.tu-berlin.de/AE39/AE39F0PX.PDF> / .PS; 3D-linearization, page 12/24  
technical information: <http://farbe.li.tu-berlin.de/AE39/AE39LF0PX.PDF> / .PS in file (F)

TUB Registration: 20190301-AE39/AE39L0FA.TXT /.PS  
application for measurement or viewing of display and print output  
TUB material: code=th4ta

i	LAB* <sub>ref</sub>	L* <sub>out</sub>	LAB* <sub>out</sub>	LAB* <sub>out-ref</sub>	ΔE*
1	18,00 0,00 0,00	0,00	18,00 0,00 0,00	0,00 0,00 0,00	0,01
2	23,16 0,00 0,00	0,17	31,34 0,00 0,00	8,17 0,00 0,00	8,17
3	28,32 0,00 0,00	0,27	38,92 0,00 0,00	10,59 0,00 0,00	10,59
4	33,48 0,00 0,00	0,35	45,22 0,00 0,00	11,73 0,00 0,00	11,73
5	38,64 0,00 0,00	0,42	50,81 0,00 0,00	12,16 0,00 0,00	12,16
6	43,80 0,00 0,00	0,48	55,93 0,00 0,00	12,12 0,00 0,00	12,12
7	48,96 0,00 0,00	0,55	60,70 0,00 0,00	11,73 0,00 0,00	11,73
8	54,12 0,00 0,00	0,60	65,19 0,00 0,00	11,06 0,00 0,00	11,06
9	59,28 0,00 0,00	0,66	69,46 0,00 0,00	10,17 0,00 0,00	10,17
10	64,44 0,00 0,00	0,71	73,55 0,00 0,00	9,11 0,00 0,00	9,11
11	69,60 0,00 0,00	0,76	77,49 0,00 0,00	7,88 0,00 0,00	7,88
12	74,76 0,00 0,00	0,81	81,29 0,00 0,00	6,52 0,00 0,00	6,52
13	79,92 0,00 0,00	0,86	84,96 0,00 0,00	5,03 0,00 0,00	5,03
14	85,08 0,00 0,00	0,91	88,54 0,00 0,00	3,45 0,00 0,00	3,45
15	90,24 0,00 0,00	0,95	92,01 0,00 0,00	1,76 0,00 0,00	1,76
16	95,41 0,00 0,00	1,00	95,41 0,00 0,00	0,00 0,00 0,00	0,01
17	18,00 0,00 0,00	0,00	18,00 0,00 0,00	0,00 0,00 0,00	0,01
18	37,35 0,00 0,00	0,40	49,47 0,00 0,00	12,11 0,00 0,00	12,11
19	56,70 0,00 0,00	0,63	67,35 0,00 0,00	10,64 0,00 0,00	10,64
20	76,05 0,00 0,00	0,82	82,22 0,00 0,00	6,16 0,00 0,00	6,16
21	95,41 0,00 0,00	1,00	95,41 0,00 0,00	0,00 0,00 0,00	0,01

**Specification according to ISO/IEC 15775 Annex G and DIN 33866-1 Annex G**

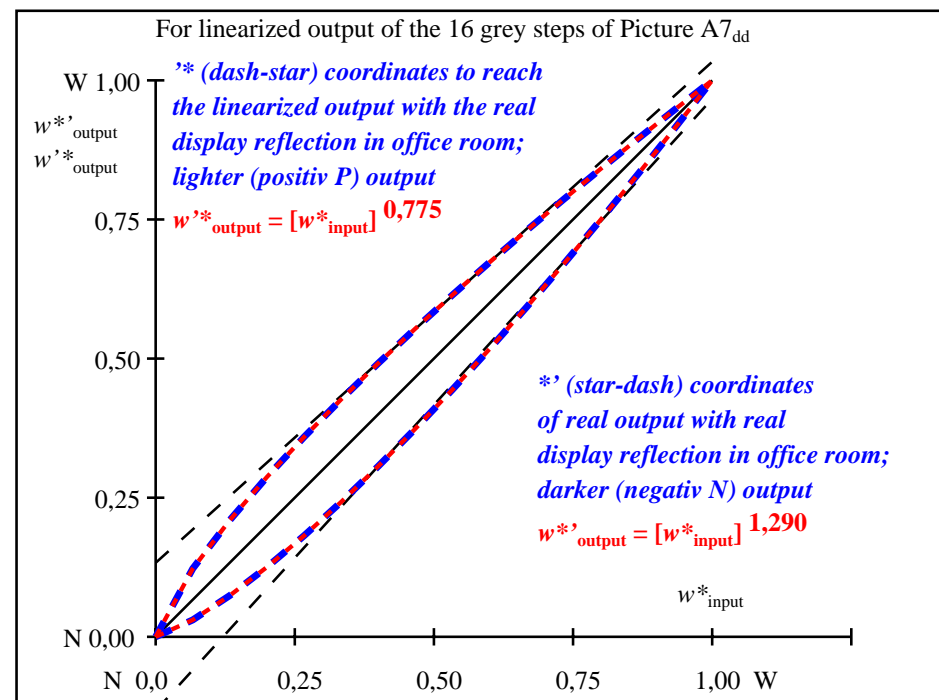
Mean lightness difference (16 steps)  
 $\Delta E^*_{\text{CIELAB}} = 7,5$

Mean lightness difference (5 steps)  
 $\Delta L^*_{\text{CIELAB}} = 5,7$

Mean colour reproduction index:  $R^*_{\text{ab,m}} = 67,0$

part 1,

AE390-3dd: 01032



part 2,

AE391-3dd: 01032

$L^*/Y^*_{\text{intended}}$ (absolute)	18,0/2,5	23,1/3,8	28,3/5,5	33,4/7,7	38,6/10,4	43,8/13,7	48,9/17,5	54,1/22,0	59,2/27,3	64,4/33,3	69,6/40,1	74,7/47,9	79,9/56,5	85,0/66,1	90,2/76,8	95,4/88,5
0 0 0 n* setcmyk gp=0,775 No. and Hex code	00;F	01;E	02;D	03;C	04;B	05;A	06;9	07;8	08;7	09;6	10;5	11;4	12;3	13;2	14;1	15;0
$w^* = l^*_{\text{CIELAB}, r}$ (relative)	0,000	0,067	0,133	0,200	0,267	0,333	0,400	0,467	0,533	0,600	0,667	0,733	0,800	0,867	0,933	1,000
$w^*_{\text{intended}}$ $w^*_{\text{output}}$	0,000 0,000	0,067 0,123	0,133 0,209	0,200 0,287	0,267 0,359	0,333 0,426	0,400 0,491	0,467 0,554	0,533 0,614	0,600 0,673	0,667 0,730	0,733 0,786	0,800 0,841	0,867 0,895	0,933 0,947	1,000 1,000

part 3, picture A7<sub>dd</sub>: 16 visual equidistant  $L^*$ -grey steps; PS operator: 0 0 0 n\* setcmykcolor

AE390-7dd: 01032

In-out: Test chart AE39 similar to test chart 1 of DIN 33872-5  
Viewing  $Y$  contrast  $Y_W:Y_N=88,9:2,5$ ;  $Y_N$ -range 1,87 to <3,75

input:  $rgb/cmy0/000n/w$  set...  
output:  $->rgb_{dd}$  setrgbcolor



Input: Colorimetric Television Luminous System TLS00a

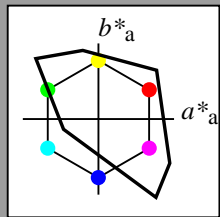
with *rgb* data of the  
four elementary hues

1 0 0 = Red  $R_e$

1 1 0 = Yellow  $Y_e$

0 1 0 = Green  $G_e$

0 0 1 = Blue  $B_e$



TLS00a; adapted (a) CIELAB data					
	$L^*=L^*_a$	$a^*_a$	$b^*_a$	$C^*_{ab,a}$	$h^*_{ab,a}$
O <sub>Ma</sub>	50.5	76.92	64.55	100.42	40
Y <sub>Ma</sub>	92.66	-20.69	90.75	93.08	103
L <sub>Ma</sub>	83.63	-82.75	79.9	115.04	136
C <sub>Ma</sub>	86.88	-46.16	-13.55	48.12	196
V <sub>Ma</sub>	30.39	76.06	-103.59	128.52	306
M <sub>Ma</sub>	57.3	94.35	-58.41	110.97	328
N <sub>Ma</sub>	0.01	0.0	0.0	0.0	0
W <sub>Ma</sub>	95.41	0.0	0.0	0.0	0
R <sub>CIE</sub>	39.92	58.74	27.99	65.07	25
J <sub>CIE</sub>	81.26	-2.88	71.56	71.62	92
G <sub>CIE</sub>	52.23	-42.41	13.6	44.55	162
B <sub>CIE</sub>	30.57	1.41	-46.46	46.49	272

Output: Colorimetric Television Luminous System TLS00a

with hue number

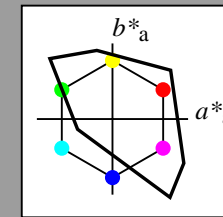
$n = 00$  to 19

00 = Red  $R_e$

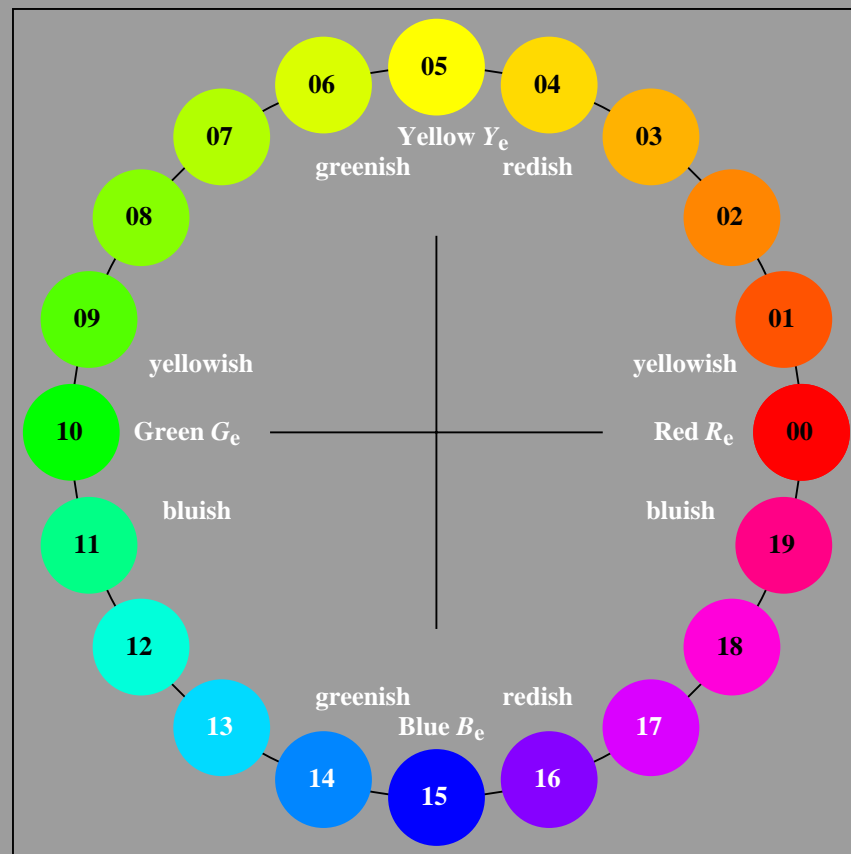
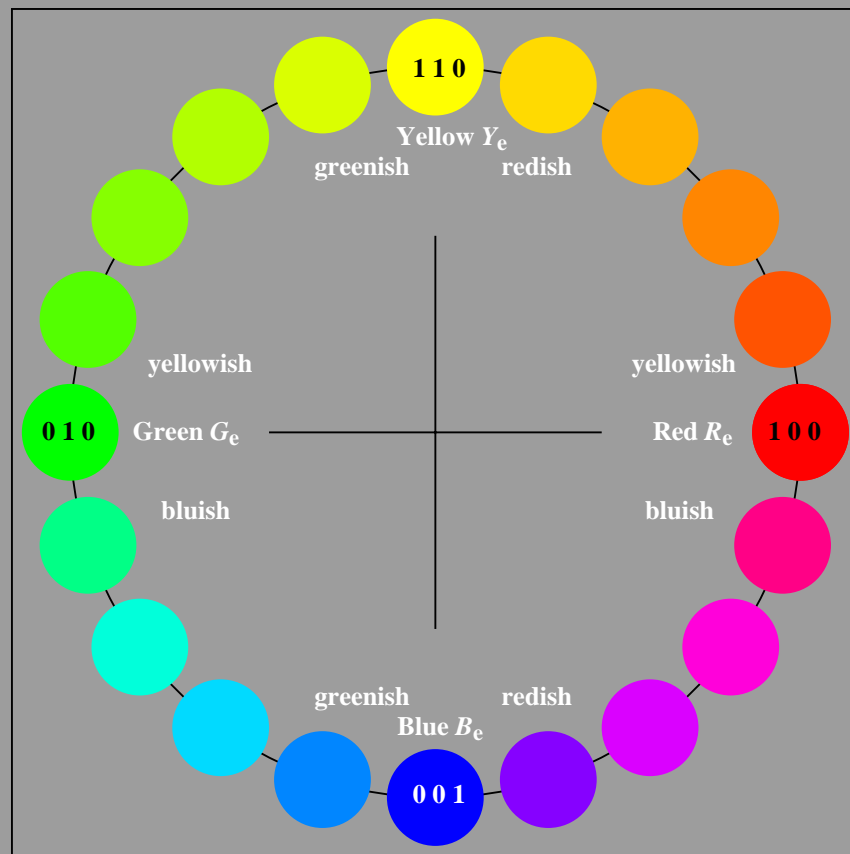
05 = Yellow  $Y_e$

10 = Green  $G_e$

15 = Blue  $B_e$



TLS00a; adapted (a) CIELAB data					
	$L^*=L^*_a$	$a^*_a$	$b^*_a$	$C^*_{ab,a}$	$h^*_{ab,a}$
O <sub>Ma</sub>	50.5	76.92	64.55	100.42	40
Y <sub>Ma</sub>	92.66	-20.69	90.75	93.08	103
L <sub>Ma</sub>	83.63	-82.75	79.9	115.04	136
C <sub>Ma</sub>	86.88	-46.16	-13.55	48.12	196
V <sub>Ma</sub>	30.39	76.06	-103.59	128.52	306
M <sub>Ma</sub>	57.3	94.35	-58.41	110.97	328
N <sub>Ma</sub>	0.01	0.0	0.0	0.0	0
W <sub>Ma</sub>	95.41	0.0	0.0	0.0	0
R <sub>CIE</sub>	39.92	58.74	27.99	65.07	25
J <sub>CIE</sub>	81.26	-2.88	71.56	71.62	92
G <sub>CIE</sub>	52.23	-42.41	13.6	44.55	162
B <sub>CIE</sub>	30.57	1.41	-46.46	46.49	272



AE390-7N-104-0: 20 step hue circle with 4 elementary colours  $R_e$ ,  $Y_e$ ,  $G_e$ ,  $B_e$  (left)

20 step hue circle with 4 elementary colours  $R_e$ ,  $Y_e$ ,  $G_e$ ,  $B_e$  (right)

Test chart AE39 similar to test chart 1 of DIN 33872-5

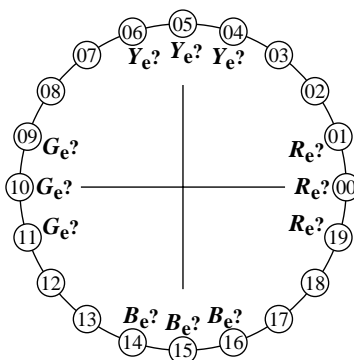
20 step elementary hue circle; Test chart according to DIN 33872-5

input: *rgb/cmy0/000n/w set...*

output: *->rgb<sub>dd</sub> setrgbcolor*

### Agreement with elementary hues (Yes/No decision)

Layout example: Agreement with elementary hues.



There are four elementary hues on each page:  
Red  $R_e$ , Yellow  $Y_e$ , Green  $G_e$ , and Blue  $B_e$

Input data 1 0 0 may produce: Red  $R_e$ .  
Input data 0 1 0 may produce: Green  $G_e$ .  
Input data 0 0 1 may produce: Blue  $B_e$ .  
Input data 1 1 0 may produce: Yellow  $Y_e$ .

The elementary hues Red  $R_e$  and Green  $G_e$   
should locate on the horizontal axis.

The elementary hues Yellow  $Y_e$  and Blue  $B_e$   
should locate on the vertical axis.

This test uses a hue circle with 20 hues.

No. 00 and 10 should be Red  $R_e$  and Green  $G_e$ .  
No. 05 and 15 should be Yellow  $Y_e$  and Blue  $B_e$ .

Are no. 00, 05, 10, and 15 the four elementary hues  $R_e$ ,  $Y_e$ ,  $G_e$  and  $B_e$ ? underline: Yes/No  
Only in case of "No":

Elementary Red  $R_e$  is hue step no. (e. g. 00, 01, 19) ..... (neither yellowish nor blueish)  
Elementary Yellow  $Y_e$  is hue step no. (e. g. 05, 04, 06) ..... (neither reddish nor greenish)  
Elementary Green  $G_e$  is hue step no. (e. g. 10, 09, 11) ..... (neither yellowish nor blueish)  
Elementary Blau  $B_e$  is hue step no. (e. g. 15, 14, 16) ..... (neither reddish nor greenish)

**Result:** Of the 4 elementary hues (e.g. three) ..... are at the intended location.

part 1,

AE390-3dd: 01041

### Documentation of file format, hardware and software for this test:

#### PDF file:

[http://farbe.li.tu-berlin.de/AE39/AE39F0PX\\_CY4\\_1.PDF](http://farbe.li.tu-berlin.de/AE39/AE39F0PX_CY4_1.PDF)

underline: Yes/No

#### PS file:

[http://farbe.li.tu-berlin.de/AE39/AE39F0PX\\_CY4\\_1.PS](http://farbe.li.tu-berlin.de/AE39/AE39F0PX_CY4_1.PS)

underline: Yes/No

#### Used computer operating system:

either one of Windows/Mac/Unix/other and version:.....

This evaluation is for the output: underline: monitor/data projector/printer

Device model, driver and version:.....

#### output with PDF/PS-file:

underline: PDF/PS file

#### For output with PDF file AE39F0PX\_CY4\_1.PDF

either PDF-file transfer "download, copy" to PDF device.....  
or with computer system interpretation by "Display-PDF":.....  
or with software e. g. Adobe-Reader/-Acrobat and version:.....  
or with software e. g. Ghostscript and version:.....

#### For output with PS file AE39F0PX\_CY4\_1.PS

either PS-file transfer "download, copy" to PS device.....  
or with computer system interpretation by "Display-PS":.....  
or with software e. g. Ghostscript and version:.....  
or with software e. g. Mac-Yap and version:.....

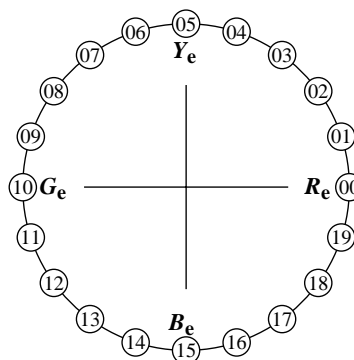
Special remarks: e. g. output of Landscape (L)

part 3,

AE390-7dd: 01041

### Discriminability of colours with 20 hues (Yes/No decision)

Layout example: Discriminability of colours with 20 hues.



There are four elementary hues on each page:  
Red  $R_e$ , Yellow  $Y_e$ , Green  $G_e$ , and Blue  $B_e$

Input data 1 0 0 may produce: Red  $R_e$ .  
Input data 0 1 0 may produce: Green  $G_e$ .  
Input data 0 0 1 may produce: Blue  $B_e$ .  
Input data 1 1 0 may produce: Yellow  $Y_e$ .

Four hue steps are between:  
Red  $R_e$  and Yellow  $Y_e$ , Yellow  $Y_e$  and Green  $G_e$ ,  
Green  $G_e$  and Blue  $B_e$ , Blue  $B_e$  and Red  $R_e$ .

This test uses a hue circle with 20 hues.  
All 20 hues should be distinguishable.

For this test it is **not** necessary:

1. All 20 differences are visually equal.
2. Elementary hues locate at 00, 05, 10, and 15.

Are all 20 colours of the 20 hues distinguishable?

underline: Yes/No

Only in case of "No":

The colours of the two hue steps no. (e. g. 00 and 01) .....are not distinguishable.  
The colours of the two hue steps no. (e. g. 14 and 15) .....are not distinguishable.  
The colours of the two hue steps no. (e. g. 15 and 16) .....are not distinguishable.  
List other pairs: .....

**Result:** Of the 20 hue differences are (e.g. 18) ..... differences visible.

part 2,

AE391-3dd: 01041

### Documentation of assessor colour-vision properties for visual assessment

The assessor has **normal** colour vision according to one test:  
either according to DIN 6160:1996 with Anomaloskop of Nagel  
or with test charts using colour points according to Ishihara  
or tested with, please specify: .....

underline: Yes/No

underline: Yes/unknown

underline: Yes/unknown

underline: Yes/unknown

### For visual evaluation of the display (Monitor, data projector) output

Office workplace illumination is daylight (clouded/north sky)

underline: Yes/No

PDF file: [http://farbe.li.tu-berlin.de/AE39/AE39F0PX\\_CY4\\_3.PDF](http://farbe.li.tu-berlin.de/AE39/AE39F0PX_CY4_3.PDF)

underline: Yes/No

PS file: [http://farbe.li.tu-berlin.de/AE39/AE39F0PX\\_CY4\\_3.PS](http://farbe.li.tu-berlin.de/AE39/AE39F0PX_CY4_3.PS)

underline: Yes/No

picture A7dd contrast range: (>F:0) (F:0) (E:0) (D:0) (C:0) (A:0) (9:0) (7:0) (5:0) (3:0) (<3:0)

compare standard print output according to ISO/IEC 15775 with range F:0

underline: Yes/No

Remark: In daylighted offices the contrast range is in many cases:

on display between: >F:0 and E:0 (monitor), D:0 and 3:0 (data projector)

### Only for optional colorimetric specification with PDF/PS file output

PDF file: [http://farbe.li.tu-berlin.de/AE39/AE39F0PX\\_CY4\\_3.PDF](http://farbe.li.tu-berlin.de/AE39/AE39F0PX_CY4_3.PDF)

underline: Yes/No

picture A7dd

underline: Yes/No

PS file: [http://farbe.li.tu-berlin.de/AE39/AE39F0PX\\_CY4\\_3.PS](http://farbe.li.tu-berlin.de/AE39/AE39F0PX_CY4_3.PS)

underline: Yes/No

picture A7dd

or underline: Yes/No

### colour measurement and specification for:

CIE standard illuminant D65, 2 degree observer, CIE 45/0 geometry:

underline: Yes/No

If No, please give other parameters: .....

Colorimetric specification for 17 step colours of <http://farbe.li.tu-berlin.de/OE70/OE70L1NP.PDF>

Exchange of CIELAB data in file <http://farbe.li.tu-berlin.de/AE82/AE82L0NP.TXT> and transfer

of the PS file AE82L0NP.PS (= .TXT) to the PDF-file AE82L0NP.PDF

underline: Yes/No

If No, please describe other method: .....

part 4,

AE391-7dd: 01041

Form A: Test chart AE39 similar to test chart 1 of DIN 33872-5  
20 step elementary hue circle; Test chart according to DIN 33872-5

input:  $rgb/cmy0/000n/w$  set...  
output:  $->rgb_{dd}$  set $rgbcolor$

see similar files: <http://farbe.li.tu-berlin.de/AE39/AE39F0PX.PDF> / .PS; 3D-linearization, page 15/24  
F: 3D-linearization AE39/AE39LF0PX.PDF /.PS in file (F)

TUB Registration: 20190301-AE39/AE39L0FA.TXT /.PS  
application for measurement or viewing of display and print output  
TUB material: code=th4ta

<i>i</i>	<i>LAB</i> <sup>*</sup> <sub>ref</sub>	<i>L</i> <sup>*</sup> <sub>out</sub>	<i>LAB</i> <sup>*</sup> <sub>out</sub>	<i>LAB</i> <sup>*</sup> <sub>out-ref</sub>	$\Delta E^*$	Start output S1
1	26,84	0,00	0,00	26,84	0,00	0,00
2	31,41	0,00	0,20	41,04	0,00	0,00
3	35,98	0,00	0,30	48,09	0,00	0,00
4	40,56	0,00	0,39	53,74	0,00	0,00
5	45,13	0,00	0,46	58,64	0,00	0,00
6	49,70	0,00	0,52	63,04	0,00	0,00
7	54,27	0,00	0,58	67,09	0,00	0,00
8	58,84	0,00	0,64	70,86	0,00	0,00
9	63,41	0,00	0,69	74,42	0,00	0,00
10	67,98	0,00	0,74	77,79	0,00	0,00
11	72,55	0,00	0,78	81,01	0,00	0,00
12	77,12	0,00	0,83	84,09	0,00	0,00
13	81,69	0,00	0,87	87,06	0,00	0,00
14	86,26	0,00	0,92	89,93	0,00	0,00
15	90,83	0,00	0,96	92,71	0,00	0,00
16	95,41	0,00	1,00	95,41	0,00	0,00
17	26,84	0,00	0,00	26,84	0,00	0,00
18	43,98	0,00	0,44	57,47	0,00	0,00
19	61,12	0,00	0,66	72,66	0,00	0,00
20	78,26	0,00	0,84	84,85	0,00	0,00
21	95,41	0,00	1,00	95,41	0,00	0,00

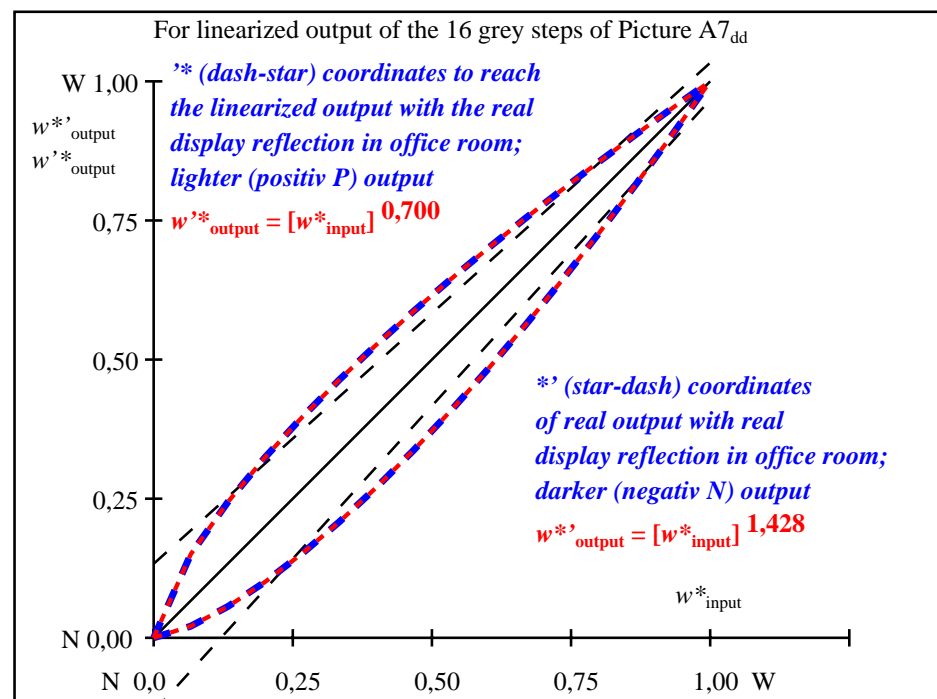
**Mean lightness difference (16 steps)**  
 $\Delta E^*_{\text{CIELAB}} = 8,3$

**Mean lightness difference (5 steps)**  
 $\Delta L^*_{\text{CIELAB}} = 6,3$

**Mean colour reproduction index:  $R^*_{\text{ab,m}} = 63,7$**

part 1,

AE390-3dd: 01042



part 2,

AE391-3dd: 01042

<i>L</i> <sup>*</sup> / <i>Y</i> <sub>intended</sub> (absolute)	26,8/5,0	31,4/6,8	35,9/9,0	40,5/11,5	45,1/14,6	49,7/18,1	54,2/22,2	58,8/26,8	63,4/32,0	67,9/37,9	72,5/44,4	77,1/51,7	81,6/59,7	86,2/68,5	90,8/78,1	95,4/88,5
<i>0 0 0 n*</i> setcmyk																
<i>gp=0,700</i>																
<i>No. and Hex code</i>	00;F	01;E	02;D	03;C	04;B	05;A	06;9	07;8	08;7	09;6	10;5	11;4	12;3	13;2	14;1	15;0
<i>w*</i> = <i>L</i> <sup>*</sup> <sub>CIELAB, r</sub> (relative)																
<i>w*</i> <sub>intended</sub>	0,000	0,067	0,133	0,200	0,267	0,333	0,400	0,467	0,533	0,600	0,667	0,733	0,800	0,867	0,933	1,000
<i>w*</i> <sub>output</sub>	0,000	0,150	0,243	0,324	0,396	0,463	0,526	0,586	0,643	0,699	0,753	0,804	0,855	0,904	0,952	1,000

part 3, picture A7<sub>dd</sub>: 16 visual equidistant *L*<sup>\*</sup>-grey steps; PS operator: 0 0 0 n\* setcmykcolor

AE390-7dd: 01042

In-out: Test chart AE39 similar to test chart 1 of DIN 33872-5  
Viewing *Y* contrast  $Y_W:Y_N=88,9:5$ ;  $Y_N$ -range 3,75 to <7,5

input: *rgb/cmy0/000n/w set...*  
output: *->rgb<sub>dd</sub> setrgbcolor*

Input: Colorimetric Television Luminous System TLS00a

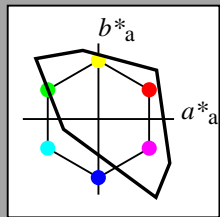
with *rgb* data of the  
four elementary hues

1 0 0 = Red  $R_e$

1 1 0 = Yellow  $Y_e$

0 1 0 = Green  $G_e$

0 0 1 = Blue  $B_e$



TLS00a; adapted (a) CIELAB data					
$L^*=L^*_a$	$a^*_a$	$b^*_a$	$C^*_{ab,a}$	$h^*_{ab,a}$	
O <sub>Ma</sub> 50.5	76.92	64.55	100.42	40	
Y <sub>Ma</sub> 92.66	-20.69	90.75	93.08	103	
L <sub>Ma</sub> 83.63	-82.75	79.9	115.04	136	
C <sub>Ma</sub> 86.88	-46.16	-13.55	48.12	196	
V <sub>Ma</sub> 30.39	76.06	-103.59	128.52	306	
M <sub>Ma</sub> 57.3	94.35	-58.41	110.97	328	
N <sub>Ma</sub> 0.01	0.0	0.0	0.0	0	
W <sub>Ma</sub> 95.41	0.0	0.0	0.0	0	
R <sub>CIE</sub> 39.92	58.74	27.99	65.07	25	
J <sub>CIE</sub> 81.26	-2.88	71.56	71.62	92	
G <sub>CIE</sub> 52.23	-42.41	13.6	44.55	162	
B <sub>CIE</sub> 30.57	1.41	-46.46	46.49	272	

Output: Colorimetric Television Luminous System TLS00a

with hue number

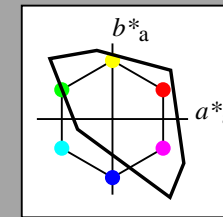
$n = 00$  to 19

00 = Red  $R_e$

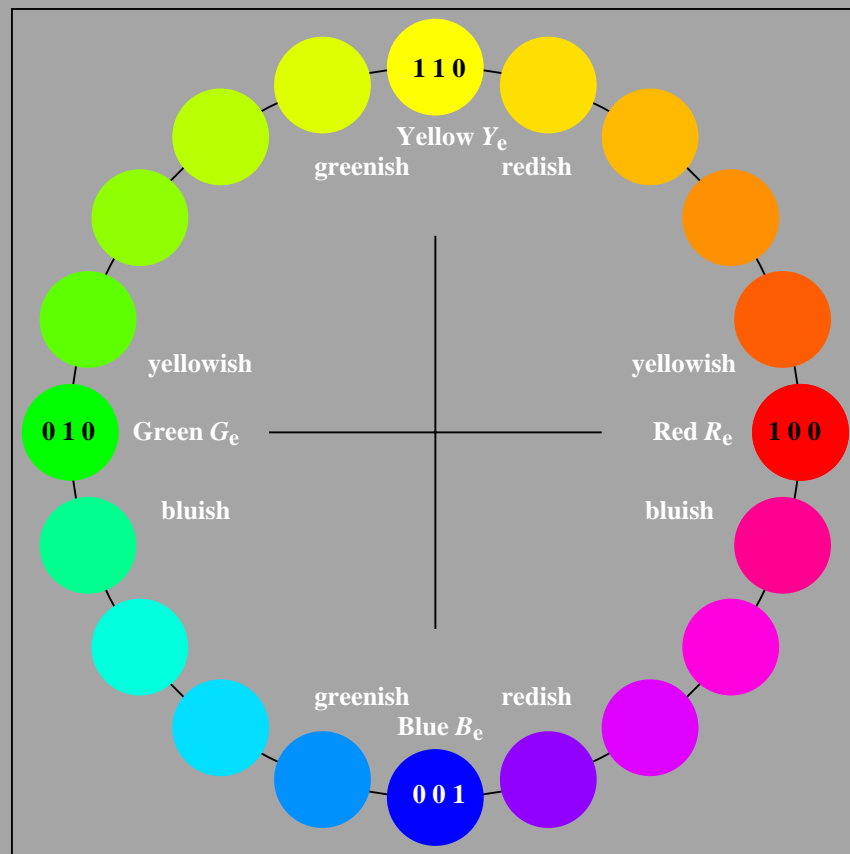
05 = Yellow  $Y_e$

10 = Green  $G_e$

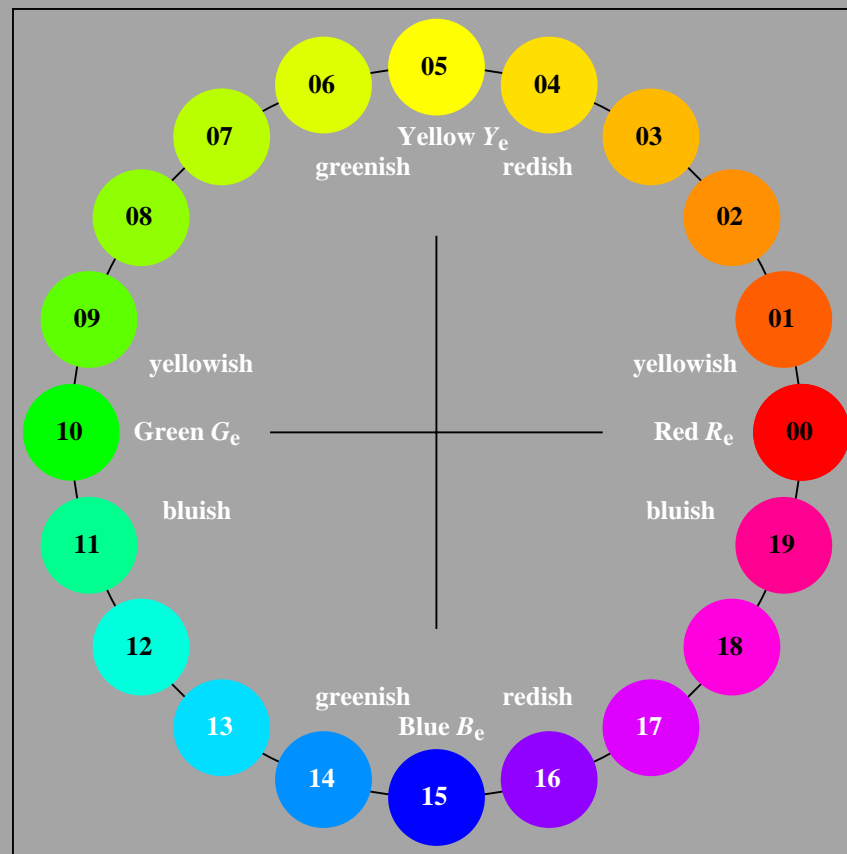
15 = Blue  $B_e$



TLS00a; adapted (a) CIELAB data					
$L^*=L^*_a$	$a^*_a$	$b^*_a$	$C^*_{ab,a}$	$h^*_{ab,a}$	
O <sub>Ma</sub> 50.5	76.92	64.55	100.42	40	
Y <sub>Ma</sub> 92.66	-20.69	90.75	93.08	103	
L <sub>Ma</sub> 83.63	-82.75	79.9	115.04	136	
C <sub>Ma</sub> 86.88	-46.16	-13.55	48.12	196	
V <sub>Ma</sub> 30.39	76.06	-103.59	128.52	306	
M <sub>Ma</sub> 57.3	94.35	-58.41	110.97	328	
N <sub>Ma</sub> 0.01	0.0	0.0	0.0	0	
W <sub>Ma</sub> 95.41	0.0	0.0	0.0	0	
R <sub>CIE</sub> 39.92	58.74	27.99	65.07	25	
J <sub>CIE</sub> 81.26	-2.88	71.56	71.62	92	
G <sub>CIE</sub> 52.23	-42.41	13.6	44.55	162	
B <sub>CIE</sub> 30.57	1.41	-46.46	46.49	272	



AE390-7N-105-0: 20 step hue circle with 4 elementary colours  $R_e$ ,  $Y_e$ ,  $G_e$ ,  $B_e$  (left)



20 step hue circle with 4 elementary colours  $R_e$ ,  $Y_e$ ,  $G_e$ ,  $B_e$  (right)

Test chart AE39 similar to test chart 1 of DIN 33872-5

20 step elementary hue circle; Test chart according to DIN 33872-5

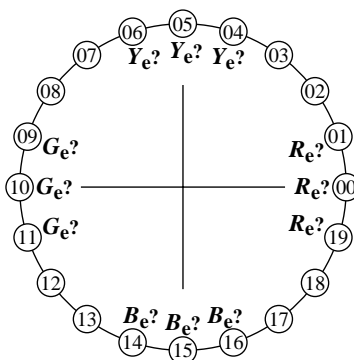
input: *rgb/cmy0/000n/w* set...

output:  $\rightarrow$  *rgb<sub>dd</sub> setrgbcolor*



### Agreement with elementary hues (Yes/No decision)

Layout example: Agreement with elementary hues.



There are four elementary hues on each page:  
Red  $R_e$ , Yellow  $Y_e$ , Green  $G_e$ , and Blue  $B_e$

Input data 1 0 0 may produce: Red  $R_e$ .  
Input data 0 1 0 may produce: Green  $G_e$ .  
Input data 0 0 1 may produce: Blue  $B_e$ .  
Input data 1 1 0 may produce: Yellow  $Y_e$ .

The elementary hues Red  $R_e$  and Green  $G_e$   
should locate on the horizontal axis.

The elementary hues Yellow  $Y_e$  and Blue  $B_e$   
should locate on the vertical axis.

This test uses a hue circle with 20 hues.

No. 00 and 10 should be Red  $R_e$  and Green  $G_e$ .  
No. 05 and 15 should be Yellow  $Y_e$  and Blue  $B_e$ .

Are no. 00, 05, 10, and 15 the four elementary hues  $R_e$ ,  $Y_e$ ,  $G_e$  and  $B_e$ ? underline: Yes/No  
Only in case of "No":

Elementary Red  $R_e$  is hue step no. (e. g. 00, 01, 19) ..... (neither yellowish nor blueish)  
Elementary Yellow  $Y_e$  is hue step no. (e. g. 05, 04, 06) ..... (neither reddish nor greenish)  
Elementary Green  $G_e$  is hue step no. (e. g. 10, 09, 11) ..... (neither yellowish nor blueish)  
Elementary Blau  $B_e$  is hue step no. (e. g. 15, 14, 16) ..... (neither reddish nor greenish)

**Result:** Of the 4 elementary hues (e.g. three) ..... are at the intended location.

part 1,

AE390-3dd: 01051

### Documentation of file format, hardware and software for this test:

#### PDF file:

[http://farbe.li.tu-berlin.de/AE39/AE39F0PX\\_CY3\\_1.PDF](http://farbe.li.tu-berlin.de/AE39/AE39F0PX_CY3_1.PDF)

underline: Yes/No

#### PS file:

[http://farbe.li.tu-berlin.de/AE39/AE39F0PX\\_CY3\\_1.PS](http://farbe.li.tu-berlin.de/AE39/AE39F0PX_CY3_1.PS)

underline: Yes/No

#### Used computer operating system:

either one of Windows/Mac/Unix/other and version:.....

This evaluation is for the output: underline: monitor/data projector/printer

Device model, driver and version:.....

#### output with PDF/PS-file:

underline: PDF/PS file

#### For output with PDF file AE39F0PX\_CY3\_1.PDF

either PDF-file transfer "download, copy" to PDF device.....  
or with computer system interpretation by "Display-PDF":.....  
or with software e. g. Adobe-Reader/-Acrobat and version:.....  
or with software e. g. Ghostscript and version:.....

#### For output with PS file AE39F0PX\_CY3\_1.PS

either PS-file transfer "download, copy" to PS device.....  
or with computer system interpretation by "Display-PS":.....  
or with software e. g. Ghostscript and version:.....  
or with software e. g. Mac-Yap and version:.....

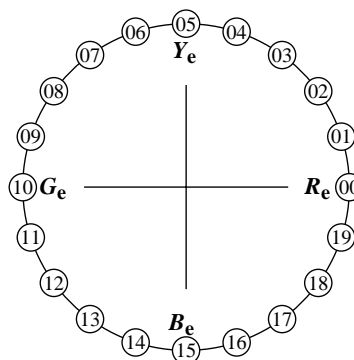
Special remarks: e. g. output of Landscape (L)

part 3,

AE390-7dd: 01051

### Discriminability of colours with 20 hues (Yes/No decision)

Layout example: Discriminability of colours with 20 hues.



There are four elementary hues on each page:  
Red  $R_e$ , Yellow  $Y_e$ , Green  $G_e$ , and Blue  $B_e$

Input data 1 0 0 may produce: Red  $R_e$ .  
Input data 0 1 0 may produce: Green  $G_e$ .  
Input data 0 0 1 may produce: Blue  $B_e$ .  
Input data 1 1 0 may produce: Yellow  $Y_e$ .

Four hue steps are between:  
Red  $R_e$  and Yellow  $Y_e$ , Yellow  $Y_e$  and Green  $G_e$ ,  
Green  $G_e$  and Blue  $B_e$ , Blue  $B_e$  and Red  $R_e$ .

This test uses a hue circle with 20 hues.  
All 20 hues should be distinguishable.

For this test it is **not** necessary:

1. All 20 differences are visually equal.
2. Elementary hues locate at 00, 05, 10, and 15.

Are all 20 colours of the 20 hues distinguishable?

underline: Yes/No

Only in case of "No":

The colours of the two hue steps no. (e. g. 00 and 01) .....are not distinguishable.  
The colours of the two hue steps no. (e. g. 14 and 15) .....are not distinguishable.  
The colours of the two hue steps no. (e. g. 15 and 16) .....are not distinguishable.  
List other pairs: .....

**Result:** Of the 20 hue differences are (e.g. 18) ..... differences visible.

part 2,

AE391-3dd: 01051

### Documentation of assessor colour-vision properties for visual assessment

The assessor has **normal** colour vision according to one test:  
either according to DIN 6160:1996 with Anomaloskop of Nagel  
or with test charts using colour points according to Ishihara  
or tested with, please specify: .....

underline: Yes/No

underline: Yes/unknown

underline: Yes/unknown

underline: Yes/unknown

### For visual evaluation of the display (Monitor, data projector) output

Office workplace illumination is daylight (clouded/north sky)

underline: Yes/No

PDF file: [http://farbe.li.tu-berlin.de/AE39/AE39F0PX\\_CY3\\_3.PDF](http://farbe.li.tu-berlin.de/AE39/AE39F0PX_CY3_3.PDF)

underline: Yes/No

PS file: [http://farbe.li.tu-berlin.de/AE39/AE39F0PX\\_CY3\\_3.PS](http://farbe.li.tu-berlin.de/AE39/AE39F0PX_CY3_3.PS)

underline: Yes/No

picture A7dd contrast range: (>F:0) (F:0) (E:0) (D:0) (C:0) (A:0) (9:0) (7:0) (5:0) (3:0) (<3:0)

compare standard print output according to ISO/IEC 15775 with range F:0

underline: Yes/No

Remark: In daylighted offices the contrast range is in many cases:

on display between: >F:0 and E:0 (monitor), D:0 and 3:0 (data projector)

### Only for optional colorimetric specification with PDF/PS file output

PDF file: [http://farbe.li.tu-berlin.de/AE39/AE39F0PX\\_CY3\\_3.PDF](http://farbe.li.tu-berlin.de/AE39/AE39F0PX_CY3_3.PDF)

underline: Yes/No

picture A7dd

underline: Yes/No

PS file: [http://farbe.li.tu-berlin.de/AE39/AE39F0PX\\_CY3\\_3.PS](http://farbe.li.tu-berlin.de/AE39/AE39F0PX_CY3_3.PS)

underline: Yes/No

picture A7dd

or underline: Yes/No

### colour measurement and specification for:

CIE standard illuminant D65, 2 degree observer, CIE 45/0 geometry:

underline: Yes/No

If No, please give other parameters: .....

Colorimetric specification for 17 step colours of <http://farbe.li.tu-berlin.de/OE70/OE70L1NP.PDF>

Exchange of CIELAB data in file <http://farbe.li.tu-berlin.de/AE82/AE82L0NP.TXT> and transfer

of the PS file AE82L0NP.PS (= .TXT) to the PDF-file AE82L0NP.PDF

underline: Yes/No

If No, please describe other method: .....

part 4,

AE391-7dd: 01051

Form A: Test chart AE39 similar to test chart 1 of DIN 33872-5  
20 step elementary hue circle; Test chart according to DIN 33872-5

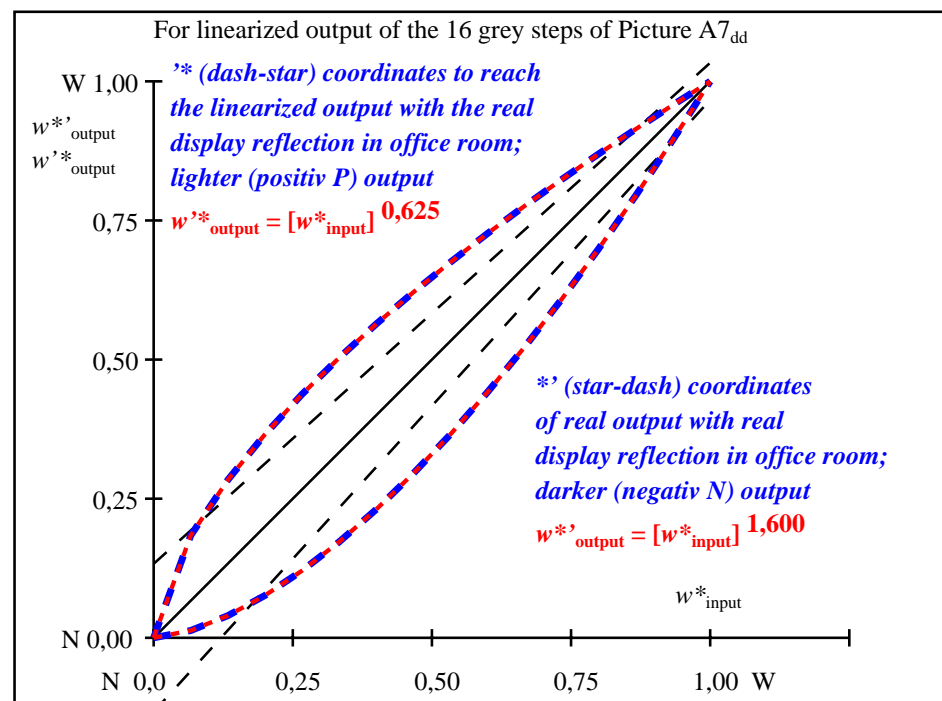
input:  $rgb/cmy0/000n/w$  set...  
output:  $->rgb_{dd}$  set $rgbcolor$

see similar files: <http://farbe.li.tu-berlin.de/AE39/AE39F0PX.PDF> / .PS; 3D-linearization, page 18/24  
technical information: <http://farbe.li.tu-berlin.de/AE39/AE39LF0PX.PDF> / .PS in file (F)

<i>i</i>	<i>LAB</i> <sup>*</sup> <sub>ref</sub>	<i>L</i> <sup>*</sup> <sub>out</sub>	<i>LAB</i> <sup>*</sup> <sub>out</sub>	<i>LAB</i> <sup>*</sup> <sub>out-ref</sub>	$\Delta E^*$	Start output S1
1	37,98 0,00 0,00	0,00	37,98 0,00 0,00	0,00 0,00 0,00	0,01	Specification according to
2	41,81 0,00 0,00	0,24	51,79 0,00 0,00	9,97 0,00 0,00	9,97	ISO/IEC 15775 Annex G
3	45,64 0,00 0,00	0,34	57,87 0,00 0,00	12,22 0,00 0,00	12,22	and DIN 33866-1 Annex G
4	49,47 0,00 0,00	0,42	62,60 0,00 0,00	13,13 0,00 0,00	13,13	
5	53,29 0,00 0,00	0,49	66,62 0,00 0,00	13,32 0,00 0,00	13,32	
6	57,12 0,00 0,00	0,56	70,19 0,00 0,00	13,06 0,00 0,00	13,06	
7	60,95 0,00 0,00	0,61	73,43 0,00 0,00	12,48 0,00 0,00	12,48	
8	64,78 0,00 0,00	0,66	76,43 0,00 0,00	11,65 0,00 0,00	11,65	
9	68,61 0,00 0,00	0,71	79,23 0,00 0,00	10,62 0,00 0,00	10,62	
10	72,44 0,00 0,00	0,76	81,87 0,00 0,00	9,43 0,00 0,00	9,43	
11	76,26 0,00 0,00	0,80	84,37 0,00 0,00	8,10 0,00 0,00	8,10	
12	80,09 0,00 0,00	0,84	86,76 0,00 0,00	6,66 0,00 0,00	6,66	
13	83,92 0,00 0,00	0,88	89,04 0,00 0,00	5,12 0,00 0,00	5,12	
14	87,75 0,00 0,00	0,92	91,24 0,00 0,00	3,49 0,00 0,00	3,49	
15	91,58 0,00 0,00	0,96	93,36 0,00 0,00	1,78 0,00 0,00	1,78	
16	95,41 0,00 0,00	1,00	95,41 0,00 0,00	0,00 0,00 0,00	0,01	
17	37,98 0,00 0,00	0,00	37,98 0,00 0,00	0,00 0,00 0,00	0,01	
18	52,34 0,00 0,00	0,48	65,66 0,00 0,00	13,32 0,00 0,00	13,32	
19	66,69 0,00 0,00	0,69	77,85 0,00 0,00	11,15 0,00 0,00	11,15	
20	81,05 0,00 0,00	0,85	87,34 0,00 0,00	6,28 0,00 0,00	6,28	
21	95,41 0,00 0,00	1,00	95,41 0,00 0,00	0,00 0,00 0,00	0,01	
Mean lightness difference (16 steps)						$\Delta E^*_{\text{CIELAB}} = 8,1$
Mean lightness difference (5 steps)						$\Delta L^*_{\text{CIELAB}} = 6,1$
Mean colour reproduction index: $R^*_{\text{ab,m}} = 64,5$						

part 1,

AE390-3dd: 01052



part 2,

AE391-3dd: 01052

<i>L</i> <sup>*</sup> / <i>Y</i> <sub>intended</sub> (absolute)	37,9/10,0	41,8/12,3	45,6/15,0	49,4/17,9	53,2/21,3	57,1/25,0	60,9/29,1	64,7/33,7	68,6/38,8	72,4/44,3	76,2/50,3	80,0/56,8	83,9/63,9	87,7/71,5	91,5/79,7	95,4/88,5
0 0 0 n*																
setcmyk																
gp=0,625																
No. and Hex code	00;F	01;E	02;D	03;C	04;B	05;A	06;9	07;8	08;7	09;6	10;5	11;4	12;3	13;2	14;1	15;0
$w^* = l^*_{\text{CIELAB}, r}$ (relative)																
$w^*_{\text{intended}}$	0,000	0,067	0,133	0,200	0,267	0,333	0,400	0,467	0,533	0,600	0,667	0,733	0,800	0,867	0,933	1,000
$w^*_{\text{output}}$	0,000	0,184	0,283	0,365	0,438	0,502	0,564	0,621	0,674	0,726	0,776	0,823	0,869	0,914	0,957	1,000

part 3, picture A7<sub>dd</sub>: 16 visual equidistant *L*<sup>\*</sup>-grey steps; PS operator: 0 0 0 n\* setcmykcolor

AE390-7dd: 01052

In-out: Test chart AE39 similar to test chart 1 of DIN 33872-5  
Viewing *Y* contrast  $Y_W:Y_N=88,9:10$ ;  $Y_N$ -range 7,5 to <15

input: *rgb/cmy0/000n/w set...*  
output: *->rgb<sub>dd</sub> setrgbcolor*

TUB Registration: 20190301-AE39/AE39L0FA.TXT /.PS  
application for measurement or viewing of display and print output  
TUB material: code=th4ta

Input: Colorimetric Television Luminous System TLS00a

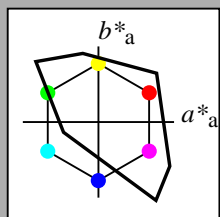
with *rgb* data of the  
four elementary hues

1 0 0 = Red  $R_e$

1 1 0 = Yellow  $Y_e$

0 1 0 = Green  $G_e$

0 0 1 = Blue  $B_e$



	$L^*=L^*_a$	$a^*_a$	$b^*_a$	$C^*_{ab,a}$	$h^*_{ab,a}$
O <sub>Ma</sub>	50.5	76.92	64.55	100.42	40
Y <sub>Ma</sub>	92.66	-20.69	90.75	93.08	103
L <sub>Ma</sub>	83.63	-82.75	79.9	115.04	136
C <sub>Ma</sub>	86.88	-46.16	-13.55	48.12	196
V <sub>Ma</sub>	30.39	76.06	-103.59	128.52	306
M <sub>Ma</sub>	57.3	94.35	-58.41	110.97	328
N <sub>Ma</sub>	0.01	0.0	0.0	0.0	0
W <sub>Ma</sub>	95.41	0.0	0.0	0.0	0
R <sub>CIE</sub>	39.92	58.74	27.99	65.07	25
J <sub>CIE</sub>	81.26	-2.88	71.56	71.62	92
G <sub>CIE</sub>	52.23	-42.41	13.6	44.55	162
B <sub>CIE</sub>	30.57	1.41	-46.46	46.49	272

Output: Colorimetric Television Luminous System TLS00a

with hue number

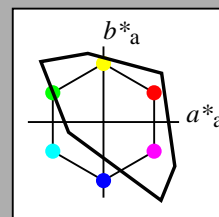
$n = 00$  to 19

00 = Red  $R_e$

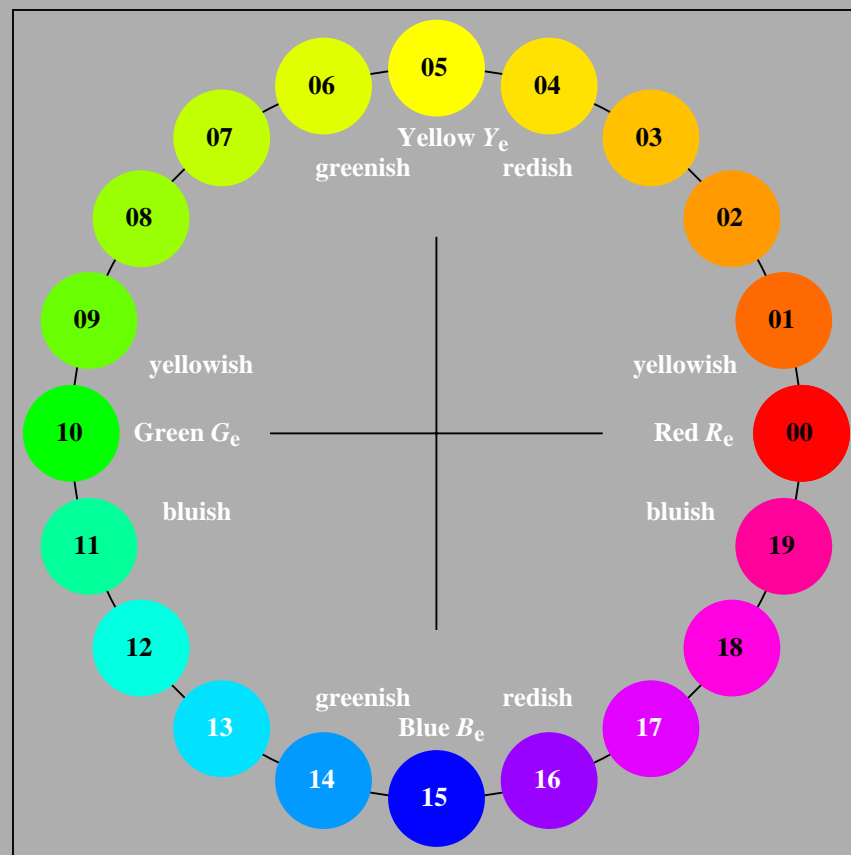
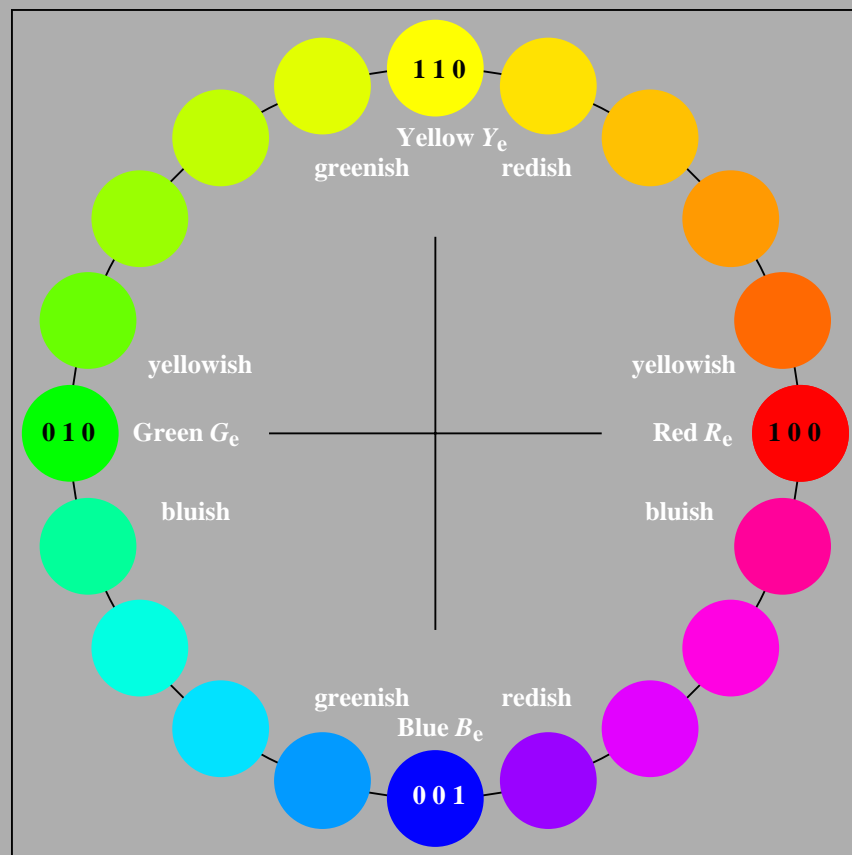
05 = Yellow  $Y_e$

10 = Green  $G_e$

15 = Blue  $B_e$



	$L^*=L^*_a$	$a^*_a$	$b^*_a$	$C^*_{ab,a}$	$h^*_{ab,a}$
O <sub>Ma</sub>	50.5	76.92	64.55	100.42	40
Y <sub>Ma</sub>	92.66	-20.69	90.75	93.08	103
L <sub>Ma</sub>	83.63	-82.75	79.9	115.04	136
C <sub>Ma</sub>	86.88	-46.16	-13.55	48.12	196
V <sub>Ma</sub>	30.39	76.06	-103.59	128.52	306
M <sub>Ma</sub>	57.3	94.35	-58.41	110.97	328
N <sub>Ma</sub>	0.01	0.0	0.0	0.0	0
W <sub>Ma</sub>	95.41	0.0	0.0	0.0	0
R <sub>CIE</sub>	39.92	58.74	27.99	65.07	25
J <sub>CIE</sub>	81.26	-2.88	71.56	71.62	92
G <sub>CIE</sub>	52.23	-42.41	13.6	44.55	162
B <sub>CIE</sub>	30.57	1.41	-46.46	46.49	272



AE390-7N-106-0: 20 step hue circle with 4 elementary colours  $R_e$ ,  $Y_e$ ,  $G_e$ ,  $B_e$  (left)

20 step hue circle with 4 elementary colours  $R_e$ ,  $Y_e$ ,  $G_e$ ,  $B_e$  (right)

Test chart AE39 similar to test chart 1 of DIN 33872-5

20 step elementary hue circle; Test chart according to DIN 33872-5

input: *rgb/cmy0/000n/w set...*

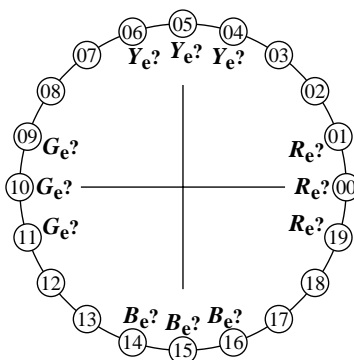
output: *->rgb<sub>dd</sub> setrgbcolor*

TUB Registration: 20190301-AE39/AE39L0FA.TXT /.PS  
application for measurement or viewing of display and print output

TUB material: code=th4ta

### Agreement with elementary hues (Yes/No decision)

Layout example: Agreement with elementary hues.



There are four elementary hues on each page:  
Red  $R_e$ , Yellow  $Y_e$ , Green  $G_e$ , and Blue  $B_e$

Input data 1 0 0 may produce: Red  $R_e$ .  
Input data 0 1 0 may produce: Green  $G_e$ .  
Input data 0 0 1 may produce: Blue  $B_e$ .  
Input data 1 1 0 may produce: Yellow  $Y_e$ .

The elementary hues Red  $R_e$  and Green  $G_e$   
should locate on the horizontal axis.

The elementary hues Yellow  $Y_e$  and Blue  $B_e$   
should locate on the vertical axis.

This test uses a hue circle with 20 hues.

No. 00 and 10 should be Red  $R_e$  and Green  $G_e$ .  
No. 05 and 15 should be Yellow  $Y_e$  and Blue  $B_e$ .

Are no. 00, 05, 10, and 15 the four elementary hues  $R_e$ ,  $Y_e$ ,  $G_e$  and  $B_e$ ? underline: Yes/No  
Only in case of "No":

Elementary Red  $R_e$  is hue step no. (e. g. 00, 01, 19) ..... (neither yellowish nor blueish)  
Elementary Yellow  $Y_e$  is hue step no. (e. g. 05, 04, 06) ..... (neither reddish nor greenish)  
Elementary Green  $G_e$  is hue step no. (e. g. 10, 09, 11) ..... (neither yellowish nor blueish)  
Elementary Blau  $B_e$  is hue step no. (e. g. 15, 14, 16) ..... (neither reddish nor greenish)

**Result:** Of the 4 elementary hues (e.g. three) ..... are at the intended location.

part 1,

AE390-3dd: 01061

### Documentation of file format, hardware and software for this test:

#### PDF file:

[http://farbe.li.tu-berlin.de/AE39/AE39F0PX\\_CY2\\_1.PDF](http://farbe.li.tu-berlin.de/AE39/AE39F0PX_CY2_1.PDF)

underline: Yes/No

#### PS file:

[http://farbe.li.tu-berlin.de/AE39/AE39F0PX\\_CY2\\_1.PS](http://farbe.li.tu-berlin.de/AE39/AE39F0PX_CY2_1.PS)

underline: Yes/No

#### Used computer operating system:

either one of Windows/Mac/Unix/other and version:.....

This evaluation is for the output: underline: monitor/data projector/printer

Device model, driver and version:.....

#### output with PDF/PS-file:

underline: PDF/PS file

#### For output with PDF file AE39F0PX\_CY2\_1.PDF

either PDF-file transfer "download, copy" to PDF device.....  
or with computer system interpretation by "Display-PDF":.....  
or with software e. g. Adobe-Reader/-Acrobat and version:.....  
or with software e. g. Ghostscript and version:.....

#### For output with PS file AE39F0PX\_CY2\_1.PS

either PS-file transfer "download, copy" to PS device.....  
or with computer system interpretation by "Display-PS":.....  
or with software e. g. Ghostscript and version:.....  
or with software e. g. Mac-Yap and version:.....

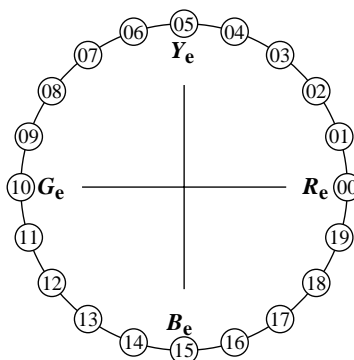
Special remarks: e. g. output of Landscape (L)

part 3,

AE390-7dd: 01061

### Discriminability of colours with 20 hues (Yes/No decision)

Layout example: Discriminability of colours with 20 hues.



There are four elementary hues on each page:  
Red  $R_e$ , Yellow  $Y_e$ , Green  $G_e$ , and Blue  $B_e$

Input data 1 0 0 may produce: Red  $R_e$ .  
Input data 0 1 0 may produce: Green  $G_e$ .  
Input data 0 0 1 may produce: Blue  $B_e$ .  
Input data 1 1 0 may produce: Yellow  $Y_e$ .

Four hue steps are between:  
Red  $R_e$  and Yellow  $Y_e$ , Yellow  $Y_e$ , and Green  $G_e$ .  
Green  $G_e$  and Blue  $B_e$ , Blue  $B_e$ , and Red  $R_e$ .

This test uses a hue circle with 20 hues.  
All 20 hues should be distinguishable.

For this test it is **not** necessary:

1. All 20 differences are visually equal.
2. Elementary hues locate at 00, 05, 10, and 15.

Are all 20 colours of the 20 hues distinguishable?

underline: Yes/No

Only in case of "No":

The colours of the two hue steps no. (e. g. 00 and 01) .....are not distinguishable.  
The colours of the two hue steps no. (e. g. 14 and 15) .....are not distinguishable.  
The colours of the two hue steps no. (e. g. 15 and 16) .....are not distinguishable.  
List other pairs: .....

**Result:** Of the 20 hue differences are (e.g. 18) ..... differences visible.

part 2,

AE391-3dd: 01061

### Documentation of assessor colour-vision properties for visual assessment

The assessor has **normal** colour vision according to one test:  
either according to DIN 6160:1996 with Anomaloskop of Nagel  
or with test charts using colour points according to Ishihara  
or tested with, please specify: .....

underline: Yes/No

underline: Yes/unknown

underline: Yes/unknown

underline: Yes/unknown

### For visual evaluation of the display (Monitor, data projector) output

Office workplace illumination is daylight (clouded/north sky)

underline: Yes/No

PDF file: [http://farbe.li.tu-berlin.de/AE39/AE39F0PX\\_CY2\\_3.PDF](http://farbe.li.tu-berlin.de/AE39/AE39F0PX_CY2_3.PDF)

underline: Yes/No

PS file: [http://farbe.li.tu-berlin.de/AE39/AE39F0PX\\_CY2\\_3.PS](http://farbe.li.tu-berlin.de/AE39/AE39F0PX_CY2_3.PS)

underline: Yes/No

picture A7dd contrast range: (>F:0) (F:0) (E:0) (D:0) (C:0) (A:0) (9:0) (7:0) (5:0) (3:0) (<3:0)

compare standard print output according to ISO/IEC 15775 with range F:0

underline: Yes/No

Remark: In daylighted offices the contrast range is in many cases:

on display between: >F:0 and E:0 (monitor), D:0 and 3:0 (data projector)

### Only for optional colorimetric specification with PDF/PS file output

PDF file: [http://farbe.li.tu-berlin.de/AE39/AE39F0PX\\_CY2\\_3.PDF](http://farbe.li.tu-berlin.de/AE39/AE39F0PX_CY2_3.PDF)

underline: Yes/No

picture A7dd

underline: Yes/No

PS file: [http://farbe.li.tu-berlin.de/AE39/AE39F0PX\\_CY2\\_3.PS](http://farbe.li.tu-berlin.de/AE39/AE39F0PX_CY2_3.PS)

or underline: Yes/No

picture A7dd

or underline: Yes/No

### colour measurement and specification for:

CIE standard illuminant D65, 2 degree observer, CIE 45/0 geometry:

underline: Yes/No

If No, please give other parameters: .....

Colorimetric specification for 17 step colours of <http://farbe.li.tu-berlin.de/OE70/OE70L1NP.PDF>

Exchange of CIELAB data in file <http://farbe.li.tu-berlin.de/AE82/AE82L0NP.TXT> and transfer

of the PS file AE82L0NP.PS (= .TXT) to the PDF-file AE82L0NP.PDF

underline: Yes/No

If No, please describe other method: .....

part 4,

AE391-7dd: 01061

Form A: Test chart AE39 similar to test chart 1 of DIN 33872-5  
20 step elementary hue circle; Test chart according to DIN 33872-5

input:  $rgb/cmy0/000n/w$  set...  
output:  $->rgb_{dd}$  setrgbcolor



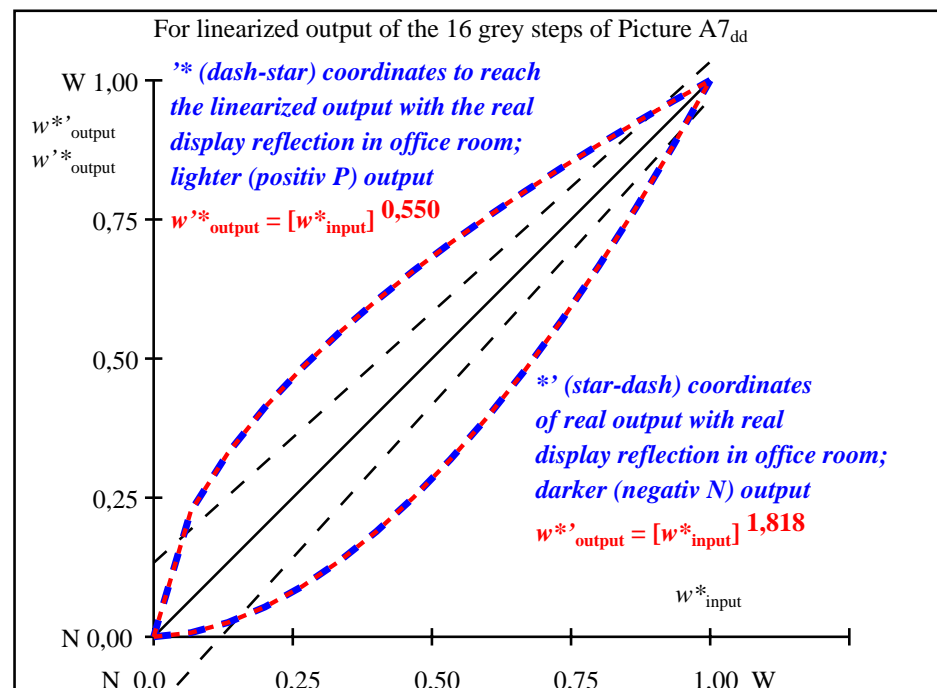
see similar files: <http://farbe.li.tu-berlin.de/AE39/AE39F0PX.PDF> / .PS; 3D-linearization, page 21/24  
technical information: <http://farbe.li.tu-berlin.de/AE39/AE39LF0PX.PDF> / .PS in file (F)

TUB Registration: 20190301-AE39/AE39L0FA.TXT /.PS  
application for measurement or viewing of display and print output  
TUB material: code=th4ta

i	LAB <sup>*</sup> <sub>ref</sub>	L <sup>*</sup> <sub>out</sub>	LAB <sup>*</sup> <sub>out</sub>	LAB <sup>*</sup> <sub>out-ref</sub>	ΔE <sup>*</sup>	Start output S1
1	52,01 0,00 0,00	0,00	52,01 0,00 0,00	0,00 0,00 0,00	0,01	Specification according to
2	54,91 0,00 0,00	0,27	63,82 0,00 0,00	8,90 0,00 0,00	8,90	ISO/IEC 15775 Annex G
3	57,80 0,00 0,00	0,37	68,48 0,00 0,00	10,68 0,00 0,00	10,68	and DIN 33866-1 Annex G
4	60,69 0,00 0,00	0,46	72,03 0,00 0,00	11,33 0,00 0,00	11,33	
5	63,58 0,00 0,00	0,52	75,00 0,00 0,00	11,41 0,00 0,00	11,41	
6	66,48 0,00 0,00	0,58	77,60 0,00 0,00	11,12 0,00 0,00	11,12	
7	69,37 0,00 0,00	0,64	79,94 0,00 0,00	10,57 0,00 0,00	10,57	
8	72,26 0,00 0,00	0,69	82,09 0,00 0,00	9,83 0,00 0,00	9,83	
9	75,16 0,00 0,00	0,73	84,09 0,00 0,00	8,93 0,00 0,00	8,93	
10	78,05 0,00 0,00	0,78	85,96 0,00 0,00	7,90 0,00 0,00	7,90	
11	80,94 0,00 0,00	0,82	87,72 0,00 0,00	6,77 0,00 0,00	6,77	
12	83,83 0,00 0,00	0,86	89,39 0,00 0,00	5,56 0,00 0,00	5,56	
13	86,73 0,00 0,00	0,89	90,99 0,00 0,00	4,26 0,00 0,00	4,26	
14	89,62 0,00 0,00	0,93	92,52 0,00 0,00	2,90 0,00 0,00	2,90	Mean lightness difference
15	92,51 0,00 0,00	0,96	93,99 0,00 0,00	1,47 0,00 0,00	1,47	(16 steps)
16	95,41 0,00 0,00	1,00	95,41 0,00 0,00	0,00 0,00 0,00	0,01	ΔE <sup>*</sup> <sub>CIELAB</sub> = 6,9
17	52,01 0,00 0,00	0,00	52,01 0,00 0,00	0,00 0,00 0,00	0,01	
18	62,86 0,00 0,00	0,51	74,30 0,00 0,00	11,43 0,00 0,00	11,43	Mean lightness difference
19	73,71 0,00 0,00	0,71	83,11 0,00 0,00	9,39 0,00 0,00	9,39	(5 steps)
20	84,56 0,00 0,00	0,87	89,80 0,00 0,00	5,24 0,00 0,00	5,24	ΔL <sup>*</sup> <sub>CIELAB</sub> = 5,2
21	95,41 0,00 0,00	1,00	95,41 0,00 0,00	0,00 0,00 0,00	0,01	Mean colour reproduction index: R <sup>*</sup> <sub>ab,m</sub> = 69,8

part 1,

AE390-3dd: 01062



part 2,

AE391-3dd: 01062

L <sup>*</sup> /Y <sub>intended</sub> (absolute)	52,0/20,1	54,9/22,8	57,8/25,7	60,6/28,9	63,5/32,2	66,4/35,9	69,3/39,8	72,2/44,0	75,1/48,5	78,0/53,3	80,9/58,3	83,8/63,7	86,7/69,4	89,6/75,4	92,5/81,8	95,4/88,5
0 0 0 n <sup>*</sup> setcmyk																
gp=0,550																
No. and Hex code	00;F	01;E	02;D	03;C	04;B	05;A	06;9	07;8	08;7	09;6	10;5	11;4	12;3	13;2	14;1	15;0
w <sup>*</sup> =l <sup>*</sup> <sub>CIELAB</sub> , r (relative)																
w <sup>*</sup> <sub>intended</sub>	0,000	0,067	0,133	0,200	0,267	0,333	0,400	0,467	0,533	0,600	0,667	0,733	0,800	0,867	0,933	1,000
w <sup>*</sup> <sub>output</sub>	0,000	0,226	0,329	0,412	0,483	0,546	0,604	0,657	0,707	0,755	0,800	0,842	0,884	0,924	0,962	1,000

part 3, picture A7<sub>dd</sub>: 16 visual equidistant L<sup>\*</sup>-grey steps; PS operator: 0 0 0 n<sup>\*</sup> setcmykcolor

AE390-7dd: 01062

In-out: Test chart AE39 similar to test chart 1 of DIN 33872-5  
Viewing Y contrast Y<sub>W</sub>:Y<sub>N</sub>=88,9:20; Y<sub>N</sub>-range 15 to <30

input: rgb/cmy0/000n/w set...  
output: ->rgb<sub>dd</sub> setrgbcolor

Input: Colorimetric Television Luminous System TLS00a

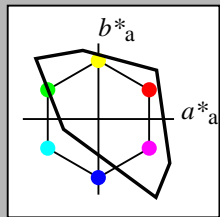
with *rgb* data of the  
four elementary hues

1 0 0 = Red  $R_e$

1 1 0 = Yellow  $Y_e$

0 1 0 = Green  $G_e$

0 0 1 = Blue  $B_e$



TLS00a; adapted (a) CIELAB data					
	$L^*=L^*_a$	$a^*_a$	$b^*_a$	$C^*_{ab,a}$	$h^*_{ab,a}$
O <sub>Ma</sub>	50.5	76.92	64.55	100.42	40
Y <sub>Ma</sub>	92.66	-20.69	90.75	93.08	103
L <sub>Ma</sub>	83.63	-82.75	79.9	115.04	136
C <sub>Ma</sub>	86.88	-46.16	-13.55	48.12	196
V <sub>Ma</sub>	30.39	76.06	-103.59	128.52	306
M <sub>Ma</sub>	57.3	94.35	-58.41	110.97	328
N <sub>Ma</sub>	0.01	0.0	0.0	0.0	0
W <sub>Ma</sub>	95.41	0.0	0.0	0.0	0
R <sub>CIE</sub>	39.92	58.74	27.99	65.07	25
J <sub>CIE</sub>	81.26	-2.88	71.56	71.62	92
G <sub>CIE</sub>	52.23	-42.41	13.6	44.55	162
B <sub>CIE</sub>	30.57	1.41	-46.46	46.49	272

Output: Colorimetric Television Luminous System TLS00a

with hue number

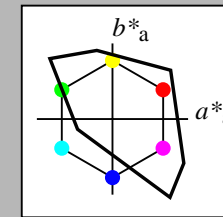
$n = 00$  to 19

00 = Red  $R_e$

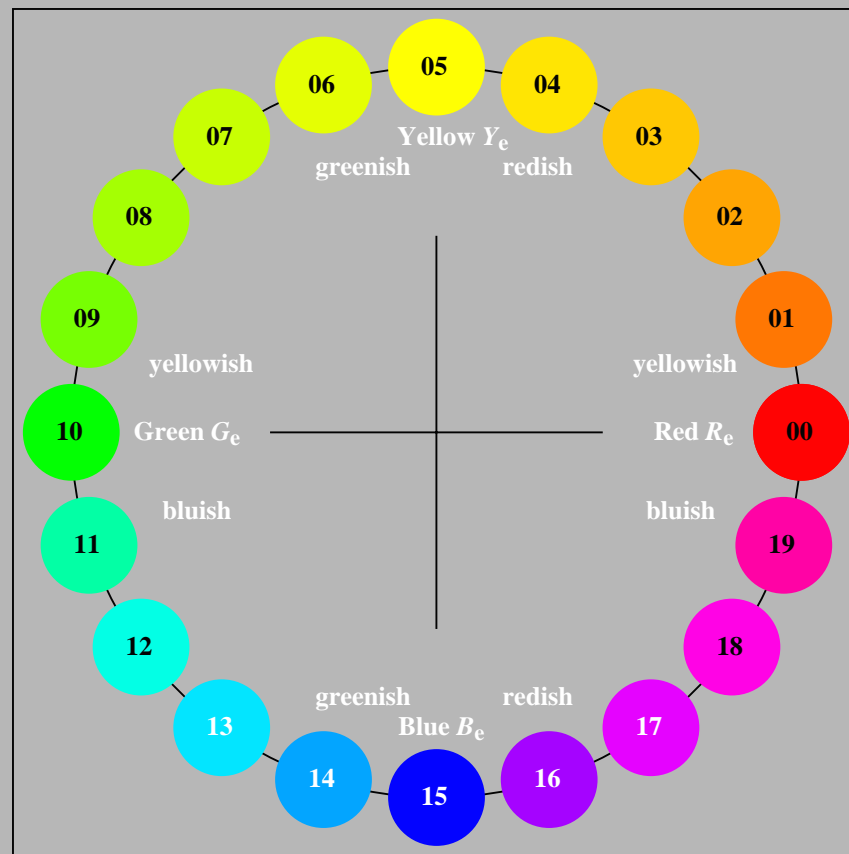
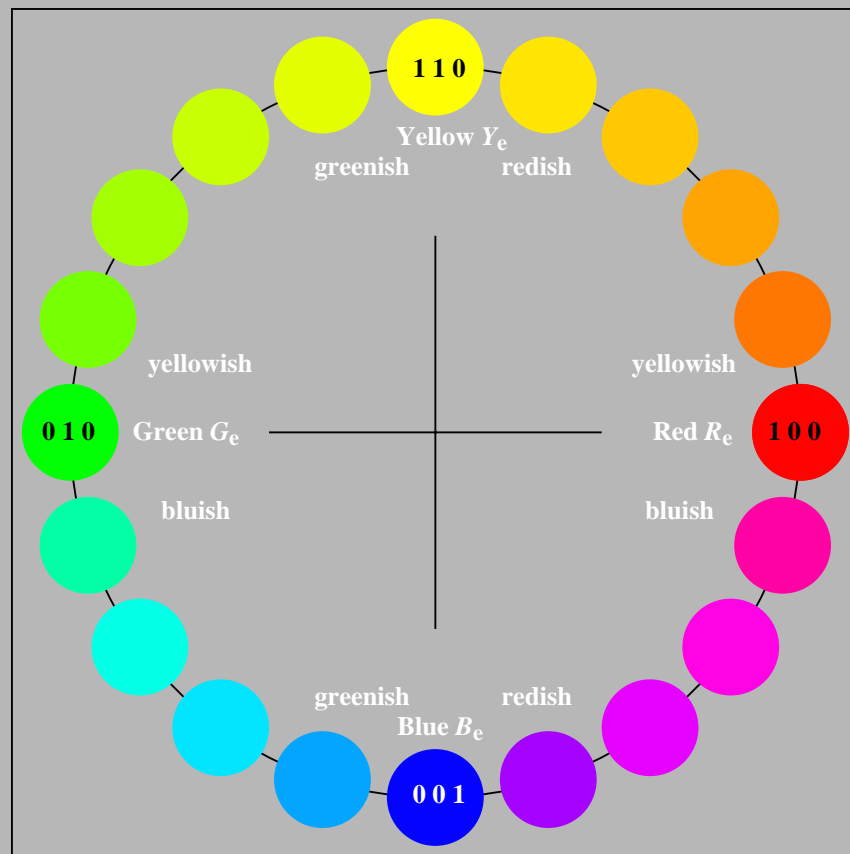
05 = Yellow  $Y_e$

10 = Green  $G_e$

15 = Blue  $B_e$



TLS00a; adapted (a) CIELAB data					
	$L^*=L^*_a$	$a^*_a$	$b^*_a$	$C^*_{ab,a}$	$h^*_{ab,a}$
O <sub>Ma</sub>	50.5	76.92	64.55	100.42	40
Y <sub>Ma</sub>	92.66	-20.69	90.75	93.08	103
L <sub>Ma</sub>	83.63	-82.75	79.9	115.04	136
C <sub>Ma</sub>	86.88	-46.16	-13.55	48.12	196
V <sub>Ma</sub>	30.39	76.06	-103.59	128.52	306
M <sub>Ma</sub>	57.3	94.35	-58.41	110.97	328
N <sub>Ma</sub>	0.01	0.0	0.0	0.0	0
W <sub>Ma</sub>	95.41	0.0	0.0	0.0	0
R <sub>CIE</sub>	39.92	58.74	27.99	65.07	25
J <sub>CIE</sub>	81.26	-2.88	71.56	71.62	92
G <sub>CIE</sub>	52.23	-42.41	13.6	44.55	162
B <sub>CIE</sub>	30.57	1.41	-46.46	46.49	272



AE390-7N-107-0: 20 step hue circle with 4 elementary colours  $R_e$ ,  $Y_e$ ,  $G_e$ ,  $B_e$  (left)

20 step hue circle with 4 elementary colours  $R_e$ ,  $Y_e$ ,  $G_e$ ,  $B_e$  (right)

Test chart AE39 similar to test chart 1 of DIN 33872-5

20 step elementary hue circle; Test chart according to DIN 33872-5

input: *rgb/cmy0/000n/w set...*

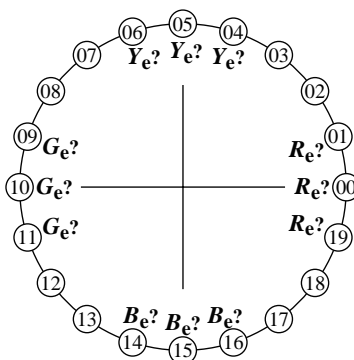
output: *->rgb<sub>dd</sub> setrgbcolor*

TUB Registration: 20190301-AE39/AE39L0FA.TXT /.PS  
application for measurement or viewing of display and print output

TUB material: code=th4ta

### Agreement with elementary hues (Yes/No decision)

Layout example: Agreement with elementary hues.



There are four elementary hues on each page:  
Red  $R_e$ , Yellow  $Y_e$ , Green  $G_e$ , and Blue  $B_e$

Input data 1 0 0 may produce: Red  $R_e$ .  
Input data 0 1 0 may produce: Green  $G_e$ .  
Input data 0 0 1 may produce: Blue  $B_e$ .  
Input data 1 1 0 may produce: Yellow  $Y_e$ .

The elementary hues Red  $R_e$  and Green  $G_e$   
should locate on the horizontal axis.

The elementary hues Yellow  $Y_e$  and Blue  $B_e$   
should locate on the vertical axis.

This test uses a hue circle with 20 hues.

No. 00 and 10 should be Red  $R_e$  and Green  $G_e$ .  
No. 05 and 15 should be Yellow  $Y_e$  and Blue  $B_e$ .

Are no. 00, 05, 10, and 15 the four elementary hues  $R_e$ ,  $Y_e$ ,  $G_e$  and  $B_e$ ? underline: Yes/No  
Only in case of "No":

Elementary Red  $R_e$  is hue step no. (e. g. 00, 01, 19) ..... (neither yellowish nor blueish)  
Elementary Yellow  $Y_e$  is hue step no. (e. g. 05, 04, 06) ..... (neither reddish nor greenish)  
Elementary Green  $G_e$  is hue step no. (e. g. 10, 09, 11) ..... (neither yellowish nor blueish)  
Elementary Blau  $B_e$  is hue step no. (e. g. 15, 14, 16) ..... (neither reddish nor greenish)

**Result:** Of the 4 elementary hues (e.g. three) ..... are at the intended location.

part 1,

AE390-3dd: 01071

### Documentation of file format, hardware and software for this test:

#### PDF file:

[http://farbe.li.tu-berlin.de/AE39/AE39F0PX\\_CY1\\_1.PDF](http://farbe.li.tu-berlin.de/AE39/AE39F0PX_CY1_1.PDF)

underline: Yes/No

#### PS file:

[http://farbe.li.tu-berlin.de/AE39/AE39F0PX\\_CY1\\_1.PS](http://farbe.li.tu-berlin.de/AE39/AE39F0PX_CY1_1.PS)

underline: Yes/No

#### Used computer operating system:

either one of Windows/Mac/Unix/other and version:.....

This evaluation is for the output: underline: monitor/data projector/printer

Device model, driver and version:.....

#### output with PDF/PS-file:

underline: PDF/PS file

#### For output with PDF file AE39F0PX\_CY1\_1.PDF

either PDF-file transfer "download, copy" to PDF device.....  
or with computer system interpretation by "Display-PDF":.....  
or with software e. g. Adobe-Reader/-Acrobat and version:.....  
or with software e. g. Ghostscript and version:.....

#### For output with PS file AE39F0PX\_CY1\_1.PS

either PS-file transfer "download, copy" to PS device.....  
or with computer system interpretation by "Display-PS":.....  
or with software e. g. Ghostscript and version:.....  
or with software e. g. Mac-Yap and version:.....

Special remarks: e. g. output of Landscape (L)

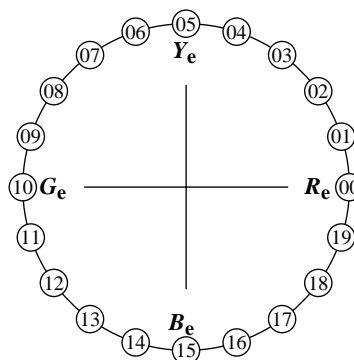
.....  
.....  
.....

part 3,

AE390-7dd: 01071

### Discriminability of colours with 20 hues (Yes/No decision)

Layout example: Discriminability of colours with 20 hues.



There are four elementary hues on each page:  
Red  $R_e$ , Yellow  $Y_e$ , Green  $G_e$ , and Blue  $B_e$

Input data 1 0 0 may produce: Red  $R_e$ .  
Input data 0 1 0 may produce: Green  $G_e$ .  
Input data 0 0 1 may produce: Blue  $B_e$ .  
Input data 1 1 0 may produce: Yellow  $Y_e$ .

Four hue steps are between:  
Red  $R_e$  and Yellow  $Y_e$ , Yellow  $Y_e$ , and Green  $G_e$ .  
Green  $G_e$  and Blue  $B_e$ , Blue  $B_e$ , and Red  $R_e$ .

This test uses a hue circle with 20 hues.  
All 20 hues should be distinguishable.

For this test it is **not** necessary:

1. All 20 differences are visually equal.
2. Elementary hues locate at 00, 05, 10, and 15.

Are all 20 colours of the 20 hues distinguishable?

underline: Yes/No

Only in case of "No":

The colours of the two hue steps no. (e. g. 00 and 01) .....are not distinguishable.  
The colours of the two hue steps no. (e. g. 14 and 15) .....are not distinguishable.  
The colours of the two hue steps no. (e. g. 15 and 16) .....are not distinguishable.  
List other pairs: .....

**Result:** Of the 20 hue differences are (e.g. 18) ..... differences visible.

part 2,

AE391-3dd: 01071

### Documentation of assessor colour-vision properties for visual assessment

The assessor has **normal** colour vision according to one test:  
either according to DIN 6160:1996 with Anomaloskop of Nagel  
or with test charts using colour points according to Ishihara  
or tested with, please specify: .....

underline: Yes/No

underline: Yes/unknown

underline: Yes/unknown

underline: Yes/unknown

### For visual evaluation of the display (Monitor, data projector) output

Office workplace illumination is daylight (clouded/north sky)

underline: Yes/No

PDF file: [http://farbe.li.tu-berlin.de/AE39/AE39F0PX\\_CY1\\_3.PDF](http://farbe.li.tu-berlin.de/AE39/AE39F0PX_CY1_3.PDF)

underline: Yes/No

PS file: [http://farbe.li.tu-berlin.de/AE39/AE39F0PX\\_CY1\\_3.PS](http://farbe.li.tu-berlin.de/AE39/AE39F0PX_CY1_3.PS)

underline: Yes/No

picture A7dd contrast range: (>F:0) (F:0) (E:0) (D:0) (C:0) (A:0) (9:0) (7:0) (5:0) (3:0) (<3:0)

compare standard print output according to ISO/IEC 15775 with range F:0

underline: Yes/No

Remark: In daylighted offices the contrast range is in many cases:

on display between: >F:0 and E:0 (monitor), D:0 and 3:0 (data projector)

### Only for optional colorimetric specification with PDF/PS file output

PDF file: [http://farbe.li.tu-berlin.de/AE39/AE39F0PX\\_CY1\\_3.PDF](http://farbe.li.tu-berlin.de/AE39/AE39F0PX_CY1_3.PDF)

underline: Yes/No

picture A7dd

underline: Yes/No

PS file: [http://farbe.li.tu-berlin.de/AE39/AE39F0PX\\_CY1\\_3.PS](http://farbe.li.tu-berlin.de/AE39/AE39F0PX_CY1_3.PS)

or underline: Yes/No

picture A7dd

or underline: Yes/No

### colour measurement and specification for:

CIE standard illuminant D65, 2 degree observer, CIE 45/0 geometry:

underline: Yes/No

If No, please give other parameters: .....

Colorimetric specification for 17 step colours of <http://farbe.li.tu-berlin.de/OE70/OE70L1NP.PDF>

Exchange of CIELAB data in file <http://farbe.li.tu-berlin.de/AE82/AE82L0NP.TXT> and transfer

of the PS file AE82L0NP.PS (= .TXT) to the PDF-file AE82L0NP.PDF

underline: Yes/No

If No, please describe other method: .....

part 4,

AE391-7dd: 01071

Form A: Test chart AE39 similar to test chart 1 of DIN 33872-5  
20 step elementary hue circle; Test chart according to DIN 33872-5

input:  $rgb/cmy0/000n/w$  set...  
output:  $->rgb_{dd}$  set $rgbc$ olor

see similar files: <http://farbe.li.tu-berlin.de/AE39/AE39L0FA.TXT> / .PS  
technical information: <http://farbe.li.tu-berlin.de/> or <http://farbe.li.tu-berlin.de/AE.HTM>

TUB Registration: 20190301-AE39/AE39L0FA.TXT / .PS  
application for measurement or viewing of display and print output  
TUB material: code=th4ta

<i>i</i>	$LAB^*_{ref}$	$L^*_{out}$	$LAB^*_{out}$	$LAB^*_{out-ref}$	$\Delta E^*$	Start output S1
1	69,69 0,00 0,00	0,00	69,69 0,00 0,00	0,00 0,00 0,00	0,01	Specification according to
2	71,41 0,00 0,00	0,30	77,45 0,00 0,00	6,04 0,00 0,00	6,04	ISO/IEC 15775 Annex G
3	73,12 0,00 0,00	0,41	80,23 0,00 0,00	7,11 0,00 0,00	7,11	and DIN 33866-1 Annex G
4	74,83 0,00 0,00	0,49	82,31 0,00 0,00	7,47 0,00 0,00	7,47	
5	76,55 0,00 0,00	0,55	84,02 0,00 0,00	7,47 0,00 0,00	7,47	
6	78,26 0,00 0,00	0,61	85,51 0,00 0,00	7,24 0,00 0,00	7,24	
7	79,98 0,00 0,00	0,66	86,83 0,00 0,00	6,85 0,00 0,00	6,85	
8	81,69 0,00 0,00	0,71	88,04 0,00 0,00	6,35 0,00 0,00	6,35	
9	83,41 0,00 0,00	0,75	89,16 0,00 0,00	5,75 0,00 0,00	5,75	
10	85,12 0,00 0,00	0,79	90,20 0,00 0,00	5,08 0,00 0,00	5,08	
11	86,83 0,00 0,00	0,83	91,18 0,00 0,00	4,34 0,00 0,00	4,34	
12	88,55 0,00 0,00	0,87	92,11 0,00 0,00	3,55 0,00 0,00	3,55	
13	90,26 0,00 0,00	0,90	92,99 0,00 0,00	2,72 0,00 0,00	2,72	
14	91,98 0,00 0,00	0,93	93,83 0,00 0,00	1,85 0,00 0,00	1,85	
15	93,69 0,00 0,00	0,96	94,63 0,00 0,00	0,94 0,00 0,00	0,94	
16	95,41 0,00 0,00	1,00	95,41 0,00 0,00	0,00 0,00 0,00	0,01	
17	69,69 0,00 0,00	0,00	69,69 0,00 0,00	0,00 0,00 0,00	0,01	
18	76,12 0,00 0,00	0,54	83,62 0,00 0,00	7,49 0,00 0,00	7,49	
19	82,55 0,00 0,00	0,73	88,61 0,00 0,00	6,06 0,00 0,00	6,06	
20	88,98 0,00 0,00	0,88	92,33 0,00 0,00	3,35 0,00 0,00	3,35	
21	95,41 0,00 0,00	1,00	95,41 0,00 0,00	0,00 0,00 0,00	0,01	

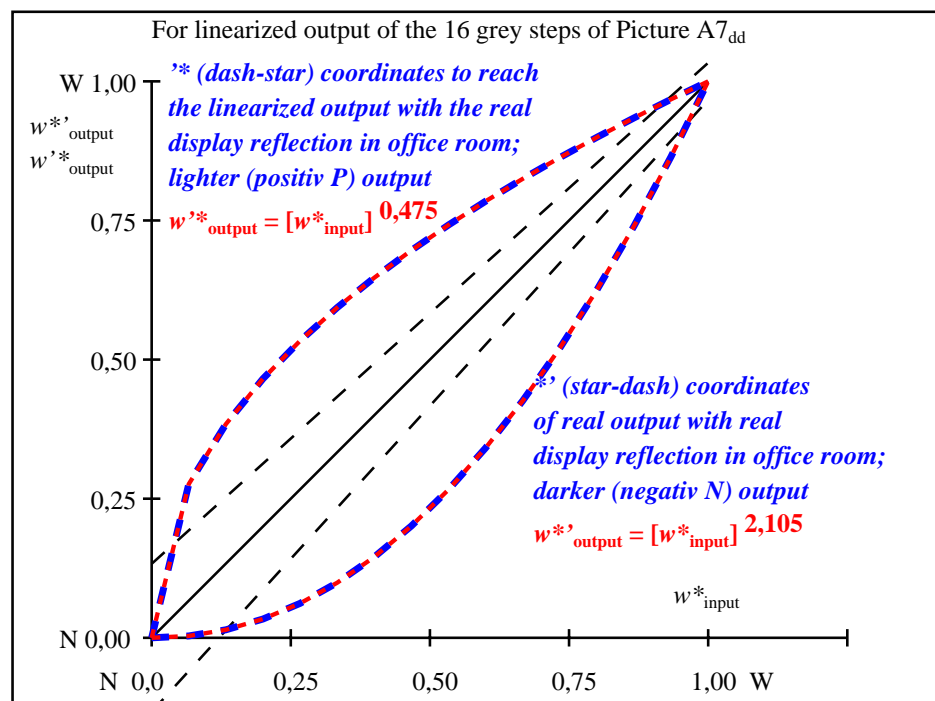
Mean lightness difference (16 steps)  
 $\Delta E^*_{CIELAB} = 4,5$

Mean lightness difference (5 steps)  
 $\Delta L^*_{CIELAB} = 3,3$

Mean colour reproduction index:  $R^*_{ab,m} = 80,3$

part 1,

AE390-3dd: 01072



AE391-3dd: 01072

$L^*/Y_{intended}$ (absolute)	69,6/40,3	71,4/42,7	73,1/45,3	74,8/48,0	76,5/50,7	78,2/53,6	79,9/56,6	81,6/59,7	83,4/62,9	85,1/66,2	86,8/69,6	88,5/73,2	90,2/76,8	91,9/80,6	93,6/84,5	95,4/88,5
0 0 0 n*																
setcmyk																
gp=0,475																
No. and Hex code	00;F	01;E	02;D	03;C	04;B	05;A	06;9	07;8	08;7	09;6	10;5	11;4	12;3	13;2	14;1	15;0
$w^* = l^*_{CIELAB, r}$ (relative)																
$w^*_{intended}$	0,000	0,067	0,133	0,200	0,267	0,333	0,400	0,467	0,533	0,600	0,667	0,733	0,800	0,867	0,933	1,000
$w^*_{output}$	0,000	0,276	0,383	0,465	0,534	0,593	0,647	0,696	0,741	0,784	0,825	0,862	0,899	0,934	0,967	1,000

part 3, picture A7<sub>dd</sub>: 16 visual equidistant  $L^*$ -grey steps; PS operator: 0 0 0 n\* setcmykcolor

AE390-7dd: 01072

In-out: Test chart AE39 similar to test chart 1 of DIN 33872-5  
Viewing  $Y$  contrast  $Y_W:Y_N=88,9:40$ ;  $Y_N$ -range 30 to <60

input:  $rgb/cmy0/000n/w$  set...  
output:  $->rgb_{dd}$  setrgbcolor