

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	absolute Gamma G_{p_k} ($k=0$ to 7) for display (P) with $G_{p_0}=2,4$ ²⁾ $G_{p_k}=2,4-0,18k$	Paper (S) luminance; Ratio $[cd/m^2]$ $L_{WS} : L_{NS}$	Display (P) luminance; Ratio $[cd/m^2]$ $L_{WP} : L_{NP}$	application and colour mode at work place; illuminance on display 500 lux or 250/125/62 lux
C_{Y_8} 288:1	88,9 : 0,31	$G_{p_0} = 2,40$	142 : 142/288	142*36 : 018	display, only 062 lux
C_{Y_7} 144:1	88,9 : 0,62	$G_{p_1} = 2,22$	142 : 142/144	142*36 : 035	display, only 125 lux
C_{Y_6} 72:1	88,9 : 1,25	$G_{p_2} = 2,04$	142 : 142/72	142*36 : 071	display, only 250 lux
C_{Y_5} 36:1	88,9 : 2,50	$G_{p_3} = 1,86$	142 : 142/36	142*36 : 142	display & surface
C_{Y_4} 18:1	88,9 : 5,00	$G_{p_4} = 1,68$	142 : 142/18	142*18 : 142	display & surface
C_{Y_3} 9:1	88,9 : 10,0	$G_{p_5} = 1,50$	142 : 142/09	142*09 : 142	display & surface
C_{Y_2} 4,5:1	88,9 : 20,0	$G_{p_6} = 1,32$	142 : 142/4,5	142*4,5 : 142	display & surface
C_{Y_1} 2,25:1 ³⁾	88,9 : 40,0	$G_{p_7} = 1,14$	142 : 142/2,25	142*2,25:142	display & surface

1) The example is given for data projectors (P). The standard contrast step (bold) C_{Y_5} with $L_{WP}=142*36 \text{ cd/m}^2$ is hard to reach.

2) The computer operating system *Apple* has used the value 1,8 until 2010. The change to 2,4 (= *Windows*) is in the wrong direction.

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_1} remains constant.

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