

Contrast step C_{Yi} (i=1 to 8), CIE tristimulus value Y_N , grey steps according to ISO 9241-306¹⁾

Contrast step C_{Yi} and Y-ratio (i=1 .. 8)	CIE tristimulus value Y_N and CIE lightness L_N^* of black	total viewing display illuminance E_{P+R} [lux] ²⁾	measured projector (P) display illuminance E_P [lux] ²⁾	room light (R) display illuminance E_R [lux] ²⁾	grey steps without output linearisation delta $L^*=1$ amount a_n ³⁾	grey steps with output linearisation delta $L^*=1$ amount a_l ³⁾
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The following example assumes that a projector produces the contrast step C_{Y3} for the illuminances measured for 5 times the horizontal A4 direction (149 cm):

C_{Y4} 36:1	10 / 38	2400+2000	4275	125	38	77
C_{Y3} 9:1	20 / 52	1200+1000	2075	125	34	68
C_{Y2} 4,5:1	40 / 70	600+500	975	125	28	57

The illuminances E_P are by the factor 4 less for 10 times the A4-direction (298 cm):

C_{Yx1} 4:1⁴⁾	30 / 61	1069+125	1069	125		34
C_{Yx2} 2:1⁵⁾	45 / 74	518+125	518	125		21

- 1) The example is intended for data projectors (P). The standard contrast step (bold) $C_{Y5} = 36:1$ is not reached.
- 2) 125 lux corresponds to the viewing luminance $L_v = 35 \text{ cd/m}^2$ for a standard white paper with the tristimulus value $Y_w = 88,9$.
- 3) For the amount of discriminable colour steps use the equations: $c_n = a_n^3$ or $c_l = a_l^3$, for example $c_n = 4096$ for $a_n = 16$.
- 4) The viewing contrast $C_{Yx1} = 1194:125 = 8,5:1$ is larger compared to the contrast $C_{Y2} = 4,5:1$. The contrast step is $C_{Y2} = 4,5:1$.
- 5) The viewing contrast $C_{Yx2} = 643:125 = 5,1:1$ is larger compared to the contrast $C_{Y2} = 4,5:1$. The contrast step is $C_{Y2} = 4,5:1$.