

**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>U</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> ]	$L$ $=L/L_U$	$L_{rW}$ $=L/L_W$	$L^*_{CIELAB_U}$ $=d_U L_{rU}^{1/3}-16$	$L^*_{TUBLOG_U}$ $=t_U \log(L_{rU})+50$
White P2 (light)	360 $=18*20$	800 $=40*20$	25	2,24	161=50+111 $=d(11,2)^{1/3}-16$	121=50+71 $=t \log(20)+50$
White P1 (light)	180 $=18*10$	400 $=40*10$	20	1,00	125=50+75 $=d(5,00)^{1/3}-16$	104=50+54 $=t \log(10)+50$
White W (fluorescent paper)	90 $=18*5$	200 $=40*5$	5	0,45	95=50+45 $=d(2,24)^{1/3}-16$	87=50+37 $=t \log(5,0)+50$
Grey U (paper)	18 $=18*1$	40 $40*1$	1	0,20	49=50-0 $=d(1,00)^{1/3}-16$	47=50-2 $=t \log(1)+50$
Black N (paper)	3,6 $=18/5$	8 $40/5$	0,20	0,09	22=50-27 $=d(0,45)^{1/3}-16$	7=50-42 $=t \log(0,20)+50$
Black p1 (glossy paper)	2,5 $=18/7$	5,7 $40/7$	0,14	0,04	17=50-32 $=d(0,20)^{1/3}-16$	-1=50-51 $=t \log(0,14)+50$
Black p2 (glossy paper)	1,8 $=18/10$	4 $40/10$	0,10	0,022	14=50-35 $=d(0,09)^{1/3}-16$	-9=50-59 $=t \log(0,10)+50$

It is valid: CIELAB<sub>U</sub>:  $d_U=d=66$ , TUBLOG<sub>U</sub>:  $t_U=t=40/\log(5)=57$