TUB registration: 20201101-AES0/AES0L0N1.TXT /.PS
application for evaluation and measurement of display or print output

TUB material: code=rha4a

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_1, B_1)*	For grey Z of D65
red−green	$A_1 = n_{1A}[X/X_Z - Y/Y_Z] = n_{1A}[a_1 - a_{Z1}]\ Y$ If contrast = 25:1 = 90:3,6, then −125 <= A_1 <= 125	X_Z = 95,05 · 0,18 Y_Z = 100,00 · 0,18
yellow−blue	$B_1 = n_{1B}[Z/Z_Z - Y/Y_Z] = n_{1B}[b_1 - b_{Z1}]\ Y$ If contrast 25:1 = 90:3,6, then −50 <= B_1 <= 50	Z_Z = 108,90 · 0,18 n_{1A} = 25, n_{1B} = −10
radial	$C_{AB,1} = [\ A_1^{\,2} + B_1^{\,2}\ ]^{1/2}$	(background)
chromaticity	*linear chromaticity diagram (a_1, b_1)*	
red−green	$a_1 = [X/Y]\ /\ X_Z = [x/y]\ /\ X_Z$	
yellow−blue	$b_1 = [Z/Y]\ /\ Z_Z = [z/y]\ /\ Z_Z$	
radial	$c_{AB,1} = [\ (a_1 - a_{Z1})^2 + (b_1 - b_{Z1})^2\ ]^{1/2}$	

AES00−3N

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)*	for n=D65
red−green	$A = n_A[\ X/Y - X_n/Y_n\ ]\ Y = n_A[\ a - a_n\ ]\ Y$ $= n_A[\ x/y - x_n/y_n\ ]\ Y$	X_n = 95,05 Y_n = 100,00
yellow−blue	$B = -0{,}4\ n_B[\ Z/Y - Z_n/Y_n\ ]\ Y = n_B[\ b - b_n\ ]\ Y$ $= -0{,}4\ n_B[\ z/y - z_n/y_n\ ]\ Y$	X_n = 108,90 $n_A = n_B$ = 2,5
radial	$C_{AB} = [\ A^2 + B^2\ ]^{1/2}$	(background)
chromaticity	*linear chromaticity diagram (a, b)*	***compare to linear cone excitation***
red−green	$a = X/Y = x/y$	
yellow−blue	$b = -0{,}4\ [Z/Y] = -0{,}4\ [z/y]$	$L/(L+M)$
radial	$c_{ab} = [\ (a - a_n)^2 + (b - b_n)^2\ ]^{1/2}$	$S/(L+M)$

AES00−7N

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

nonlinear color terms	name and relationship with tristimulus or chromaticity values	notes
lightness	$L^*_1 = k \log [\ Y/Y_Z\ ]$ (L^*_1= 0 for $Y = Y_Z$) If contrast = 25:1 = 90:3,6, then −40 <= L^*_1 <= 40	LABJND 2019 k = 40 / log (5) = 57
chroma	*logarithmic transform of tristimulus values XYZ.*	For grey Z of D65
red−green	$A^*_1 = n_{A^*}[\ \log (X/X_Z) - \log (Y/Y_Z)\ ]$ If contrast 25:1 = 90:3,6, then −70 <= A^*_1 <= 70	X_Z = 95,05 · 0,18 Y_Z = 100,00 · 0,18
yellow−blue	$B^*_1 = n_{B^*}[\ \log (Y/Y_Z) - \log (Z/Z_Z)\ ]$ If contrast = 25:1 = 90:3,6, then −28 <= B^*_1 <= 28	Z_Z = 108,90 · 0,18 n_{A^*} = 100, n_{B^*} = −40
radial	$C^*_{AB,1} = [\ A^{*\,2}_1 + B^{*\,2}_1\ ]^{1/2}$	(background)
chromaticity	*nonlinear chromaticities, if XYZ are normalized to 100.*	*compare to log cone excitation*
red−green	$a^*_1 = \log [\ X/Y\ ] = \log [\ x/y\ ]$	$\log [\ L/L_Z)]$
yellow−blue	$b^*_1 = \log [Z/Y\ ] = \log [z/y\ ]$	$\log [M/(M_Z))]$
radial	$c^*_{AB,1} = [\ (a^*_1 - a^*_{Z1})^2 + (b^*_1 - b^*_{Z1})^2\ ]^{1/2}$	$\log [S/(S_Z)]$

AES00−3N

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 transform chromatic values A, B*	
red−green	$a^* = 500\ [\ (X/X_n)^{1/3} - (Y/Y_n)^{1/3}\ ]$ $= 500\ (\ a' - a'_n\ )\ Y^{1/3}$	CIELAB 1976
yellow−blue	$b^* = 200\ [\ (Y/Y_n)^{1/3} - (Z/Z_n)^{1/3}\ ]$ $= 500\ (\ b' - b'_n\ )\ Y^{1/3}$	**CIELAB 1976** *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	$b' = -0{,}4\ (1/Z_n)^{1/3}\ (z/y)^{1/3}$ $= -0{,}08376\ (z/y)^{1/3}$ for D65	$\log[S/(L+M)]$
radial	$c'_{ab} = [\ (a' - a'_n)^2 + (b' - b'_n)^2\ ]^{1/2}$	

AES00−7N