Color threshold formula LABJNDS 1985 for *NW* achromatic colours

$$\Delta E^{*}_{JND,NW} = Y_0 \left[(\Delta Y_W)^2 + (\Delta c_{ab,W} \cdot Y_W)^2 \right]^{1/2} / \ (s + q \cdot Y_W{}^t)$$

$$= Y_0 \left[(\Delta Y_N)^2 + (\Delta c_{ab,N} \cdot Y_N)^2 \right]^{1/2} / \ (s + q \cdot Y_N{}^t)$$

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

$c_{ab} = [a_0{}^2 (a - a_n)^2 + b_0{}^2 (b - b_n)^2]^{1/2}$ n = D65 or A (surround)

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

$p_{c,NW} = c_{ab} / c_{ab,NW}$ s = 0,0170 q = 0,0058 t = 1,0

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

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

Just noticeable difference of complementary (c) *NW* colours with:

$(a_W - a_n)Y_W = (a_N - a_n)Y_N; \quad (b_W - b_n)Y_W = (b_N - b_n)Y_N; \quad c_{ab,W} Y_W = c_{ab,N} Y_N$

$\Delta Y_W = \text{const} \ (s + q \cdot Y_W{}^t) / Y_0$ in luminance direction *WN*

$\Delta c_{ab,W} \cdot Y_W = \text{const} \ (s + q \cdot Y_W{}^t) / Y_0$ in any chromaticity direction c_{ab}

$\Delta c_{ab,N} \cdot Y_N = \text{const} \ (s + q \cdot Y_N{}^t) / Y_0$ and for the *NW* purity $p_{c,NW}=0$