

Color threshold formula LABJNDS 1985 (JND=just noticeable difference)

$$\Delta E_{\text{JND}}^* = Y_0 [(\Delta Y)^2 + (a_0 \Delta a'' \cdot Y)^2 + (b_0 \Delta b'' \cdot Y)^2]^{1/2} / (s + q \cdot Y^g)$$

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

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

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

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

$$s = 0,0170 \quad q = 0,0058 \quad g = 1,0$$

$$a_0 = 1,0 \quad b_0 = 1,8 \quad Y_0 = 1,5 \quad \text{surround D65}$$

$$a_0 = 1,0 \quad b_0 = 1,7 \quad Y_0 = 1,0 \quad \text{surround A}$$

Just noticeable difference (JND) in four colour directions

$$\Delta Y = \text{const} (s + q \cdot Y^g) / Y_0 \quad \text{in luminance direction } WN$$

$$\Delta a'' \cdot Y = \text{const} (s + q \cdot Y^g) / (Y_0 \cdot a_0) \quad \text{in chromaticity direction } RG$$

$$\Delta b'' \cdot Y = \text{const} (s + q \cdot Y^g) / (Y_0 \cdot b_0) \quad \text{in chromaticity direction } YB$$

$$\Delta c_{ab}'' \cdot Y = \text{const} (s + q \cdot Y^g) / (Y_0 \cdot [a_0^2 + b_0^2]^{1/2}) \quad \text{in any chromaticity direction } c_{ab}$$