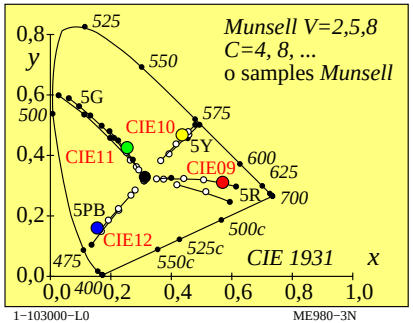
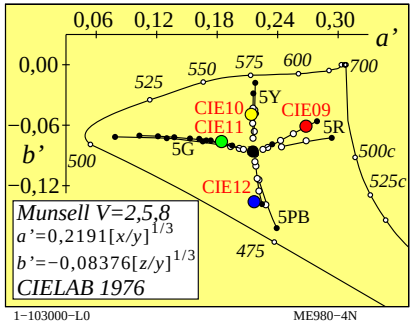
colour attributes of low and high colour metric		mode of colour mixture dichromatic	mode of colour mixture trichromatic
low colour- or valence metric		(for $Y_- >= B_-$)	(for $R_- >= G_- >= B_-$)
white value	W	B_-	B_-
black value	N	$100 - Y_-$	$100 - R_-$
chromatic value	C	$Y_- - B_-$	$R_- - B_-$
high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

1−103000−L0 ME980−1N



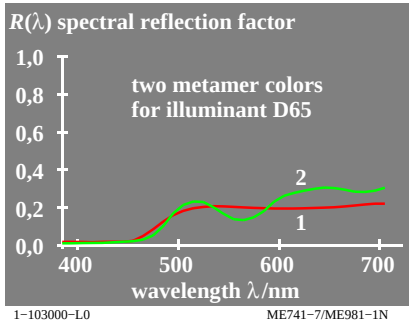
1−103000−L0 ME980−3N



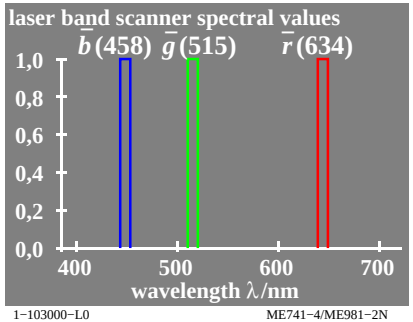
1−103000−L0 ME980−4N

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	$c_{ab} = [\ (a - a_n)^2 + (b - b_n)^2\ ]^{1/2}$	$L/(L+M)=P/(P+D)$ $S/(L+M)=T/(P+D)$

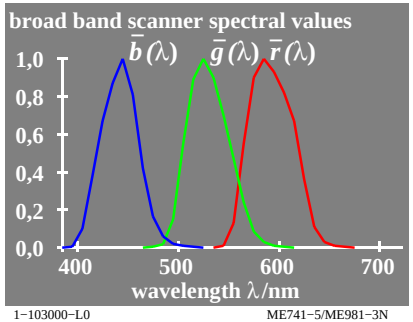
1−103000−L0 ME980−7N



1−103000−L0 ME741−7/ME981−1N



1−103000−L0 ME741−4/ME981−2N



1−103000−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			

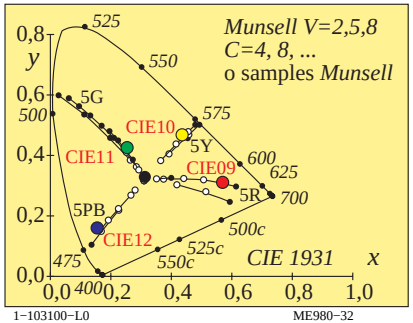
1−103000−L0 ME741−8/ME981−4N

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 transform 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 transform 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	$c'_{ab} = [\ (a' - a'_n)^2 + (b' - b'_n)^2\ ]^{1/2}$	$= \log[T/(P+D)]$

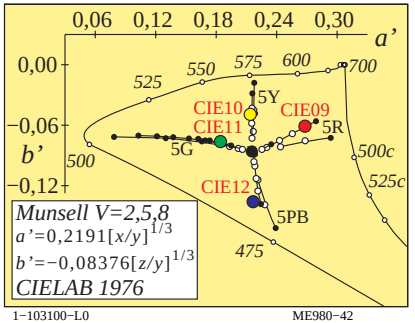
1−103000−L0 ME981−7N

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

1−103100−L0 ME980−12



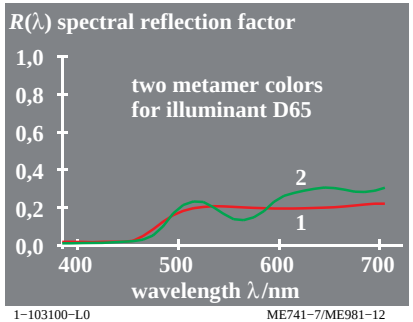
1−103100−L0 ME980−32



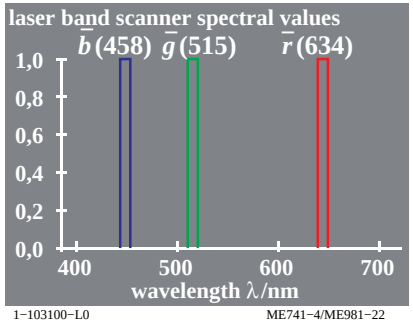
1−103100−L0 ME980−42

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	$c_{ab} = [\ (a - a_n)^2 + (b - b_n)^2\ ]^{1/2}$	$L/(L+M)=P/(P+D)$ $S/(L+M)=T/(P+D)$

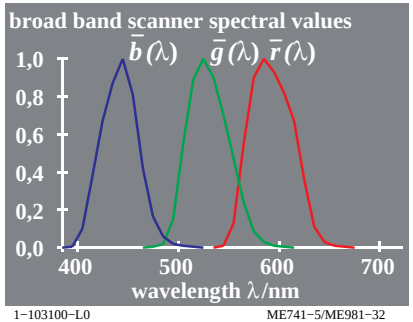
1−103100−L0 ME980−72



1−103100−L0 ME741−7/ME981−12



1−103100−L0 ME741−4/ME981−22



1−103100−L0 ME741−5/ME981−32

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

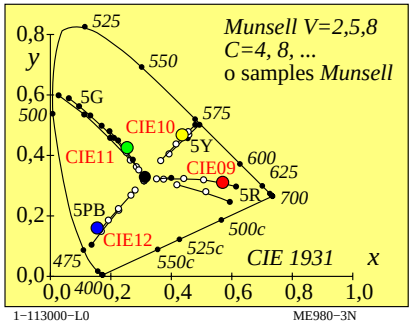
1−103100−L0 ME741−8/ME981−42

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 transform 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 transform 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	$c'_{ab} = [\ (a' - a'_n)^2 + (b' - b'_n)^2\ ]^{1/2}$	$= \log[T/(P+D)]$

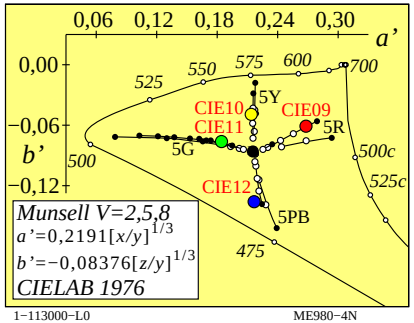
1−103100−L0 ME981−72

colour attributes of low and high colour metric		mode of colour mixture dichromatic	mode of colour mixture 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^*	$Y^*_- - B^*_-$	$R^*_- - B^*_-$

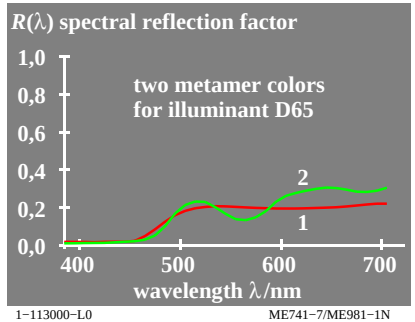
1−113000−L0 ME980−1N



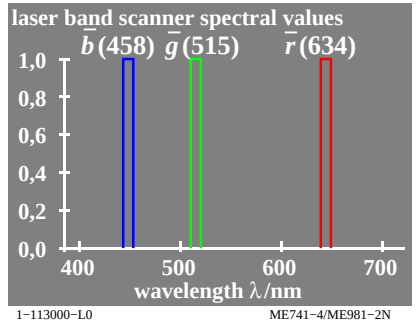
1−113000−L0 ME980−3N



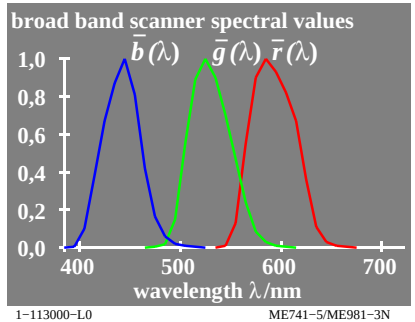
1−113000−L0 ME980−4N



1−113000−L0 ME741−7/ME981−1N



1−113000−L0 ME741−4/ME981−2N



1−113000−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			

1−113000−L0 ME741−8/ME981−4N

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	$c_{ab} = [\ (a - a_n)^2 + (b - b_n)^2\ ]^{1/2}$	$L/(L+M)=P/(P+D)$ $S/(L+M)=T/(P+D)$

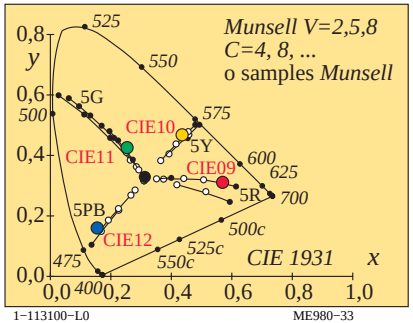
1−113000−L0 ME980−7N

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 transform 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 transform 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	$c'_{ab} = [\ (a' - a'_n)^2 + (b' - b'_n)^2\ ]^{1/2}$	$= \log[T/(P+D)]$

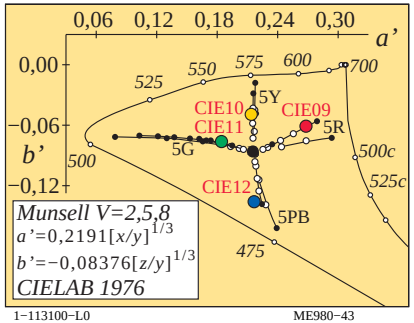
1−113000−L0 ME981−7N

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

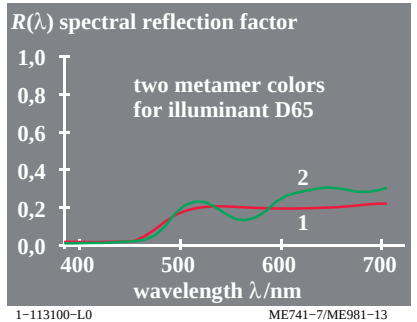
1–113100–L0 ME980–13



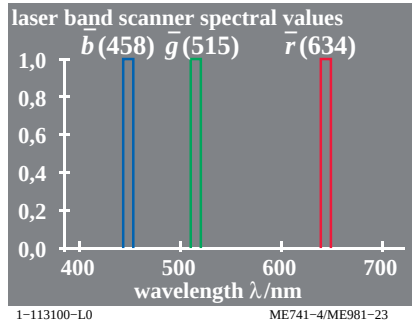
1–113100–L0 ME980–33



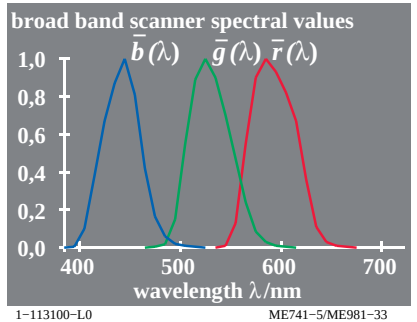
1–113100–L0 ME980–43



1–113100–L0 ME741–7/ME981–13



1–113100–L0 ME741–4/ME981–23



1–113100–L0 ME741–5/ME981–33

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			

1–113100–L0 ME741–8/ME981–43

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	$b = -0{,}4\ [Z/Y] = -0{,}4\ [z/y]$	$L/(L+M) = P/(P+D)$
radial	$c_{ab} = [\ (a - a_n)^2 + (b - b_n)^2\ ]^{1/2}$	$S/(L+M) = T/(P+D)$

1–113100–L0 ME980–73

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 transform 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 transform 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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