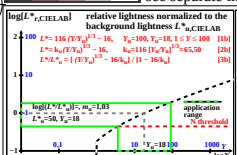
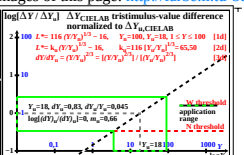
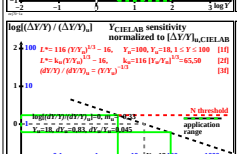
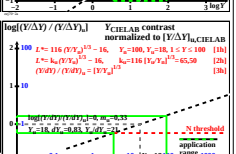
see similar files of the whole serie: http://farbe.li.tu-berlin.de/eejs.htm
technical information: http://farbe.li.tu-berlin.de or http://color.li.tu-berlin.de

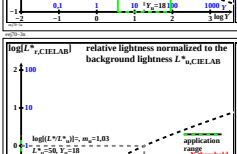
TUB registration: 20230701-eej7/eej70n1.txt /.ps
application for evaluation and measurement of display or print output
TUB material: code=rha4ta

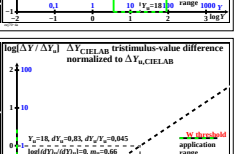


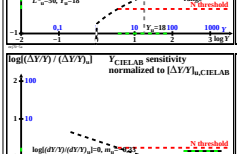


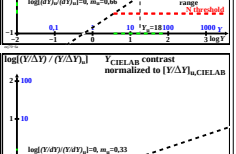


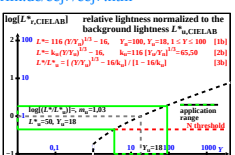


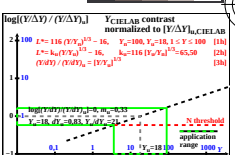


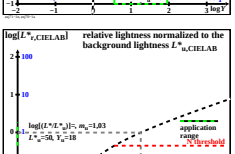


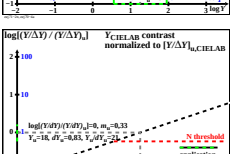












Lightness L^* and differences ΔY or dY in the colour space CIELAB

The lightness L^* is defined by the equation:

$$L^* = 116\,(Y/Y_n)^{1/3} - 16, \quad Y_n = 100, \; Y_r = 18, \; 1 \le Y \le 100 \qquad [1]$$

This CIELAB equation as function of relative tristimulus values is

$$L^* = k_n\,(Y/Y_n)^{1/3} - 16, \qquad k_n = 116\,[Y_r/Y_n]^{1/3} = 65{,}50 \qquad [2]$$

The tristimulus values difference dY is for $dL^*=1$

$$dY = (3/116)\cdot(Y/Y_n)^{2/3} = a\cdot(Y/Y_n)^{2/3} = b\cdot(Y/Y_n)^{2/3} \qquad [3]$$

$$a = 0{,}557 \quad b = 6{,}516 \qquad [4]$$

Relative normalized differences are dY/dY_n and $[Y/dY] / [(Y/dY)_n]$

$$dY/dY_n = (Y/Y_n)^{2/3} = [(Y/Y_n)^{1/3}] / [(Y_r/Y_n)^{1/3}] \qquad [5]$$

$$(Y/dY) / (Y/dY)_n = [(Y/Y_n)^{1/3} \qquad [6]$$

Line-element examples for grey samples ($0.2 \le x = Y/Y_n \le 5$)

$F(x)$ is called the line-element function of $f(x)$.

The following relations are valid for $x = Y/Y_n = Y/18$:

$$\frac{d[F(x)]}{dx} = f(x) \qquad [1]$$

$$F(x) = \int \frac{f'(x)}{f(x)}\,dx \qquad [2]$$

Example for all normalized tristimulus values $x = Y/Y_n$, for example for $Y_n = 3{,}6$, $Y_r = 18$, $Y_w = 90$.

$$\frac{d\,[\,k_n(x)^{1/3} - 16\,]}{dx} = [\,k_n(x)^{-2/3}\,] / 3 \qquad [3]$$

$$k_n(x)^{1/3} + \text{const} = \int \frac{k_n(x)^{-2/3}}{3} \qquad [4]$$

TUB-test chart eej7; CIELAB colour space and colour differences, see ISO/CIE 11664-4
log[lightness L^*, threshold ΔY, sensitivity $\Delta Y/Y$, contrast $Y/\Delta Y$], unnormalized and normalized for U