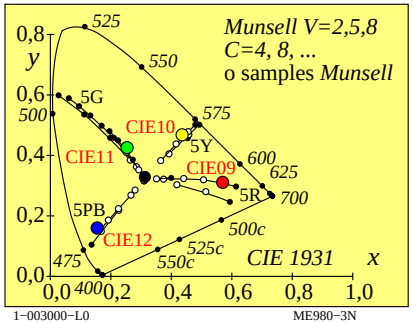
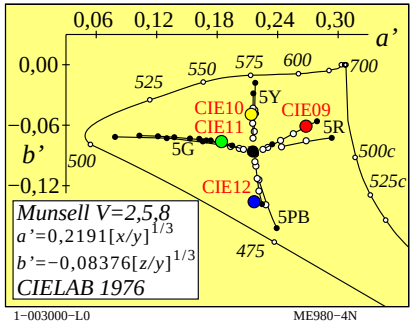
colour attributes of low and high colour metric		mode of colour mixture dichromatic	trichromatic
low colour- or valence metric		(for $Y_- >= B_-$)	(for $R_- >= G_- >= B_-$)
white value	W	B_-	B_-
black value	N	$100 - Y_-$	$100 - R_-$
chromatic value	C	$Y_- - B_-$	$R_- - B_-$
high colour- or sensation metric		(for $Y^*_- >= B^*_-$)	(for $R^*_- >= G^*_- >= B^*_-$)
whiteness	W^*	B^*_-	B^*_-
blackness	N^*	$100 - Y^*_-$	$100 - R^*_-$
chromaticness	C^*	$Y^*_- - B^*_-$	$R^*_- - B^*_-$

1−003000−L0 ME980−1N



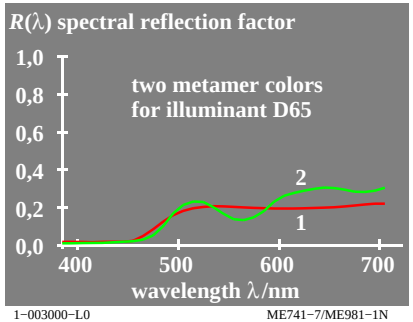
1−003000−L0 ME980−3N



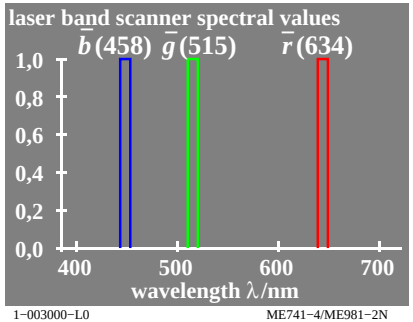
1−003000−L0 ME980−4N

colour valence metric (color data: linear relation to CIE 1931 data)		
linear color terms	**name and relationship to CIE tristimulus or chromaticity values**	**notes**
tristimulus values	X, Y, Z	
chromatic value	*linear chromatic value diagram (A, B)*	*n=D65*
red−green	$A = [\ X/Y - X_n/Y_n\ ]\ Y = [\ a - a_n\ ]\ Y$	*(background)*
	$= [\ x/y - x_n/y_n\ ]\ Y$	
yellow−blue	$B = -0{,}4\ [\ Z/Y - Z_n/Y_n\ ]\ Y = [\ b - b_n\ ]\ Y$	
	$= -0{,}4\ [\ z/y - z_n/y_n\ ]\ Y$	
radial	$C_{AB} = [\ A^2 + B^2\ ]^{1/2}$	
chromaticity	*linear chromaticity diagram (a, b)*	***compare to linear cone excitation***
red−green	$a = X/Y = x/y$	
yellow−blue	$b = -0{,}4\ [Z/Y] = -0{,}4\ [z/y]$	
radial	$c_{ab} = [\ (a - a_n)^2 + (b - b_n)^2\ ]^{1/2}$	$L/(L+M)=P/(P+D)$ $S/(L+M)=T/(P+D)$

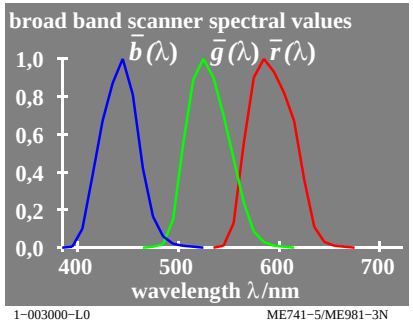
1−003000−L0 ME980−7N



1−003000−L0 ME741−7/ME981−1N



1−003000−L0 ME741−4/ME981−2N



1−003000−L0 ME741−5/ME981−3N

Colour rendering index R_i of two metameric BAM-scanner test colours			
scanner	**TC**	**colour rendering index**	**colour difference**
broad band	**1**	**82**	**3**
	2	**84**	
laser	**1**	**63**	**10**
	2	**69**	
ideal	**1**	**100**	**0**
	2	**100**	
D65, colour adjustment with white paper			

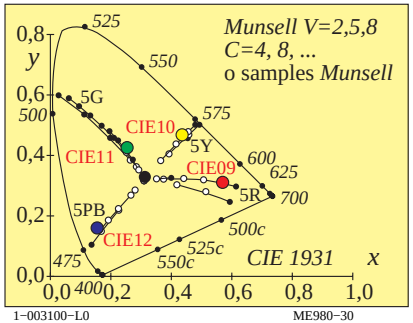
1−003000−L0 ME741−8/ME981−4N

higher colour metric (color data: nonlinear relation to CIE 1931 data)		
nonlinear color terms	**name and relationship with tristimulues or chromaticity values**	**notes**
lightness	$L^* = 116\ (\ Y/100\ )^{1/3} - 16 \quad (Y > 0{,}8)$	CIELAB 1976
	approximation: $L^* = 100\ (Y/100)^{1/2,4}\ (Y > 0)$	
chroma	*nonlinear transfer of chromatic values A, B*	
red−green	$a^* = 500\ [\ (X/X_n)^{1/3} - (Y/Y_n)^{1/3}\ ]$	CIELAB 1976
	$= 500\ (\ a' - a'_n\ )\ Y^{1/3}$	
yellow−blue	$b^* = 200\ [\ (Y/Y_n)^{1/3} - (Z/Z_n)^{1/3}\ ]$	**CIELAB 1976**
	$= 500\ (\ b' - b'_n\ )\ Y^{1/3}$	*n=D65*
radial	$C^*_{ab} = [\ a^{*2} + b^{*2}\ ]^{1/2}$	*(background)*
chromaticity	*nonlinear transfer of chromaticities x/y, z/y*	*compare to log cone excitation*
red−green	$a' = (\ 1/X_n\ )^{1/3}\ (\ x/y\ )^{1/3}$	
	$= 0{,}2191\ (\ x/y\ )^{1/3}$ for D65	$\log[L/(L+M)]$
yellow−blue	$b' = -0{,}4\ (\ 1/Z_n\ )^{1/3}\ (\ z/y\ )^{1/3}$	$= \log[P/(P+D)]$
	$= -0{,}08376\ (\ z/y\ )^{1/3}$ for D65	$\log[S/(L+M)]$
radial	$c'_{ab} = [\ (a' - a'_n)^2 + (b' - b'_n)^2\ ]^{1/2}$	$= \log[T/(P+D)]$

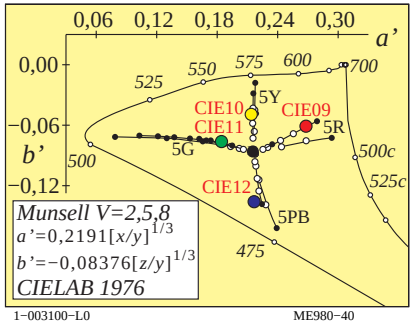
1−003000−L0 ME981−7N

colour attributes of low and high colour metric		mode of colour mixture dichromatic	trichromatic
low colour- or valence metric		(for $Y_d >= B_d$)	(for $R_d >= G_d >= B_d$)
white value	W	B_d	B_d
black value	N	$100 - Y_d$	$100 - R_d$
chromatic value	C	$Y_d - B_d$	$R_d - B_d$
high colour- or sensation metric		(for $Y^*_d >= B^*_d$)	(for $R^*_d >= G^*_d >= B^*_d$)
whiteness	W^*	B^*_d	B^*_d
blackness	N^*	$100 - Y^*_d$	$100 - R^*_d$
chromaticness	C^*	$Y^*_d - B^*_d$	$R^*_d - B^*_d$

1−003100−L0 ME980−10



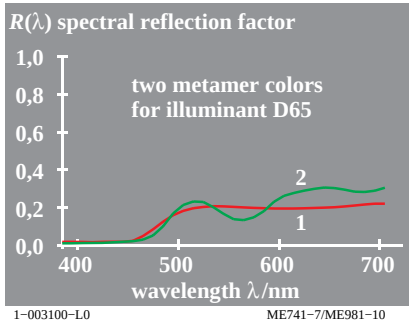
1−003100−L0 ME980−30



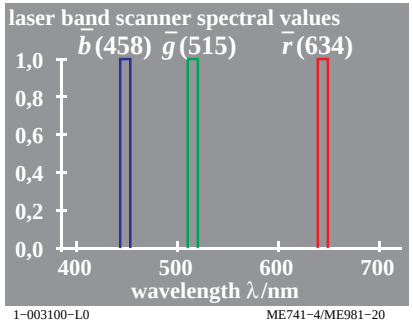
1−003100−L0 ME980−40

colour valence metric (color data: linear relation to CIE 1931 data)		
linear color terms	**name and relationship to CIE tristimulus or chromaticity values**	**notes**
tristimulus values	X, Y, Z	
chromatic value	*linear chromatic value diagram (A, B)*	*n=D65*
red−green	$A = [\ X/Y - X_n/Y_n\ ]\ Y = [\ a - a_n\ ]\ Y$	*(background)*
	$= [\ x/y - x_n/y_n\ ]\ Y$	
yellow−blue	$B = -0{,}4\ [\ Z/Y - Z_n/Y_n\ ]\ Y = [\ b - b_n\ ]\ Y$	
	$= -0{,}4\ [\ z/y - z_n/y_n\ ]\ Y$	
radial	$C_{AB} = [\ A^2 + B^2\ ]^{1/2}$	
chromaticity	*linear chromaticity diagram (a, b)*	***compare to linear cone excitation***
red−green	$a = X/Y = x/y$	
yellow−blue	$b = -0{,}4\ [Z/Y] = -0{,}4\ [z/y]$	
radial	$c_{ab} = [\ (a - a_n)^2 + (b - b_n)^2\ ]^{1/2}$	$L/(L+M)=P/(P+D)$ $S/(L+M)=T/(P+D)$

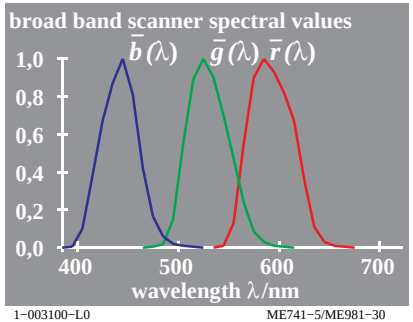
1−003100−L0 ME980−70



1−003100−L0 ME741−7/ME981−10



1−003100−L0 ME741−4/ME981−20



1−003100−L0 ME741−5/ME981−30

Colour rendering index R_i of two metameric BAM-scanner test colours			
scanner	**TC**	**colour rendering index**	**colour difference**
broad band	**1**	**82**	**3**
	2	**84**	
laser	**1**	**63**	**10**
	2	**69**	
ideal	**1**	**100**	**0**
	2	**100**	
D65, colour adjustment with white paper			

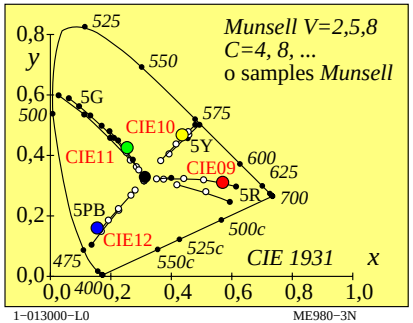
1−003100−L0 ME741−8/ME981−40

higher colour metric (color data: nonlinear relation to CIE 1931 data)		
nonlinear color terms	**name and relationship with tristimulues or chromaticity values**	**notes**
lightness	$L^* = 116\ (\ Y/100\ )^{1/3} - 16 \quad (Y > 0{,}8)$	CIELAB 1976
	approximation: $L^* = 100\ (Y/100)^{1/2,4} \quad (Y > 0)$	
chroma	*nonlinear transfer of chromatic values A, B*	
red−green	$a^* = 500\ [\ (X/X_n)^{1/3} - (Y/Y_n)^{1/3}\ ]$	CIELAB 1976
	$= 500\ (\ a' - a'_n\ )\ Y^{1/3}$	
yellow−blue	$b^* = 200\ [\ (Y/Y_n)^{1/3} - (Z/Z_n)^{1/3}\ ]$	**CIELAB 1976**
	$= 500\ (\ b' - b'_n\ )\ Y^{1/3}$	*n=D65*
radial	$C^*_{ab} = [\ a^{*2} + b^{*2}\ ]^{1/2}$	*(background)*
chromaticity	*nonlinear transfer of chromaticities x/y, z/y*	*compare to log cone excitation*
red−green	$a' = (\ 1/X_n\ )^{1/3}\ (\ x/y\ )^{1/3}$	
	$= 0{,}2191\ (\ x/y\ )^{1/3}$ for D65	$\log[L/(L+M)]$
yellow−blue	$b' = -0{,}4\ (\ 1/Z_n\ )^{1/3}\ (\ z/y\ )^{1/3}$	$= \log[P/(P+D)]$
	$= -0{,}08376\ (\ z/y\ )^{1/3}$ for D65	$\log[S/(L+M)]$
radial	$c'_{ab} = [\ (a' - a'_n)^2 + (b' - b'_n)^2\ ]^{1/2}$	$= \log[T/(P+D)]$

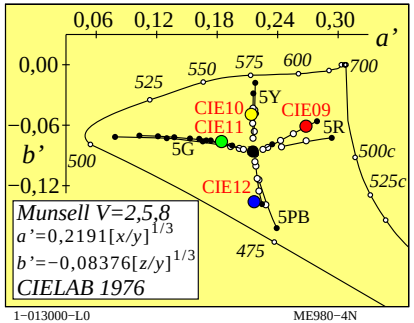
1−003100−L0 ME981−70

colour attributes of low and high colour metric		mode of colour mixture dichromatic	trichromatic
low colour- or valence metric		(for $Y_- >= B_-$)	(for $R_- >= G_- >= B_-$)
white value	W	B_-	B_-
black value	N	$100 - Y_-$	$100 - R_-$
chromatic value	C	$Y_- - B_-$	$R_- - B_-$
high colour- or sensation metric		(for $Y^*_- >= B^*_-$)	(for $R^*_- >= G^*_- >= B^*_-$)
whiteness	W^*	B^*_-	B^*_-
blackness	N^*	$100 - Y^*_-$	$100 - R^*_-$
chromaticness	C^*	$Y^*_- - B^*_-$	$R^*_- - B^*_-$

1−013000−L0 ME980−1N



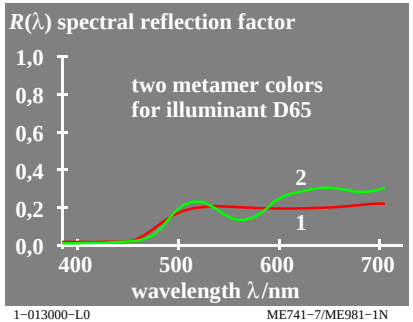
1−013000−L0 ME980−3N



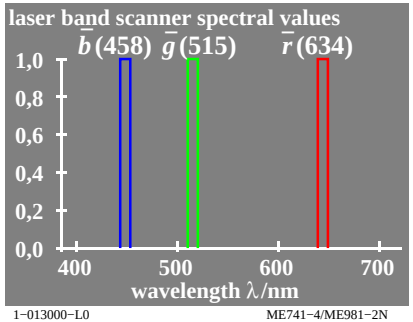
1−013000−L0 ME980−4N

colour valence metric (color data: linear relation to CIE 1931 data)		
linear color terms	**name and relationship to CIE tristimulus or chromaticity values**	**notes**
tristimulus values	X, Y, Z	
chromatic value	*linear chromatic value diagram (A, B)*	*n=D65*
red−green	$A = [\ X / Y - X_n / Y_n\ ]\ Y = [\ a - a_n\ ]\ Y$	*(background)*
	$= [\ x / y - x_n / y_n\ ]\ Y$	
yellow−blue	$B = -\ 0{,}4\ [\ Z/Y - Z_n/Y_n\ ]\ Y = [\ b - b_n\ ]\ Y$	
	$= -\ 0{,}4\ [\ z / y - z_n / y_n\ ]\ Y$	
radial	$C_{AB} = [\ A^2 + B^2\ ]^{1/2}$	
chromaticity	*linear chromaticity diagram (a, b)*	***compare to linear cone excitation***
red−green	$a = X / Y = x / y$	
yellow−blue	$b = -\ 0{,}4\ [Z / Y\ ] = -\ 0{,}4\ [z / y\ ]$	
radial	$c_{ab} = [\ (\ a - a_n\ )^2 + (\ b - b_n\ )^2\ ]^{1/2}$	$L/(L+M)=P/(P+D)$ $S/(L+M)=T/(P+D)$

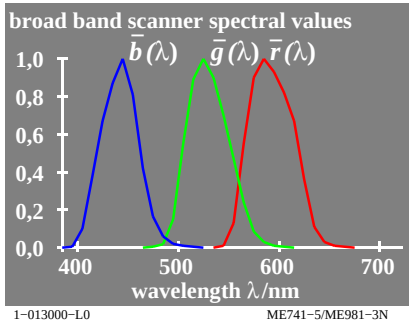
1−013000−L0 ME980−7N



1−013000−L0 ME741−7/ME981−1N



1−013000−L0 ME741−4/ME981−2N



1−013000−L0 ME741−5/ME981−3N

Colour rendering index R_i of two metameric BAM-scanner test colours			
scanner	**TC**	**colour rendering index**	**colour difference**
broad band	**1**	**82**	**3**
	2	**84**	
laser	**1**	**63**	**10**
	2	**69**	
ideal	**1**	**100**	**0**
	2	**100**	
D65, colour adjustment with white paper			

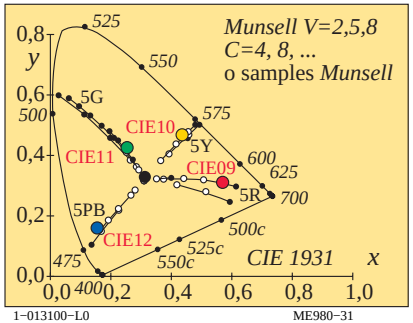
1−013000−L0 ME741−8/ME981−4N

higher colour metric (color data: nonlinear relation to CIE 1931 data)		
nonlinear color terms	**name and relationship with tristimulues or chromaticity values**	**notes**
lightness	$L^* = 116\ (\ Y / 100\ )^{1/3} - 16 \quad (Y > 0{,}8)$	CIELAB 1976
	approximation: $L^* = 100\ (Y/100)^{1/2,4} \quad (Y > 0)$	
chroma	*nonlinear transfer of chromatic values A, B*	
red−green	$a^* = 500\ [\ (\ X / X_n)^{1/3} - (\ Y / Y_n)^{1/3}\ ]$	CIELAB 1976
	$= 500\ (\ a' - a'_n\ )\ Y^{1/3}$	
yellow−blue	$b^* = 200\ [\ (\ Y / Y_n)^{1/3} - (\ Z / Z_n)^{1/3}\ ]$	**CIELAB 1976**
	$= 500\ (\ b' - b'_n\ )\ Y^{1/3}$	*n=D65*
radial	$C^*_{ab} = [\ a^{*2} + b^{*2}\ ]^{1/2}$	*(background)*
chromaticity	*nonlinear transfer of chromaticities x/y, z/y*	*compare to log cone excitation*
red−green	$a' = (\ 1 / X_n\ )^{1/3}\ (\ x / y\ )^{1/3}$	
	$= 0{,}2191\ (\ x / y\ )^{1/3}$ for D65	$\log[L / (L+M)]$
yellow−blue	$b' = -\ 0{,}4\ (\ 1 / Z_n\ )^{1/3}\ (\ z / y\ )^{1/3}$	$= \log[P / (P+D)]$
	$= -\ 0{,}08376\ (\ z / y\ )^{1/3}$ for D65	$\log[S / (L+M)]$
radial	$c'_{ab} = [\ (\ a' - a'_n\ )^2 + (\ b' - b'_n\ )^2\ ]^{1/2}$	$= \log[T / (P+D)]$

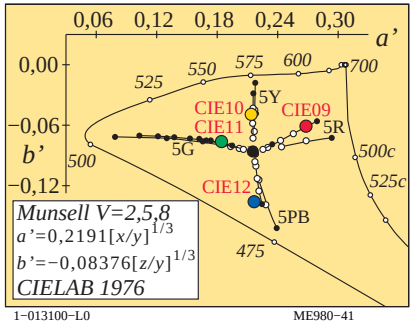
1−013000−L0 ME981−7N

colour attributes of low and high colour metric		mode of colour mixture dichromatic	trichromatic
low colour- or valence metric		(for $Y_e >= B_e$)	(for $R_e >= G_e >= B_e$)
white value	W	B_e	B_e
black value	N	$100 - Y_e$	$100 - R_e$
chromatic value	C	$Y_e - B_e$	$R_e - B_e$
high colour- or sensation metric		(for $Y^*_e >= B^*_e$)	(for $R^*_e >= G^*_e >= B^*_e$)
whiteness	W^*	B^*_e	B^*_e
blackness	N^*	$100 - Y^*_e$	$100 - R^*_e$
chromaticness	C^*	$Y^*_e - B^*_e$	$R^*_e - B^*_e$

1−013100−L0 ME980−11



1−013100−L0 ME980−31

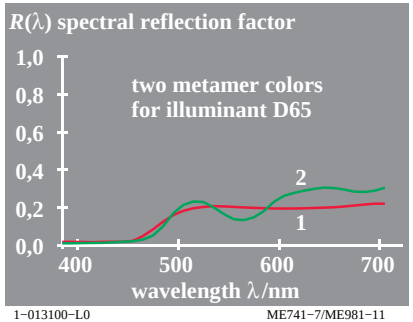


1−013100−L0 ME980−41

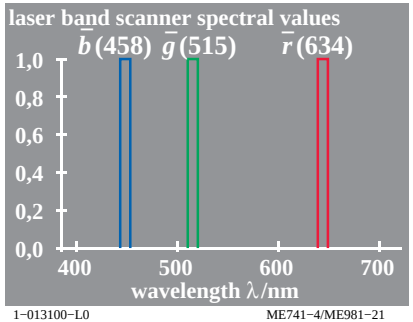
colour valence metric (color data: linear relation to CIE 1931 data)

linear color terms	name and relationship to CIE tristimulus or chromaticity values	notes
tristimulus values	X, Y, Z	
chromatic value	*linear chromatic value diagram (A, B)*	*n=D65*
red−green	$A = [\ X/Y - X_n/Y_n\ ]\ Y = [\ a - a_n\ ]\ Y$	*(background)*
	$= [\ x/y - x_n/y_n\ ]\ Y$	
yellow−blue	$B = -0{,}4\ [\ Z/Y - Z_n/Y_n\ ]\ Y = [\ b - b_n\ ]\ Y$	
	$= -0{,}4\ [\ z/y - z_n/y_n\ ]\ Y$	
radial	$C_{AB} = [\ A^2 + B^2\ ]^{1/2}$	
chromaticity	*linear chromaticity diagram (a, b)*	***compare to linear cone excitation***
red−green	$a = X/Y = x/y$	
yellow−blue	$b = -0{,}4\ [Z/Y] = -0{,}4\ [z/y]$	
radial	$c_{ab} = [\ (a - a_n)^2 + (b - b_n)^2\ ]^{1/2}$	$L/(L+M)=P/(P+D)$ $S/(L+M)=T/(P+D)$

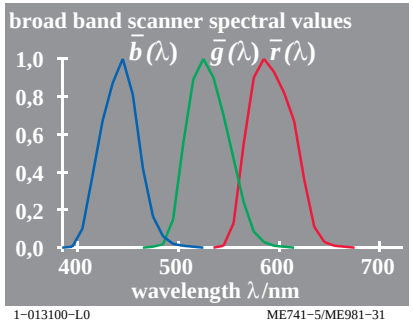
1−013100−L0 ME980−71



1−013100−L0 ME741−7/ME981−11



1−013100−L0 ME741−4/ME981−21



1−013100−L0 ME741−5/ME981−31

Colour rendering index R_i of two metameric BAM-scanner test colours

scanner	TC	colour rendering index	colour difference
broad band	1	82	3
	2	84	
laser	1	63	10
	2	69	
ideal	1	100	0
	2	100	

D65, colour adjustment with white paper

1−013100−L0 ME741−8/ME981−41

higher colour metric (color data: nonlinear relation to CIE 1931 data)

nonlinear color terms	name and relationship with tristimulues or chromaticity values	notes
lightness	$L^* = 116\ (\ Y/100\ )^{1/3} - 16 \quad (Y > 0{,}8)$	CIELAB 1976
	approximation: $L^* = 100\ (Y/100)^{1/2,4} \quad (Y > 0)$	
chroma	*nonlinear transfer of chromatic values A, B*	
red−green	$a^* = 500\ [\ (X/X_n)^{1/3} - (Y/Y_n)^{1/3}\ ]$	CIELAB 1976
	$= 500\ (\ a' - a'_n\ )\ Y^{1/3}$	
yellow−blue	$b^* = 200\ [\ (Y/Y_n)^{1/3} - (Z/Z_n)^{1/3}\ ]$	**CIELAB 1976**
	$= 500\ (\ b' - b'_n\ )\ Y^{1/3}$	*n=D65*
radial	$C^*_{ab} = [\ a^{*2} + b^{*2}\ ]^{1/2}$	*(background)*
chromaticity	*nonlinear transfer of chromaticities x/y, z/y*	*compare to log cone excitation*
red−green	$a' = (\ 1/X_n\ )^{1/3}\ (\ x/y\ )^{1/3}$	
	$= 0{,}2191\ (\ x/y\ )^{1/3}$ for D65	$\log[L/(L+M)]$
yellow−blue	$b' = -0{,}4\ (\ 1/Z_n\ )^{1/3}\ (\ z/y\ )^{1/3}$	$= \log[P/(P+D)]$
	$= -0{,}08376\ (\ z/y\ )^{1/3}$ for D65	$\log[S/(L+M)]$
radial	$c'_{ab} = [\ (a' - a'_n)^2 + (b' - b'_n)^2\ ]^{1/2}$	$= \log[T/(P+D)]$

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