

**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	IECsRGB <sub>W</sub> lightness	relative luminance		CIELAB <sub>W</sub> lightness	TUBLOG <sub>U</sub> lightness
<b>Contrast W:N (25:1=100:4)</b>	$Y$ ( $5^{0,5}=2,24$ )	$L^*_{IECsRGBW} = s_W L_{rW}^{1/2,4}$	$L_{rU}$ $=L/L_U$	$L_{rW}$ $=L/L_W$	$L^*_{CIELABW} = c_W L_{rW}^{1/3} - 16$	$L^*_{TUBLOGU} = t_U \log(L_{rU}) + 50$
White P2 (light)	450 $=18*25$	$104=54+50$ $=s(2,24)^{1/2,4}$	25	2,24	$104=54+50$ $=c(2,24)^{1/3} - 16$	$103=53+50$ $=t \log(11,2) + 50$
White P1 (light)	224 $=18*11,2$	$74=24+50$ $=s(1,00)^{1/2,4}$	11,2	1,00	$76=26+50$ $=c(1,00)^{1/3} - 16$	$78=28+50$ $=t \log(5,00) + 50$
White W (fluorescent paper)	90 $=18*5$	$53=3+50$ $=s(0,45)^{1/2,4}$	5	0,45	$54=4+50$ $=c(0,45)^{1/3} - 16$	$53=3+50$ $=t \log(2,24) + 50$
Grey U (paper)	18 $=18*1$	$38=-11+50$ $=s(0,20)^{1/2,4}$	1	0,20	$37=-12+50$ $=c(0,20)^{1/3} - 16$	$28=-21+50$ $=t \log(1,00) + 50$
Black N (paper)	3,6 $=18/5$	$27=-22+50$ $=s(0,09)^{1/2,4}$	0,20	0,09	$25=-24+50$ $=c(0,09)^{1/3} - 16$	$3=-46+50$ $=t \log(0,45) + 50$
Black p1 (glossy paper)	2,5 $=18/7$	$19=-30+50$ $=s(0,04)^{1/2,4}$	0,14	0,04	$15=-34+50$ $=c(0,04)^{1/3} - 16$	$-21=-71+50$ $=t \log(0,20) + 50$
Black p2 (glossy paper)	1,8 $=18/10$	$14=-35+50$ $=s(0,02)^{1/2,4}$	0,10	0,022	$8=-41+50$ $=c(0,02)^{1/3} - 16$	$-46=-96+50$ $=t \log(0,09) + 50$

Valid: CIELAB<sub>W</sub>:  $c_W=c=116$ , IECsRGB<sub>W</sub>:  $s_W=s=100$ , TUBLOG<sub>U</sub>:  $t_U=t=50/\log(5)=71,533$