

**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 <sub>W</sub> lightness	TUBLOG <sub>U</sub> lightness
<b>Contrast W:N (25:1=90:3,6)</b>	$Y$ ( $5^{0,5}=2,24$ )	$L$ [cd/m <sup>2</sup> ]	$L_{rU}$ $=L/L_U$	$L_{rW}$ $=L/L_W$	$L^*_{CIELABW}$ $=c_W L_{nW}^{1/3} - 16$	$L^*_{TUBLOGU}$ $=t_U \log(L_{nU}) + 52$
White P1 (light)	180 $=18*10$	400 $=40*10$	10	2,24	125=50+75 $=c(2,00)^{1/3} - 16$	120=50+70 $=t \log(10,00) + 52$
White W (fluorescent paper)	90 $=18*5$	200 $=40*5$	5	1,00	95=50+45 $=c(1,00)^{1/3} - 16$	98=50+48 $=t \log(5,00) + 52$
light Grey H (paper)	40 $=18*2,24$	89,6 $=40*2,24$	2,24	0,45	69=50+19 $=c(0,45)^{1/3} - 16$	73=50+23 $=t \log(2,24) + 52$
Grey U (paper)	18	40 $40*1$	1	0,20	49=50-0 $=c(0,20)^{1/3} - 16$	48=50-1 $=t \log(1,00) + 52$
dark Grey D (paper)	8,0 $=18/2,24$	17,9	0,45	0,09	34=50-15 $=c(0,09)^{1/3} - 16$	23=50-26 $=t \log(0,45) + 52$
Black N (paper)	3,6 $=18/5$	8 $28,2/5$	0,20	0,04	22=50-27 $=c(0,04)^{1/3} - 16$	-1=50-51 $=t \log(0,20) + 52$
Black p1 (glossy paper)	1,8 $=18/10$	4 $28,2/11,2$	0,10	0,022	14=50-35 $=c(0,02)^{1/3} - 16$	-22=50-72 $=t \log(0,10) + 52$

It is valid: CIELAB<sub>W</sub>:  $c_W=c=116$ , TUBLOG<sub>U</sub>:  $t_U=t=50/\log(5)=72$