

**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> (5 <sup>0.5</sup> =2,24	<b>L*</b> IECsRGB <sub>W</sub> = <b>s</b> W L <sub>rW</sub> <sup>1/2,4</sup>	<b>L<sub>rU</sub> / L<sub>rW</sub> = L / L<sub>W</sub></b>	<b>L*</b> CIELAB <sub>W</sub> = <b>c</b> w L <sub>rW</sub> <sup>1/3,16</sup> -16	<b>L*</b> TUBLOG <sub>U</sub> = <b>t</b> <sub>U</sub> log(L <sub>rU</sub> )+50
White P2 (light)	450 =18*25	104=50+54 =s(2,24) <sup>1/2,4</sup>	2,24	104=50+54 =c(2,24) <sup>1/3,16</sup> -16	103=50+55 =t log(11,20)+50
White P1 (light)	224 =18*11,2	74=50+24 =s(1,00) <sup>1/2,4</sup>	11,2	76=50+26 =c(1,00) <sup>1/3,16</sup> -16	78=50+30 =t log(5,00)+50
White W (fluorescent paper)	90 =18*5	53=50+3 =s(0,45) <sup>1/2,4</sup>	5	54=50+4 =c(0,45) <sup>1/3,16</sup> -16	53=50+5 =t log(2,24)+50
Grey U (paper)	18 =18*1	38=50-11 =s(0,20) <sup>1/2,4</sup>	1	37=50-12 =c(0,20) <sup>1/3,16</sup> -16	28=50-19 =t log(1,00)+50
Black N (paper)	3,6 =18/5	27=50-22 =s(0,09) <sup>1/2,4</sup>	0,20	25=50-24 =c(0,09) <sup>1/3,16</sup> -16	3=50-44 =t log(0,45)+50
Black p1 (glossy paper)	2,5 =18/7	19=50-30 =s(0,04) <sup>1/2,4</sup>	0,14	15=50-34 =c(0,04) <sup>1/3,16</sup> -16	-21=50-69 =t log(0,20)+50
Black p2 (glossy paper)	1,8 =18/10	14=50-35 =s(0,02) <sup>1/2,4</sup>	0,10	8=50-41 =c(0,02) <sup>1/3,16</sup> -16	-46=50-94 =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

feo6l0-3n

**Colourimetric scaling of achromatic colours between peak white and black.**  
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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=100:4)</b>	<b>Y</b> (5 <sup>0.5</sup> =2,24	<b>L</b> [cd/m <sup>2</sup> ]	<b>L<sub>rU</sub> / L<sub>rW</sub> = L / L<sub>W</sub></b>	<b>L*</b> CIELAB <sub>U</sub> = <b>d</b> <sub>U</sub> L <sub>rU</sub> <sup>1/3,16</sup> -16	<b>L*</b> TUBLOG <sub>U</sub> = <b>t</b> <sub>U</sub> log(L <sub>rU</sub> )+50
White P2 (light)	450 =18*25	1000 =40*25	25	104=50+54 =c(11,20) <sup>1/3,16</sup> -16	103=50+55 =t log(11,20)+50
White P1 (light)	224 =18*11,2	448 =40*11,2	11,2	76=50+26 =c(5,00) <sup>1/3,16</sup> -16	78=50+30 =t log(5,00)+50
White W (fluorescent paper)	90 =18*5	200 =40*5	5	54=50+4 =c(2,24) <sup>1/3,16</sup> -16	53=50+5 =t log(2,24)+50
Grey U (paper)	18 =18*1	40 =40*1	1	37=50-12 =c(1,00) <sup>1/3,16</sup> -16	28=50-19 =t log(1,00)+50
Black N (paper)	3,6 =18/5	8 =40/5	0,20	25=50-24 =c(0,45) <sup>1/3,16</sup> -16	3=50-44 =t log(0,45)+50
Black p1 (glossy paper)	2,5 =18/7	5,7 =40/7	0,14	15=50-34 =c(0,20) <sup>1/3,16</sup> -16	-21=50-69 =t log(0,20)+50
Black p2 (glossy paper)	1,8 =18/10	4 =40/10	0,10	8=50-41 =c(0,09) <sup>1/3,16</sup> -16	-46=50-94 =t log(0,09)+50

It is valid: CIELAB<sub>U</sub>: d<sub>U</sub>=d=66, TUBLOG<sub>U</sub>: t<sub>U</sub>=t=50/log(5)=72

feo6l-3n

**Colourimetric scaling of achromatic colours between peak white and black.**  
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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> (5 <sup>0.5</sup> =2,24	<b>L</b> [cd/m <sup>2</sup> ]	<b>L<sub>rU</sub> / L<sub>rW</sub> = L / L<sub>W</sub></b>	<b>L*</b> CIELAB <sub>W</sub> = <b>c</b> w L <sub>rW</sub> <sup>1/3,16</sup> -16	<b>L*</b> TUBLOG <sub>U</sub> = <b>t</b> <sub>U</sub> log(L <sub>rU</sub> )+50
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White P1 (light)	224 =18*11,2	448 =40*11,2	11,2	76=50+26 =c(1,00) <sup>1/3,16</sup> -16	78=50+30 =t log(5,00)+50
White W (fluorescent paper)	90 =18*5	200 =40*5	5	54=50+4 =c(0,45) <sup>1/3,16</sup> -16	53=50+5 =t log(2,24)+50
Grey U (paper)	18 =18*1	40 =40*1	1	37=50-12 =c(0,20) <sup>1/3,16</sup> -16	28=50-19 =t log(1,00)+50
Black N (paper)	3,6 =18/5	8 =40/5	0,20	25=50-24 =c(0,09) <sup>1/3,16</sup> -16	3=50-44 =t log(0,45)+50
Black p1 (glossy paper)	2,5 =18/7	5,7 =40/7	0,14	15=50-34 =c(0,04) <sup>1/3,16</sup> -16	-21=50-69 =t log(0,20)+50
Black p2 (glossy paper)	1,8 =18/10	4 =40/10	0,10	8=50-41 =c(0,02) <sup>1/3,16</sup> -16	-46=50-94 =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

feo6l0-7n

**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	HDR display luminance	relative luminance	IECsRGB <sub>W</sub> lightness	TUBLOG <sub>U</sub> lightness
<b>Contrast W:N (25:1=100:4)</b>	<b>Y</b> (5 <sup>0.5</sup> =2,24	<b>L</b> [cd/m <sup>2</sup> ]	<b>L<sub>rU</sub> / L<sub>rW</sub> = L / L<sub>W</sub></b>	<b>L*</b> IECsRGB <sub>W</sub> = <b>s</b> w L <sub>rW</sub> <sup>1/2,4</sup>	<b>L*</b> TUBLOG <sub>U</sub> = <b>t</b> <sub>U</sub> log(L <sub>rU</sub> )+50
White P2 (light)	450 =18*25	1000 =40*25	25	104=50+54 =s(2,24) <sup>1/2,4</sup>	103=50+55 =t log(11,20)+50
White P1 (light)	224 =18*11,2	448 =40*11,2	11,2	74=50+24 =s(1,00) <sup>1/2,4</sup>	78=50+30 =t log(5,00)+50
White W (fluorescent paper)	90 =18*5	200 =40*5	5	53=50+3 =s(0,45) <sup>1/2,4</sup>	53=50+5 =t log(2,24)+50
Grey U (paper)	18 =18*1	40 =40*1	1	38=50-11 =s(0,20) <sup>1/2,4</sup>	28=50-19 =t log(1,00)+50
Black N (paper)	3,6 =18/5	8 =40/5	0,20	27=50-22 =s(0,09) <sup>1/2,4</sup>	3=50-44 =t log(0,45)+50
Black p1 (glossy paper)	2,5 =18/7	5,7 =40/7	0,14	19=50-30 =s(0,04) <sup>1/2,4</sup>	-21=50-69 =t log(0,20)+50
Black p2 (glossy paper)	1,8 =18/10	4 =40/10	0,10	14=50-35 =s(0,02) <sup>1/2,4</sup>	-46=50-94 =t log(0,09)+50

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

feo6l-7n

TUB-test chart feo6; Colourimetric scaling of achromatic colours between white and black.

Contrast W:N=90:3;6, P2:p2=1000:4 with LrW, LrU. See ISO 22028-5, ISO/CIE 11664-4, CIE 230