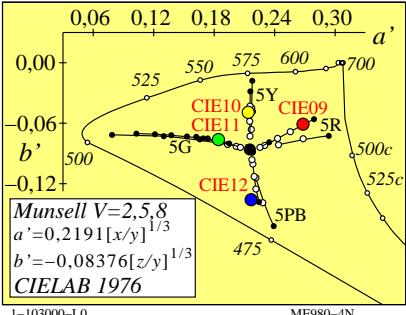
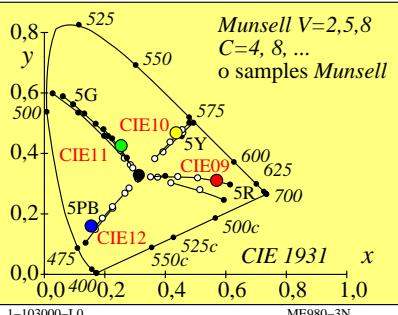


colour attributes of low and high colour metric	mode of colour mixture dichromatic	trichromatic
<i>low colour- or valence metric</i>		
white value $W$	(for $Y_- \geq B_-$ ) $B_-$	(for $R_- \geq G_- \geq B_-$ ) $B_-$
black value $N$	$100 - Y_-$	$100 - R_-$
chromatic value $C$	$Y_- - B_-$	$R_- - B_-$
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

1-103000-L0

ME980-1N

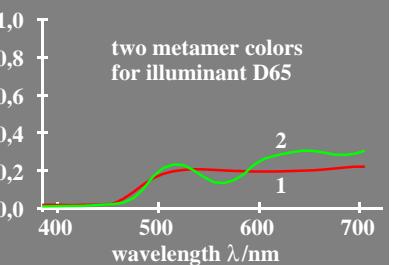


## colour valence metric (color data: linear relation to CIE 1931 data)

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

1-103000-L0

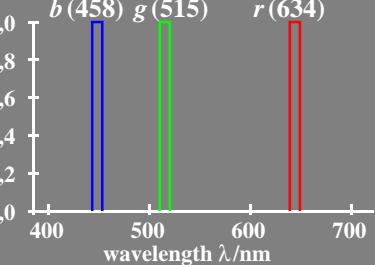
ME980-7N

 $R(\lambda)$  spectral reflection factor

1-103000-L0

ME741-7/ME981-1N

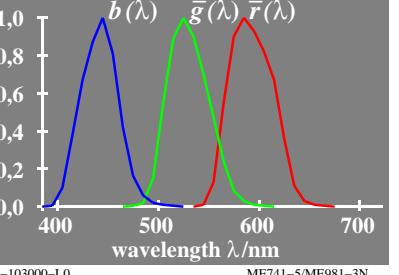
## laser band scanner spectral values



1-103000-L0

ME741-4/ME981-2N

## broad band scanner spectral values



1-103000-L0

ME741-5/ME981-3N

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

ME981-7N

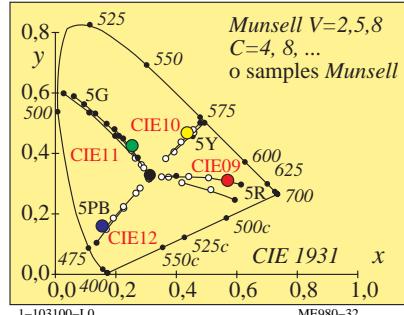


see similar files: <http://farbe.li.tu-berlin.de/M98/M98.HTML>  
<http://130.149.60.45/~farbmetrik> or <http://farbe.li.tu-berlin.de>

## colour attributes of low and high colour metric

<i>low colour- or valence metric</i>	
white value	W
black value	N
chromatic value	C
<i>high colour- or sensation metric</i>	
whiteness	W*
blackness	N*
chromaticness	C*

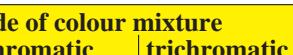
1-103100-10



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

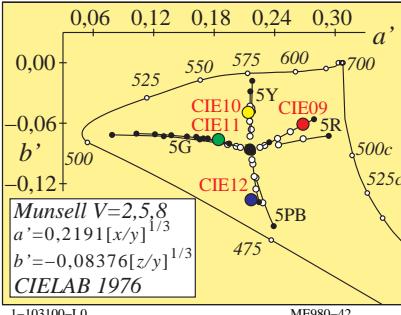
linear color terms	name and relationship to CIE tristimulus or chromaticity values	notes
tristimulus values	$X, Y, Z$	
chromatic value	<i>linear chromatic value diagram (A, B)</i>	$n=D65$
red-green	$A = [ X / Y - X_n / Y_n ] Y = [ a - a_n ] Y$ $= [ x / y - x_n / y_n ] Y$	(background)
yellow-blue	$B =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

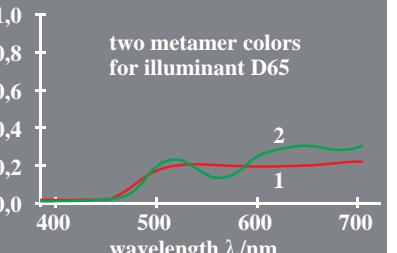


$Y_{dd} \geq B_{dd}$	(for $R_{dd} \geq G_{dd}$ )
$B_{dd}$	$B_{dd}$
$- Y_{dd}$	$100 - R_{dd}$
$- B_{dd}$	$R_{dd} - B_{dd}$
$Y^*_{dd} \geq B^*_{dd}$	(for $R^*_{dd} \geq G^*$ )
$B^*_{dd}$	$B^*_{dd}$
$- Y^*_{dd}$	$100 - R^*_{dd}$
$- B^*_{dd}$	$R^*_{dd} - B^*_{dd}$

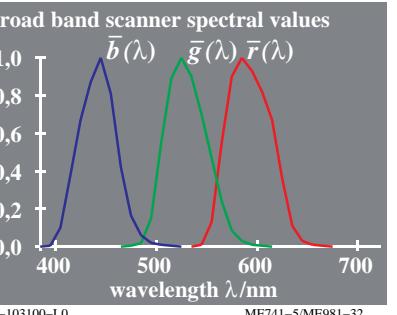
ME980\_12



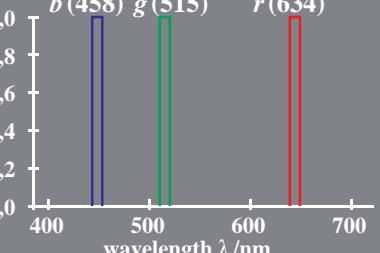
(or relation to CIE 1931 data)



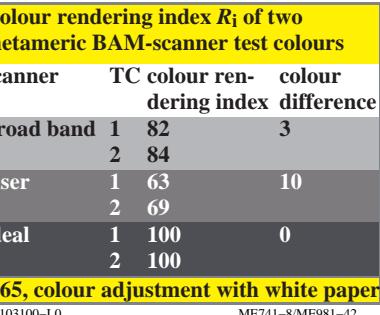
103100\_10



higher c



103100\_10



### **near rela**

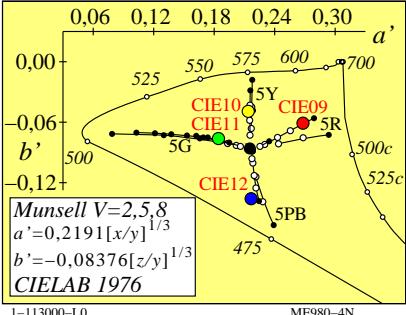
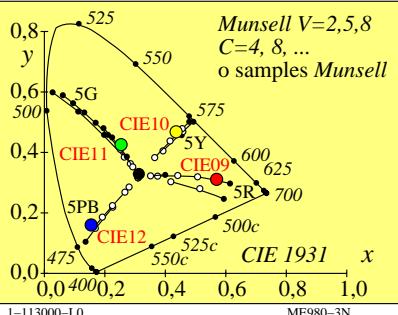
TUB registration: 20190801-ME98/ME98LOFA.TXT /PS application for measurement of display output, no separation

TUB material: code=rha4ta

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

1-113000-L0

ME980-1N

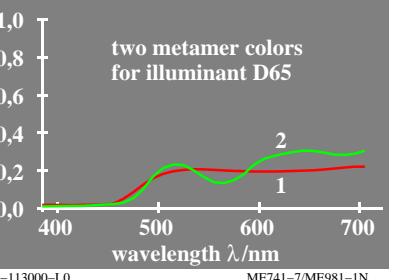


## colour valence metric (color data: linear relation to CIE 1931 data)

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

1-113000-L0

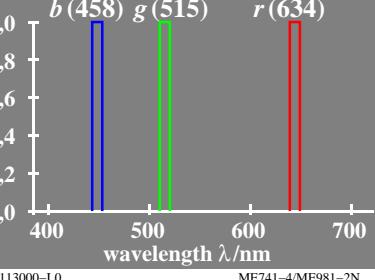
ME980-7N

 $R(\lambda)$  spectral reflection factor

1-113000-L0

ME741-7/ME981-1N

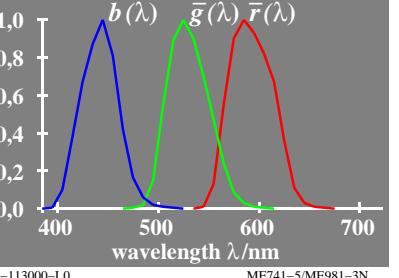
## laser band scanner spectral values



1-113000-L0

ME741-4/ME981-2N

## broad band scanner spectral values



1-113000-L0

ME741-5/ME981-3N

Colour rendering index  $R_i$  of two metamer 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

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

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

1-113000-L0

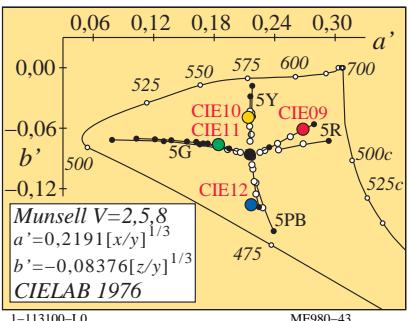
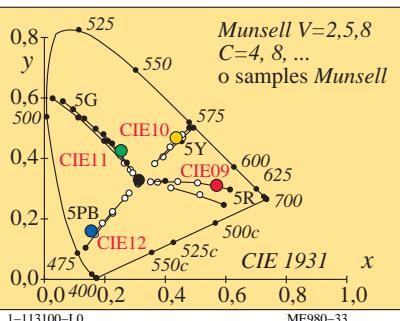
ME981-0N

ME981-7N

colour attributes of low and high colour metric			mode of colour mixture	dichromatic	trichromatc
low colour- or valence metric			(for $Y_{de} \geq B_{de}$ )	(for $R_{de} \geq G_{de} \geq B_{de}$ )	
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 $Y^*_{de} \geq B^*_{de}$ )	(for $R^*_{de} \geq G^*_{de} \geq B^*_{de}$ )	
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



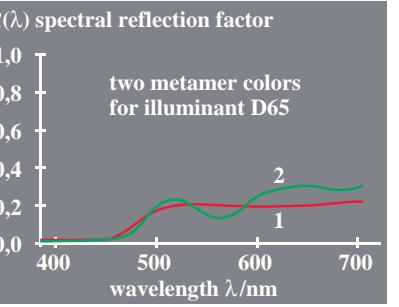
## colour valence metric (color data: linear relation to CIE 1931 data)

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

1-113100-L0

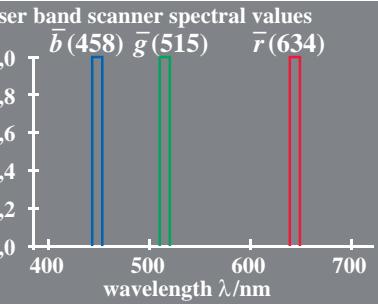
ME980-73

TUB-test chart ME98; Computer graphics and colorimetry  
Image series ME98, 3D=1, de=1,  $L-cmyn6^*$



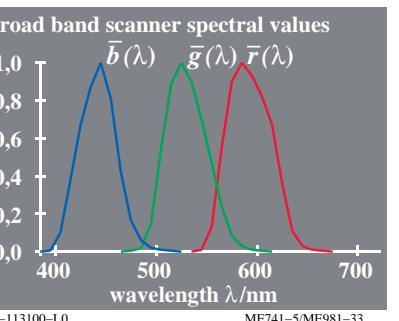
1-113100-L0

ME741-7/ME981-13



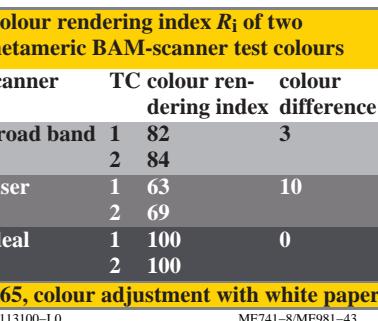
1-113100-L0

ME741-4/ME981-23



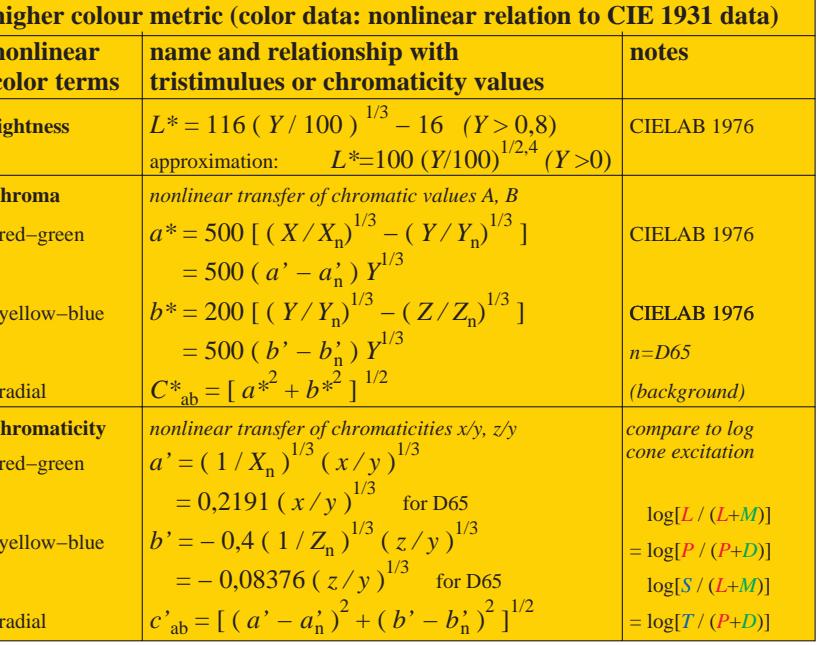
1-113100-L0

ME741-5/ME981-33



1-113100-L0

ME741-8/ME981-43



1-113100-L0

ME981-73

PE4300L\_120830.TXT, 1080 colors, Separation cmyn6\*  
input:  $rgb/cmky \rightarrow rgb_{de}$   
output: 3D-linearization to  $rgb^*_{de}$