

**Colourimetric scaling of achromatic colours between peak white and black.
Relations between tristimulus value Y , luminance L , and lightness L^* of ISO-standards**

Colour (light or paper)	tristimulus values	HDR display luminance	relative luminance		CIELAB _W lightness	TUBLOG _U lightness
Contrast W:N (25:1=100:4)	Y ($5^{0,5}=2,24$)	L [cd/m ²]	L_{rU} $=L/L_U$	L_{rW} $=L/L_W$	$L^*_{CIELABW}$ $=c_W L_{nW}^{1/3} - 16$	$L^*_{TUBLOGU}$ $=t_U \log(L_{nU}) + 50$
White P2 (light)	450 $=18*25$	1000 $=40*25$	25	2,24	182=50+132 $=c(5,00)^{1/3} - 16$	150=50+102 $=t \log(25,00) + 50$
White P1 (light)	224 $=18*11,2$	448 $=40*11,2$	11,2	1,00	135=50+85 $=c(2,24)^{1/3} - 16$	125=50+77 $=t \log(11,20) + 50$
White W (fluorescent paper)	90 $=18*5$	200 $=40*5$	5	0,45	100=50+50 $=c(1,00)^{1/3} - 16$	100=50+52 $=t \log(5,00) + 50$
Grey U (paper)	18 $=18*1$	40 $=40*1$	1	0,20	51=50+1 $=c(0,20)^{1/3} - 16$	50=50+2 $=t \log(1,00) + 50$
Black N (paper)	3,6 $=18/5$	8 $=40/5$	0,20	0,09	23=50-26 $=c(0,04)^{1/3} - 16$	0=50-48 $=t \log(0,20) + 50$
Black p1 (glossy paper)	2,5 $=18/7$	5,7 $=40/7$	0,14	0,04	17=50-32 $=c(0,03)^{1/3} - 16$	-14=50-62 $=t \log(0,13) + 50$
Black p2 (glossy paper)	1,8 $=18/10$	4 $=40/10$	0,10	0,022	14=50-35 $=c(0,02)^{1/3} - 16$	-24=50-72 $=t \log(0,09) + 50$

It is valid: CIELAB_W: $c_W=c=116$, TUBLOG_U: $t_U=t=50/\log(5)=72$