



R_dab Color Scale

Background

This color scale was developed by Richard Hunter to provide a color scale that could be computed automatically by analog devices like those an early colorimeter would have used. The R_dab scale is an opponent-color system similar to Hunter L, a, b. Instead of an L, R_d is used to designate lightness. Sometimes R_dab is expressed as L_{Rd} a_{Rd} b_{Rd}.

Conditions for Measurement

Instrumental: Most HunterLab color measurement instruments

Illuminant: Any

Standard Observer Function: 2 or 10 degree

Transmittance and/or Reflectance: Either

Formulas

$$f(Y) = \frac{0.51 (21 + 0.2Y)}{1 + 0.2Y}$$

$$R_d = Y$$

$$a_{Rd} = K_a f(Y) \left(\frac{X}{X_n} - \frac{Y}{Y_n} \right)$$

$$b_{Rd} = K_b f(Y) \left(\frac{Y}{Y_n} - \frac{Z}{Z_n} \right)$$

where

X, Y, and Z are the CIE Tristimulus Values

X_n, Y_n, and Z_n are the tristimulus values for the illuminant

Y_n = 100.00

X_n and Z_n are listed in the tables below.

CIE 2° Standard Observer

Illuminant	X_n	Z_n	K_a	K_b
A	109.83	35.55	185.20	38.40
C	98.04	118.11	175.00	70.00
D ₆₅	95.02	108.82	172.30	67.20
F2	98.09	67.53	175.00	52.90
TL4	101.40	65.90	178.00	52.30
UL 3000	107.99	33.91	183.70	37.50
D ₅₀	96.38	82.45	173.51	58.48
D ₆₀	95.23	100.86	172.47	64.72
D ₇₅	94.96	122.53	172.22	71.30

CIE 10° Standard Observer

Illuminant	X_n	Z_n	K_a	K_b
A	111.16	35.19	186.30	38.20
C	97.30	116.14	174.30	69.40
D ₆₅	94.83	107.38	172.10	66.70
F2	102.13	69.37	178.60	53.60
TL4	103.82	66.90	180.10	52.70
UL 3000	111.12	35.21	186.30	38.20
D ₅₀	96.72	81.45	173.82	58.13
D ₆₀	95.21	99.60	172.45	64.28
D ₇₅	94.45	120.70	171.76	70.76

Typical Applications

This color scale may be used for measurement of the color of any object whose color can be measured. This color scale is no longer used very often.

For Additional Information Contact:

Technical Services Department
 Hunter Associates Laboratory, Inc.
 11491 Sunset Hills Road
 Reston, Virginia 20190
 Telephone: 703-471-6870
 FAX: 703-471-4237
www.hunterlab.com