

**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=100:4)</b>	<b>Y</b> ( <sup>50,5</sup> =2,24	<b>L</b> [cd/m <sup>2</sup> ]	$L_{rU} / L_{rW} = L_{rU} / L_{rW}$	$L^*_{CIELABW} = \sqrt[3]{\frac{L_{rU}}{L_{rW}}} = \sqrt[3]{\frac{L}{L_{rW}}} = \sqrt[3]{\frac{L}{25}} = 16$	$L^*_{TUBLOGU} = \log(L_{rU}) + 50$
White P2=p00w (light)	500 =100*5	1000 =200*5	=5*5	182=50+132 =c(5,00) <sup>1/3</sup> -16	150=50+102 =t log(25,00)+50
White p02w (light)	334 =100*3,34	668 =200*3,34	=16,7 =5*3,3	157=50+107 =c(3,34) <sup>1/3</sup> -16	137=50+89 =t log(16,70)+50
White p04w (light)	224 =100*2,24	448 =200*2,24	=11,2 =5*2,2	135=50+85 =c(2,24) <sup>1/3</sup> -16	125=50+77 =t log(11,20)+50
White p06w (light)	150 =100*1,50	300 =200*1,5	=7,5 =5*1,5	120=50+70 =c(1,62) <sup>1/3</sup> -16	114=50+66 =t log(8,10)+50
White W=p08w (glossy paper)	100 =100/1	200 =200*1	=5 =5*1	100=50+50 =c(1,00) <sup>1/3</sup> -16	100=50+52 =t log(5,00)+50
Grey U=w08n (paper)	20 =100/5	40 =200/5	=1 =5/5	51=50+1 =c(0,20) <sup>1/3</sup> -16	50=50+2 =t log(1,00)+50
Black N=w16n (glossy paper)	4 =100/25	8 =200/25	=0,2 =5/25	23=50-26 =c(0,04) <sup>1/3</sup> -16	0=50-48 =t log(0,20)+50

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

iea0-3n

**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=100:4)</b>	<b>Y</b> ( <sup>50,5</sup> =2,24	<b>L</b> [cd/m <sup>2</sup> ]	$L_{rU} / L_{rW} = L_{rU} / L_{rW}$	$L^*_{CIELABW} = \sqrt[3]{\frac{L_{rU}}{L_{rW}}} = \sqrt[3]{\frac{L}{L_{rW}}} = \sqrt[3]{\frac{L}{25}} = 16$	$L^*_{TUBLOGU} = \log(L_{rU}) + 50$
White P2 (light)	500 =20*25	1000 =40*25	=5*5	182=50+132 =c(5,00) <sup>1/3</sup> -16	150=50+102 =t log(25,00)+50
White W (fluorescent paper)	100 =20*5	200 =40*5	=5 =5*1	100=50+50 =c(1,00) <sup>1/3</sup> -16	100=50+52 =t log(5,00)+50
light Grey H (paper)	44,8 =20*2,24	89,6 =40*2,24	=2,24 =0,45	72=50+22 =c(0,45) <sup>1/3</sup> -16	75=50+27 =t log(2,24)+50
Grey U (paper)	20 =100/5	40 =200/5	=1 =5/5	51=50+1 =c(0,20) <sup>1/3</sup> -16	50=50+2 =t log(1,00)+50
dark Grey D (paper)	8,9 =20/2,24	17,8 =40/2,24	=0,45 =0,09	35=50-14 =c(0,09) <sup>1/3</sup> -16	24=50-23 =t log(0,45)+50
Black N (paper)	4 =20/5	8 =40/5	=0,2 =0,04	23=50-26 =c(0,04) <sup>1/3</sup> -16	0=50-48 =t log(0,20)+50
Black P2 (glossy paper)	1,9 =20/11,2	3,6 =40/11,2	=0,09 =0,02	14=50-35 =c(0,02) <sup>1/3</sup> -16	24=50-72 =t log(0,09)+50

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

iea00-7n

**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>	<b>Y</b> ( <sup>50,5</sup> =2,24	$L^*_{IECsRGBW} = \sqrt[2,4]{\frac{L_{rU}}{L_{rW}}}$	$L_{rU} / L_{rW} = L_{rU} / L_{rW}$	$L^*_{CIELABW} = \sqrt[3]{\frac{L_{rU}}{L_{rW}}} = \sqrt[3]{\frac{L}{L_{rW}}} = \sqrt[3]{\frac{L}{25}} = 16$	$L^*_{TUBLOGU} = \log(L_{rU}) + 50$
White P2=p00w (light)	500 =100*5	195=50+145 =s(5,00) <sup>1/2,4</sup>	=5*5	182=50+132 =c(5,00) <sup>1/3</sup> -16	150=50+102 =t log(25,00)+50
White p02w (light)	334 =100*3,34	165=50+115 =s(3,34) <sup>1/2,4</sup>	=16,7 =5*3,3	157=50+107 =c(3,34) <sup>1/3</sup> -16	137=50+89 =t log(16,70)+50
White p04w (light)	224 =100*2,24	139=50+89 =s(2,24) <sup>1/2,4</sup>	=11,2 =5*2,2	135=50+85 =c(2,24) <sup>1/3</sup> -16	125=50+77 =t log(11,20)+50
White p06w (light)	150 =100*1,50	122=50+72 =s(1,62) <sup>1/2,4</sup>	=7,5 =5*1,5	120=50+70 =c(1,62) <sup>1/3</sup> -16	114=50+66 =t log(8,10)+50
White W=p08w (glossy paper)	100 =100/1	100=50+50 =s(1,00) <sup>1/2,4</sup>	=5 =5*1	100=50+50 =c(1,00) <sup>1/3</sup> -16	100=50+52 =t log(5,00)+50
Grey U=w08n (paper)	20 =100/5	51=50+1 =s(0,20) <sup>1/2,4</sup>	=1 =5/5	51=50+1 =c(0,20) <sup>1/3</sup> -16	50=50+2 =t log(1,00)+50
Black N=w16n (glossy paper)	4 =100/25	26=50-23 =s(0,04) <sup>1/2,4</sup>	=0,2 =5/25	23=50-26 =c(0,04) <sup>1/3</sup> -16	0=50-48 =t log(0,20)+50

It is valid: CIELAB<sub>W</sub>: c<sub>w</sub>=c=116, IECsRGB<sub>W</sub>: s<sub>w</sub>=s=100, TUBLOG<sub>U</sub>: t<sub>U</sub>=t=50/log(5)=72

iea01-3n

**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>	<b>Y</b> ( <sup>50,5</sup> =2,24	$L^*_{IECsRGBW} = \sqrt[2,4]{\frac{L_{rU}}{L_{rW}}}$	$L_{rU} / L_{rW} = L_{rU} / L_{rW}$	$L^*_{CIELABW} = \sqrt[3]{\frac{L_{rU}}{L_{rW}}} = \sqrt[3]{\frac{L}{L_{rW}}} = \sqrt[3]{\frac{L}{25}} = 16$	$L^*_{TUBLOGU} = \log(L_{rU}) + 50$
White P2 (light)	500 =20*25	195=50+145 =s(5,00) <sup>1/2,4</sup>	=5*5	182=50+132 =c(5,00) <sup>1/3</sup> -16	150=50+102 =t log(25,00)+50
White W (fluorescent paper)	100 =20*5	100=50+50 =s(1,00) <sup>1/2,4</sup>	=5 =5*1	100=50+50 =c(1,00) <sup>1/3</sup> -16	100=50+52 =t log(5,00)+50
light Grey H (paper)	44,8 =20*2,24	71=50+21 =s(0,45) <sup>1/2,4</sup>	=2,24 =0,45	72=50+22 =c(0,45) <sup>1/3</sup> -16	75=50+27 =t log(2,24)+50
Grey U (paper)	20 =100/5	51=50+1 =s(0,20) <sup>1/2,4</sup>	=1 =5/5	51=50+1 =c(0,20) <sup>1/3</sup> -16	50=50+2 =t log(1,00)+50
dark Grey D (paper)	8,9 =20/2,24	36=50-13 =s(0,09) <sup>1/2,4</sup>	=0,45 =0,09	35=50-14 =c(0,09) <sup>1/3</sup> -16	24=50-23 =t log(0,45)+50
Black N (paper)	4 =20/5	26=50-23 =s(0,04) <sup>1/2,4</sup>	=0,2 =0,04	23=50-26 =c(0,04) <sup>1/3</sup> -16	0=50-48 =t log(0,20)+50
Black P2 (glossy paper)	1,9 =20/11,2	18=50-31 =s(0,02) <sup>1/2,4</sup>	=0,09 =0,02	14=50-35 =c(0,02) <sup>1/3</sup> -16	24=50-72 =t log(0,09)+50

It is valid: CIELAB<sub>W</sub>: c<sub>w</sub>=c=116, IECsRGB<sub>W</sub>: s<sub>w</sub>=s=100, TUBLOG<sub>U</sub>: t<sub>U</sub>=t=50/log(5)=72

iea01-7n