

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

Contrast step C_{Y_i} and Y -ratio ($i=1 \dots 8$)	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_{Y_3} for the illuminances measured for 5 times the horizontal A4 direction (149 cm):

C_{Y_3} 9:1	10 / 38	2500+2000	4000	500	28	57
C_{Y_2} 4,5:1	20 / 52	1250+1000	1750	500	21	43
C_{Y_1} 2,25:1	40 / 70	625+500	625	500	12	25

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

$C_{Y_{x1}}$ 3:1 ⁴⁾	30 / 61	1000+500	1000	500	17	34
$C_{Y_{x2}}$ 1,9:1 ⁵⁾	45 / 74	438+500	438	500	10	21

- 1) The example is intended for data projectors (P). The standard contrast step (bold) $C_{Y_5} = 36:1$ is not reached.
- 2) 500 lux corresponds to the viewing luminance $L_v = 142 \text{ cd/m}^2$ 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 $C_{Y_{x1}} = 1500:500 = 3:1$ is larger compared to the contrast $C_{Y_1} = 2,25:1$. The contrast step is $C_{Y_1} = 2,25:1$.
- 5) The viewing contrast $C_{Y_{x2}} = 938:500 = 1,9:1$ is smaller compared to the contrast $C_{Y_1} = 2,25:1$. A contrast step is not defined.