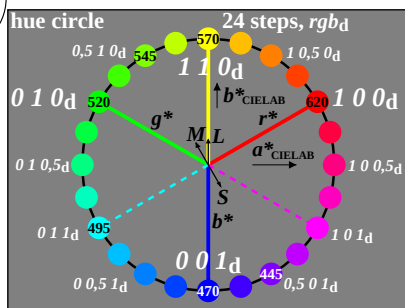
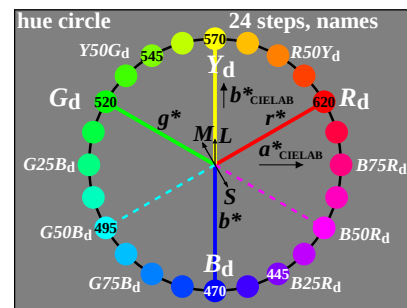




BEA60-1N



BEA60-2N

**Achromatic colours,
intermediate colours
five achromatic colours:**

N = black (French noir)
D = dark grey
Z = central grey
H = light grey
W = white

two intermediate colours:

C_e = G50B_e blue-green
M_e = B50R_e blue-red

**Chromatic colours,
elementary colours
"neither-nor"-colours**

four elementary (e) colours:

R = R_e red
neither yellowish nor bluish
G = G_e green
neither yellowish nor bluish
B = B_e blue
neither greenish nor reddish
J = Y_e yellow (French jaune)
neither greenish nor reddish

**chromatic colours,
device colours**

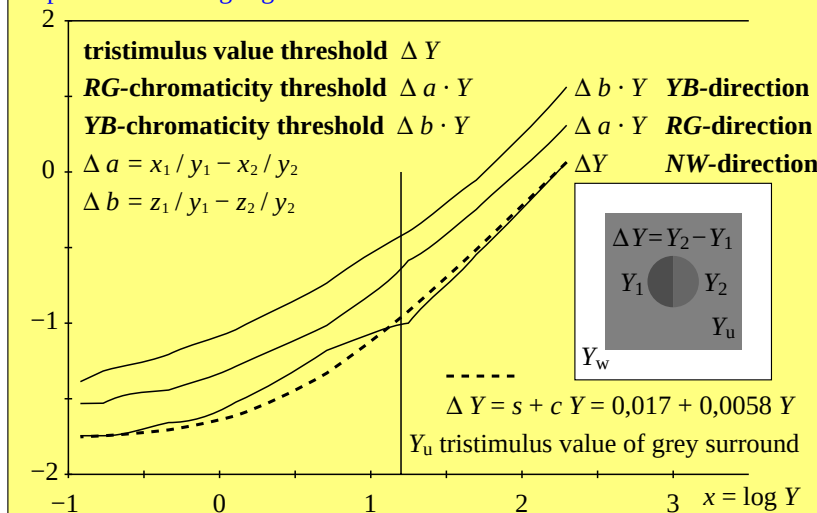
TV, print (PR), photo (PH)

six device (d) colours:

C = C_d cyan blue (cyan)
M = M_d magenta red (magenta)
Y = Y_d yellow
O = R_d orange red (red)
L = G_d leaf green (green)
V = B_d violet blue (blue)

NW-achromatic, and RG- and YB-chrom. thresholds as function of Y

experiments and data: BAM-research report no. 115 (1985), page 72, see
<https://nbn-resolving.org/urn:nbn:de:kobv:b43-3350>



BEA60-7, B4-70

TUB-test chart BEA6; Criteria for elementary hues
Thresholds in NW, RG and YB direction; Colour-difference formula LABJND and metric with (a, b) & Y

Colour-difference formula LABJND 1985 (JND=just noticeable difference)

$$\Delta E_{JND}^* = \Delta E_{85}^* = A_0 [(\Delta Y)^2 + (A_3 \Delta a'' \cdot Y)^2 + (A_4 \Delta b'' \cdot Y)^2]^{1/2} / (A_1 + A_2 \cdot Y)$$

$$a = x / y \quad a_n = x_n / y_n \quad b = -0,4 z / Y \quad b_n = -0,4 z_n / y_n$$

$$a'' = a_n + (a - a_n) / (1 + 0,5 |a - a_n|) \quad n = D65 \text{ or } A \text{ (background)}$$

$$b'' = b_n + (b - b_n) / (1 + 0,5 |b - b_n|)$$

$$Y = (Y_1 + Y_2) / 2 \quad \Delta Y = Y_1 - Y_2 \quad \Delta a'' = a_1'' - a_2'' \quad \Delta b'' = b_1'' - b_2''$$

$$A_1 = 0,0170 \quad A_2 = 0,0058$$

$$A_3 = 1,0 \quad A_4 = 1,8 \quad A_0 = 1,5 \quad \text{background D65}$$

$$A_3 = 1,0 \quad A_4 = 1,7 \quad A_0 = 1,0 \quad \text{background A}$$

Just noticeable difference (JND) in four colour directions

$$\Delta Y = \text{const} (A_1 + A_2 \cdot Y) / A_0 \quad \text{in luminance direction WN}$$

$$\Delta a'' \cdot Y = \text{const} (A_1 + A_2 \cdot Y) / (A_0 \cdot A_3) \quad \text{in chromaticity direction RG}$$

$$\Delta b'' \cdot Y = \text{const} (A_1 + A_2 \cdot Y) / (A_0 \cdot A_4) \quad \text{in chromaticity direction YB}$$

$$\Delta c_{ab}'' \cdot Y = \text{const} (A_1 + A_2 \cdot Y) / (A_0 \cdot [A_3^2 + A_4^2]^{1/2}) \quad \text{in any chromaticity direction } c_{ab}$$

BEA60-3N-L0

Colour-difference formula LABJND 1985 only for achromatic colours

$$\Delta E_{JND}^* = \Delta E_{85}^* = A_0 [(\Delta Y)^2 + (A_3 \Delta a \cdot Y)^2 + (A_4 \Delta b \cdot Y)^2]^{1/2} / (A_1 + A_2 \cdot Y)$$

$$a = x / y \quad b = -0,4 z / y$$

$$Y = (Y_1 + Y_2) / 2 \quad \Delta Y = Y_1 - Y_2 \quad \Delta a = a_1 - a_2 \quad \Delta b = b_1 - b_2$$

$$A_1 = 0,0170 \quad A_2 = 0,0058$$

$$A_3 = 1,0 \quad A_4 = 1,8 \quad A_0 = 1,5 \quad \text{background D65}$$

$$A_3 = 1,0 \quad A_4 = 1,7 \quad A_0 = 1,0 \quad \text{background A}$$

Just noticeable difference (JND) in three colour directions and line elements

$$A_0 \cdot \Delta Y = (A_1 + A_2 \cdot Y) \quad \text{in luminance direction WN}$$

$$A_0 \cdot \Delta a \cdot A_3 \cdot Y = (A_1 + A_2 \cdot Y) \quad \text{in chromaticity direction RG}$$

$$A_0 \cdot \Delta b \cdot A_4 \cdot Y = (A_1 + A_2 \cdot Y) \quad \text{in chromaticity direction YB}$$

$$dE_{85,L}^* = \frac{\delta}{\delta Y} L_{85}^* = \frac{\delta}{\delta Y} [(A_0 / A_2) \cdot \ln (A_1 + A_2 \cdot Y)] = A_0 \cdot dY / (A_1 + A_2 \cdot Y)$$

$$dE_{85,a}^* = \frac{\delta}{\delta a} a_{85}^* = \frac{\delta}{\delta a} [(A_0 \cdot A_3 \cdot Y \cdot a) / (A_1 + A_2 \cdot Y)] = A_0 \cdot da \cdot A_3 \cdot Y / (A_1 + A_2 \cdot Y)$$

$$dE_{85,b}^* = \frac{\delta}{\delta b} b_{85}^* = \frac{\delta}{\delta b} [(A_0 \cdot A_4 \cdot Y \cdot b) / (A_1 + A_2 \cdot Y)] = A_0 \cdot db \cdot A_4 \cdot Y / (A_1 + A_2 \cdot Y)$$

BEA60-3N-L0

input: rgb/cmy0/000k/n