Basic and mixed colors of standard sRGB and a special LED display

basic color or mixed color and name		CIE standard chromaticity x	y	CIE standard tristimulus value X	Y	Z
sRGB display: three additive basic colors and White:						
$O = R_d$	Orang red	0,6400	0,3300	43,03	22,19	2,02
$L = G_d$	Leaf green	0,2900	0,6000	34,16	70,68	12,96
$V = B_d$	Violet blue	0,1415	0,0482	17,82	7,13	93,87
W	White	0,3127	0,3291	95,01	100,00	108,85
special LED display: three additive basic colors and White:						
$O = R_d$	Orang red	0,6400	0,3300	43,03+21%	22,19+21%	2,02+21%
$L = G_d$	Leaf green	0,2900	0,6000	34,16+21%	70,68+21%	12,96+21%
$V = B_d$	Violet blue	0,1415	0,0482	17,82+21%	7,13+21%	93,87+21%
W	White	0,3127	0,3291	95,01+0%	100,00+0%	108,85+0%

Assumption: Display of 142+30 cd/m² (=+21% compared to office standard)
rgb input data for Red and no internal display change *l**: 1,0 0,0 0,0 = 1,0 0,0 0,0
rgb input data for D65 and internal 10%-change of *l**: 1,0 1,0 1,0 –> 0,9 0,9 0,9
Result: The office luminance 142 cd/m² for 500 lux on White paper is matched.
CIELAB lightness *L** and chroma C^*_{ab} of Red is 10% higher for the LED display.

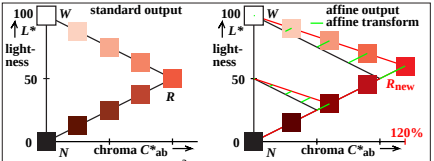
gek00−3N

Example files: Basic and mixed colors of a special LED display

basic color or mixed color and name		CIE standard chromaticity x	y	CIE standard tristimulus value X	Y	Z
special LED display: three additive basic colors and White:						
$O = R_d$	Orang red	0,6400	0,3300	43,03+44%	22,19+44%	2,02+44%
$L = G_d$	Leaf green	0,2900	0,6000	34,16+44%	70,68+44%	12,96+44%
$V = B_d$	Violet blue	0,1415	0,0482	17,82+44%	7,13+44%	93,87+44%
W	White	0,3127	0,3291	95,01+0%	100,00+0%	108,85+0%

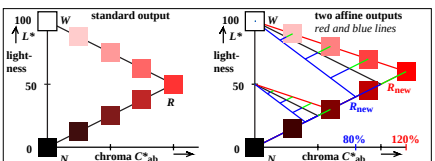
Assumption: Display of 142+64 cd/m² (=+44% compared to office standard)
rgb input data for Red and no internal display change *l**: 1,0 0,0 0,0 = 1,0 0,0 0,0
rgb input data for D65 and internal 20%-change of *l**: 1,0 1,0 1,0 –> 0,8 0,8 0,8
See example simulation files with 0, 5, 10, ..., 35%change on 8 pages and
white frame: http://farbe.li.tu-berlin.de/gek1/gek2l0np.pdf
grey frame: http://farbe.li.tu-berlin.de/gek1/gek1l0np.pdf
Compare for example samples 01b (White) and 01j (Orange red) on different pages
Result: Lightness *L** and chroma C^*_{ab} of Red is 20% higher for the LED display.
relative brilliance $l^* = l^* + 0{,}5\ c^*$ of Red is 30% higher for the LED display.
relative blackness $n^* = 1 - i^*$ of Red is 30% lower for the LED display.

gek00−7N



Assumption: display of 142+64 cd/m² (=+44% compared to office standard)
rgb input data for Red, no internal display change of *r**: 1,0 0,0 0,0 = 1,0 0,0 0,0
rgb input data for D65, internal 20% reduction of *w**: 1,0 1,0 1,0 –> 0,8 0,8 0,8
See example simulation files with 0, 5, 10, ..., 35% change on pages 1, 3,..,15 with
grey frame: http://farbe.li.tu-berlin.de/gek1/gek1l0np.pdf
Compare for example samples 01b (White) and 01j (device red) on different pages
Result if on page 5 sample 01b appears still White:
Lightness *L** and chroma C^*_{ab} of Red is 20% higher for the affine display output!
Similar effect for Green and displays with LED (3-band) backlight!
Problem in image technology: How to specify the affine output by a CRI?
Visual evaluation prefers the more chromatic affine output!
A fidelity metric gives low CRI's, similar in lighting for LED (3-band) output.

gek01−3N



***RGB* display luminance 142+64 cd/m²** (=+44% compared to office standard)
rgb input data for Red, no internal display change of *r**: 1,0 0,0 0,0 = 1,0 0,0 0,0
rgb input data for D65, internal 20% reduction of *w**: 1,0 1,0 1,0 –> 0,8 0,8 0,8
See example simulation files with 0, 5, 10, ..., 35% change on pages 1, 3,..,15 with
grey frame: http://farbe.li.tu-berlin.de/gek1/gek1l0np.pdf
or see an ISO-file: http://standards.iso.org/iso/9241/306/ed-2/AE89/AE89L0NP.PDF
The rgb data of all the colours are on the even pages 2, 4,...16.

***RGBW* display (projector) with additional white primary**
rgb input data for D65, internal 20% reduction of *r**: 1,0 0,0 0,0 –> 0,8 0,0 0,0
rgb input data for White, no internal display change of *w**: 1,0 0,0 0,0 = 1,0 1,0 1,0
Result: R_{new} **appears fluorescent and more chromatic on many *RGB* displays**
R_{new} **appears blackish or greyish on many *RGBW* displays**

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