

## Color threshold formula YCHJNDS 1996 for all colours o&oc, N&W

$$\Delta E_{\text{JND}}^* = Y_0 [ (\Delta Y_{\text{eff}})^2 + (\Delta c_{\text{ab}} \cdot Y_{\text{eff}})^2 ]^{1/2} / (s + q \cdot Y_{\text{eff}})^t$$

$$Y_{\text{eff}} = Y \cdot [ 1 - p_{\text{c,o}} \cdot (1 - Y_0 / Y_n) ]; \quad Y_0 = \text{tristimulus value Ostwald colour}$$

$$a = x / y \quad a_n = x_n / y_n \quad b = -0,4 z / y \quad b_n = -0,4 z_n / y_n \quad Y_n = 100$$

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

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

$$p_{\text{c,o}} = c_{\text{ab}} / c_{\text{ab,o}}; p_{\text{c,oc}} = c_{\text{ab}} / c_{\text{ab,oc}} \quad s = 0,0170 \quad q = 0,0058 \quad t = 1,0$$

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

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

**Just noticeable difference of all complementary (c) colours o&oc, N&W**

$$(a_o - a_n)Y_o = (a_{\text{oc}} - a_n)Y_{\text{oc}}; \quad (b_o - b_n)Y_o = (b_{\text{oc}} - b_n)Y_{\text{oc}}; \quad c_{\text{ab,o}}Y_o = c_{\text{ab,oc}}Y_{\text{oc}}$$

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

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

$$\Delta c_{\text{ab,c}} \cdot Y_{\text{c,eff}} = \text{const} (s + q \cdot Y_{\text{c,eff}})^t / Y_0 \quad \text{and for any purity } 0 \leq p_{\text{c}} \text{ or } p_{\text{c,c}} \leq 1$$