

Contrast steps C_{Y_i} ($i=1$ to 8), CIE tristimulus values Y_W and Y_N according to ISO 9241-306¹⁾

Contrast step C_{Y_i} and Y -ratio ($i=1 \dots 8$)	CIE tristimulus values; Ratio $Y_W : Y_N$ of White W and Black N	CIE tristimulus values; Range $Y_{N1} \dots Y_{N2}$	Paper (S) luminance ²⁾ ; Ratio $[cd/m^2]$ $L_{WS} : L_{NS}$	Display (P) luminance ²⁾ ; Ratio $[cd/m^2]$ $L_{WP} : L_{NP}$	application and colour mode at work place; illuminance on display 125 lux or 62/31/15 lux
C_{Y8} 288:1	88,9 : 0,31	0,00 ... <0,46	142 : 142/288	36*36 : 4,5	display, only 15 lux
C_{Y7} 144:1	88,9 : 0,62	0,46 ... <0,93	142 : 142/144	36*36 : 09	display, only 31 lux
C_{Y6} 72:1	88,9 : 1,25	0,93 ... <1,87	142 : 142/72	36*36 : 18	display, only 62 lux
C_{Y5} 36:1	88,9 : 2,50	1,87 ... <3,75	142 : 142/36	36*36 : 36	display & surface
C_{Y4} 18:1	88,9 : 5,00	3,75 ... <7,50	142 : 142/18	36*18 : 36	display & surface
C_{Y3} 9:1	88,9 : 10,0	7,50 ... <15,0	142 : 142/09	36*09 : 36	display & surface
C_{Y2} 4,5:1	88,9 : 20,0	15,0 ... <30,0	142 : 142/4,5	36*4,5 : 36	display & surface
C_{Y1} 2,25:1³⁾	88,9 : 40,0	30,0 ... <60,0	142 : 142/2,25	36*2,25 : 36	display & surface

1) The example is intended for data projectors (P). The standard contrast step (bold) with $L_{WP}=36*36 \text{ cd/m}^2$ is hard to reach.

2) 125 lux corresponds to the viewing luminance $L_v=36 \text{ cd/m}^2$ for a standard white paper with the tristimulus value $Y_W=88,9$.

3) For the contrast $C_Y=2:1$ the viewing luminances of both the black in the projection and the white standard offset paper are equal (!).

Visual fatigue caused by the adaptation luminance ratio 36:1 of the black at the screen and the black at the paper shall be reduced.

If for example a grey screen with the CIE tristimulus value $Y_Z = 22,2 (=0,25*88,9)$ is used the contrast step C_{Y_i} remains constant.

Then the luminance ratio of all colours at the screen and the paper has reduced to 9:1. This reduces visual fatigue.