

Gernot Hoffmann
PS-Swatch Spot

Colors by Lab numbers
Coated
1137 Color Patches

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November 08 / 2018

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The set of spot ink colors can be considered as a representative set for all real world surface colors under illuminant D50. It means that more vivid colors are hardly found.

This was recently confirmed in chapter 8.4.3 of this book:

Ján Morovič
Color Gamut Mapping
John Wiley & Sons, Ltd
2008

In this sense the gamut volume, as occupied by these colors, can be considered as the necessary gamut.

This doc: <http://docs-hoffmann.de/swatch16032005.pdf>

March 16 / 2005 + February 01 / 2013 + January 04 / 2014 + March 27 / 2015
+ June 05 / 2018 (scheme below) + November 08 / 2018 (definitions for OptiRGB)

	sRGB	aRGB	
R	224	191	aRGB = Adobe RGB Out of gamut in sRGB or aRGB, if at least one value RGB is indicated by 0 or 255 Name or Number Asterisk can be omitted
G	0	0	
B	138	134	
	Hexachrome-Magenta	105	
Lab	L*	a*	b*
	48.49	81.28	-11.86
	L*	a*	b*
	49.02	-1.27	48.05

Introduction

■ This document contains on page 3 to 14 altogether 1137 color patches or swatches (spot colors, coated), each one defined by CIELab values.

The Lab values are written under each patch. Additionally the RGB numbers were calculated for sRGB and aRGB=AdobeRGB(98) and written in the patches. Lab values are valid for reference white D50, but sRGB and AdobeRGB(98) use D65 white point.

In order to get matching values in Photoshop, a chromatic adaptation transform (Bradford) was applied. This is accurate within ± 1 unit of 255, with a few exceptions.

For tests by Photoshop choose the appropriate RGB working space and open a page of the PDF in Lab mode, providing a sufficient resolution. Check Lab and RGB numbers by Info Palette.

A color is out of gamut for an RGB space if at least one value is negative or greater than 255. Because of clipping this is indicated by 0 or 255.

■ Page 15 and 16 show the patches in the CIE chromaticity diagram. The Lab colors are at correct positions in xy-coordinates, but for the gamut test the chromatic adaptation transform was applied. A few colors are outside the gamut triangle but nevertheless in-gamut for the RGB space.

■ Page 17 shows a suggestion for an 'optimal' RGB working space and printer inks CMY,M+Y,C+Y,C+M for ISO Coated and an inkjet.

■ Page 18 and 19 show the colors for the common IT8.7/2 target which is used for scanner and camera calibration. The gamut is not extraordinarily large. These colors are obviously relevant for practical color reproduction.

■ Page 20 to 31 show planes of constant Lab hue and the nearest spot colors, if the distance is not larger than 10 Lab units ($dE \leq 10$).

This PDF is not a spot document. That means, it does not contain 1137 spot plates. In fact it will be printed by CMYK. It depends entirely on the quality of the RIP whether the Lab colors are correctly reproduced.

The document was not authorized by any manufacturer of color systems.

Thanks to *Roger Breton* for providing a method how to generate a list of common spot colors by Lab values.

More about CIELab (1.6 MB):
<http://docs-hoffmann.de/cielab03022003.pdf>

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s	a
156	155
158	157
155	154

7539
65.08 -1.29 1.41

s	a
92	143
221	220
71	85

802
78.87 -57.29 59.31

s	a
254	234
51	54
132	129

812
61.12 81.69 11.51

s	a
136	132
125	124
111	111

8003
53.35 2.53 9.23

s	a
109	109
110	109
115	114

7540
46.58 0.55 -3.07

s	a
254	254
231	231
2	54

803
92.5 -1.61 90.12

s	a
232	199
20	27
173	169

813
53.0 80.2 -25.86

s	a
150	141
119	118
105	105

8021
52.98 11.06 12.81

s	a
221	221
226	225
230	229

7541
89.71 -1.29 -2.8

s	a
254	254
160	158
68	76

804
81.25 50.07 69.86

s	a
124	116
96	97
205	201

814
48.02 30.84 -53.49

s	a
151	139
107	107
120	119

8062
50.42 19.34 -0.01

s	a
172	176
191	189
199	197

7542
76.11 -5.44 -6.51

s	a
254	254
86	87
94	94

805
68.3 76.9 43.1

s	a
138	131
117	117
74	78

871
50.73 3.72 26.91

s	a
135	129
116	116
138	136

8100
51.5 10.56 -9.01

s	a
162	164
172	171
182	180

7543
70.08 -2.16 -6.38

s	a
254	225
21	28
170	166

806
58.7 86.34 -14.85

s	a
141	133
116	115
76	79

872
50.73 5.76 25.98

s	a
92	103
126	125
145	143

8201
50.9 -8.78 -14.35

s	a
132	135
145	144
158	156

7544
59.62 -2.68 -8.65

s	a
212	181
6	14
176	172

807
48.86 77.56 -34.48

s	a
143	134
115	114
78	81

873
50.67 7.38 24.88

s	a
109	118
141	140
138	137

8281
56.3 -12.05 -2.59

s	a
80	86
98	98
114	113

7545
40.58 -3.64 -11.56

s	a
0	56
174	173
150	150

808
61.52 -61.15 -2.58

s	a
144	135
111	111
78	80

874
49.88 9.9 23.96

s	a
122	126
138	137
110	111

8321
55.82 -10.32 13.11

s	a
59	66
76	77
92	92

7546
31.56 -3.57 -11.83

s	a
225	225
227	227
0	46

809
88.18 -15.47 87.87

s	a
147	136
107	107
78	80

875
49.22 13.54 23.12

s	a
31	41
46	50
59	61

7547
18.3 -3.26 -10.49

s	a
254	254
206	205
17	52

810
88.21 18.62 87.02

s	a
149	136
99	99
66	69

876
47.06 18.47 27.37

s	a
0	39
167	165
216	213

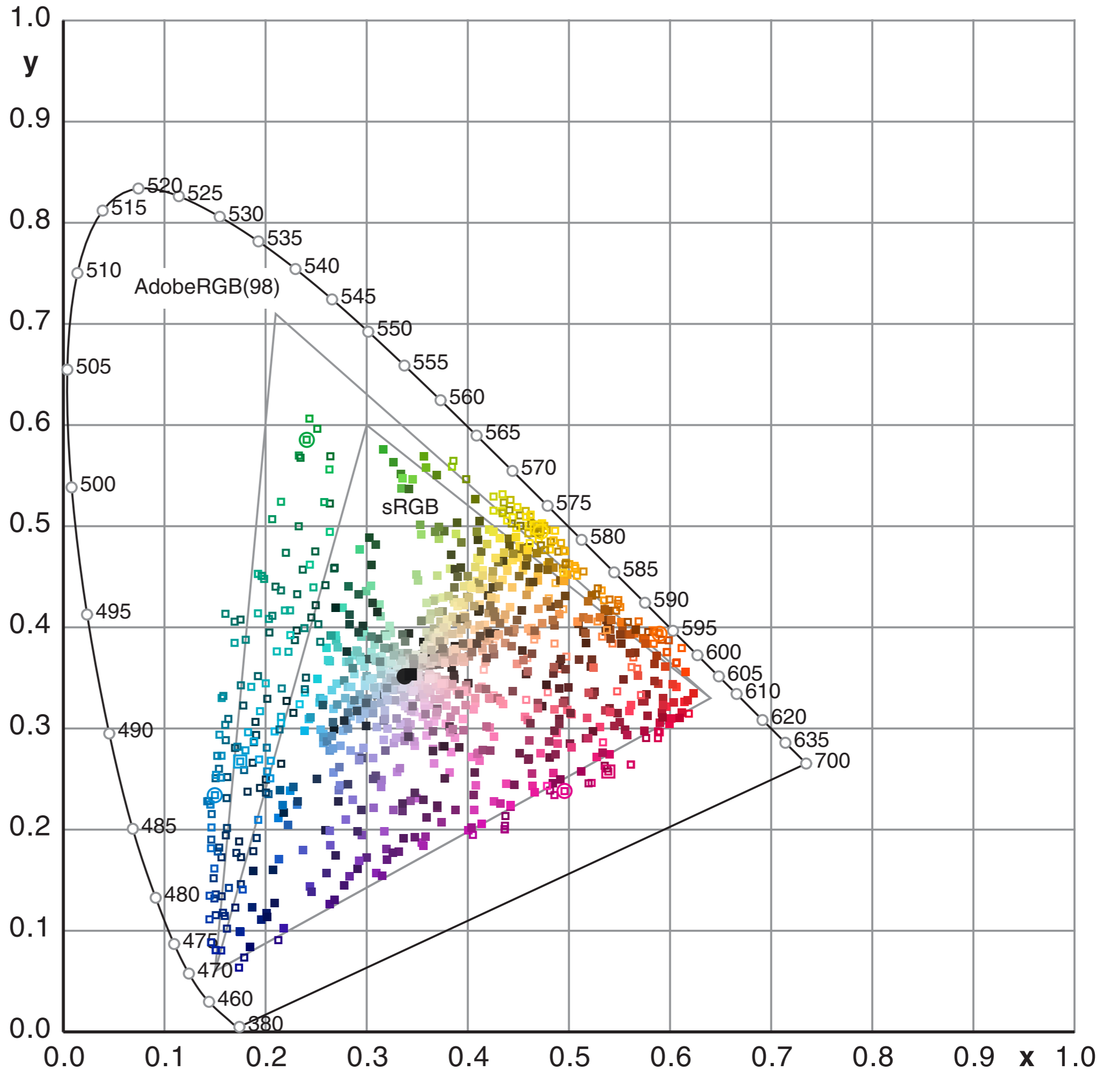
801
60.83 -39.8 -40.09

s	a
254	254
117	117
81	84

811
73.13 66.63 55.63

s	a
145	145
149	148
153	152

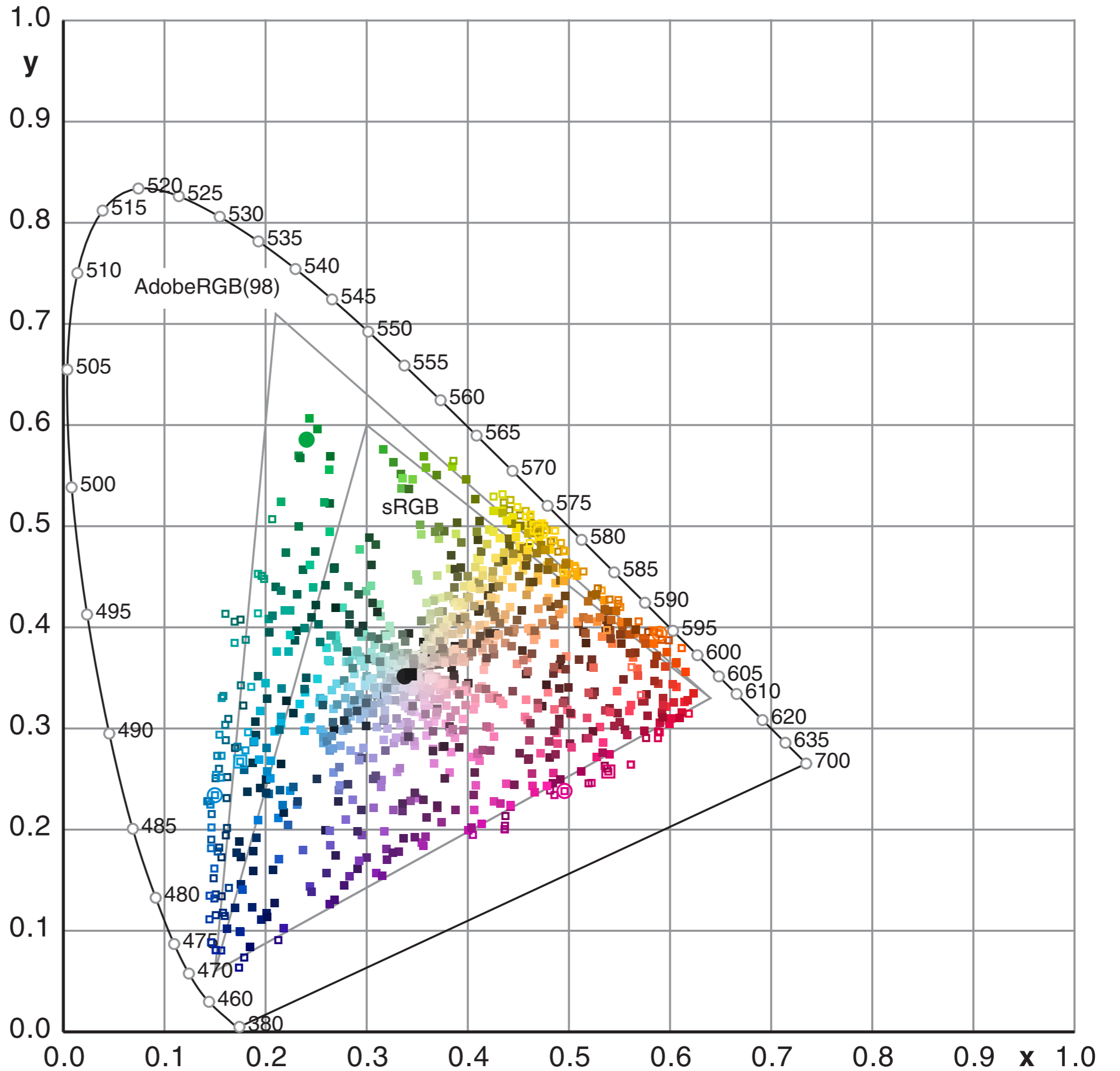
877
61.73 -0.91 -2.59



Spot colors in the CIE chromaticity diagram

For sRGB

- | | |
|--------------|--------------|
| Filled | In gamut |
| Stroked | Out of gamut |
| Small square | Spot color |
| Big square | CMYK |
| Big circle | CMYKOG |



Spot colors in the CIE chromaticity diagram

For AdobeRGB(98)

- | | |
|--------------|-------------------|
| Filled | In gamut |
| Stroked | Out of gamut |
| Small square | Spot color |
| Big square | CMYK |
| Big circle | CMYKOG Hexachrome |

OptiRGB

Primaries in the table

Gamma=2.2

D65

OptiRGB is optimized for surface colors. Spot colors are assumed to be the most complete collection of surface colors.

For OptiRGB as working space, defined by an ICC profile, one has to use according to the ICC specifications D50 as 'illuminant', though this doesn't make any sense. The white point remains D65.

<http://docs-hoffmann.de/OptiRGB.icc>

The transform is done for each triple \mathbf{X} by $\mathbf{X}_{50} = \mathbf{B} \mathbf{X}_{65}$, using the Bradford Matrix \mathbf{B} as shown on p.10 of this doc:

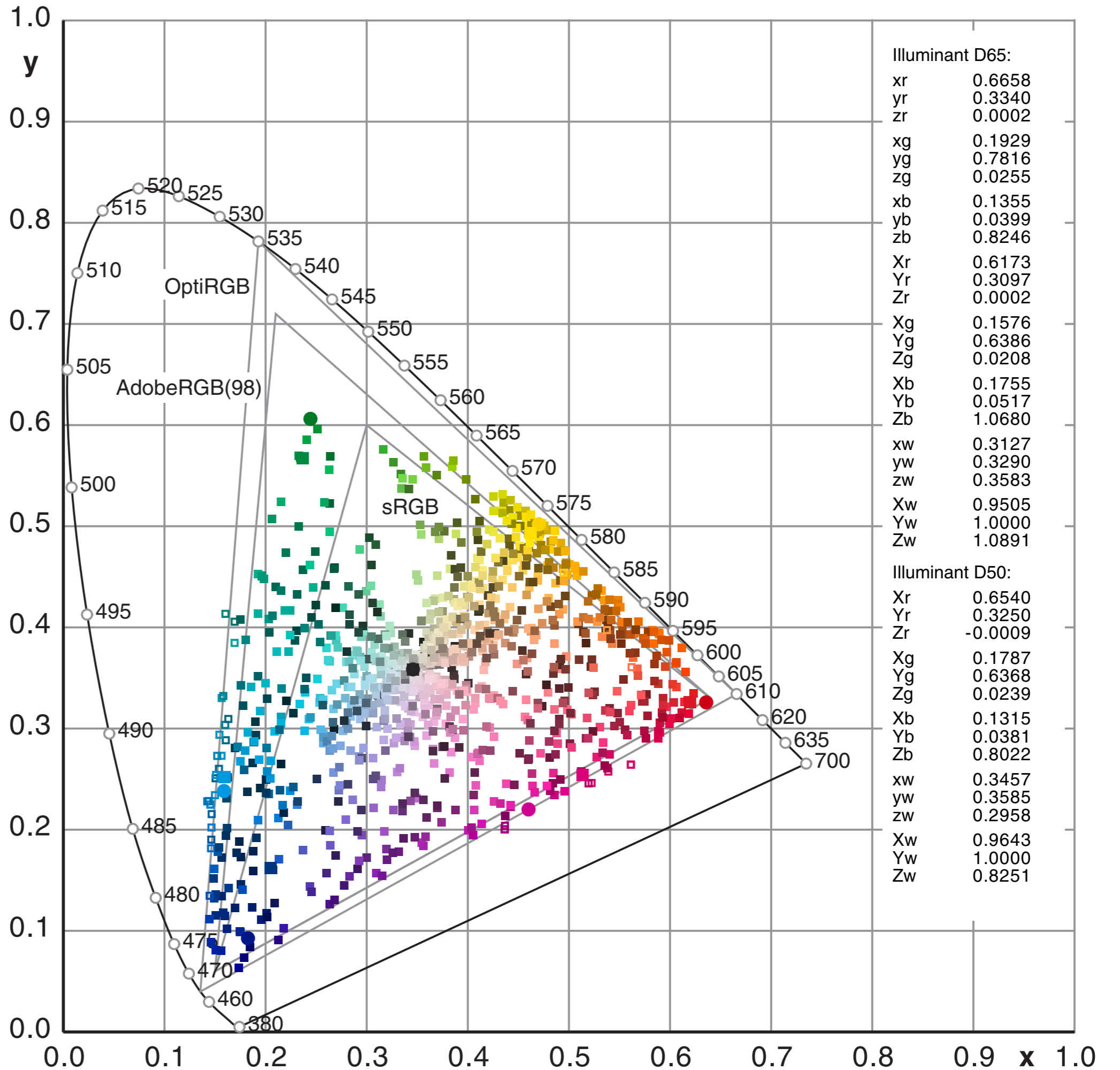
<http://docs-hoffmann.de/cielab03022003.pdf>

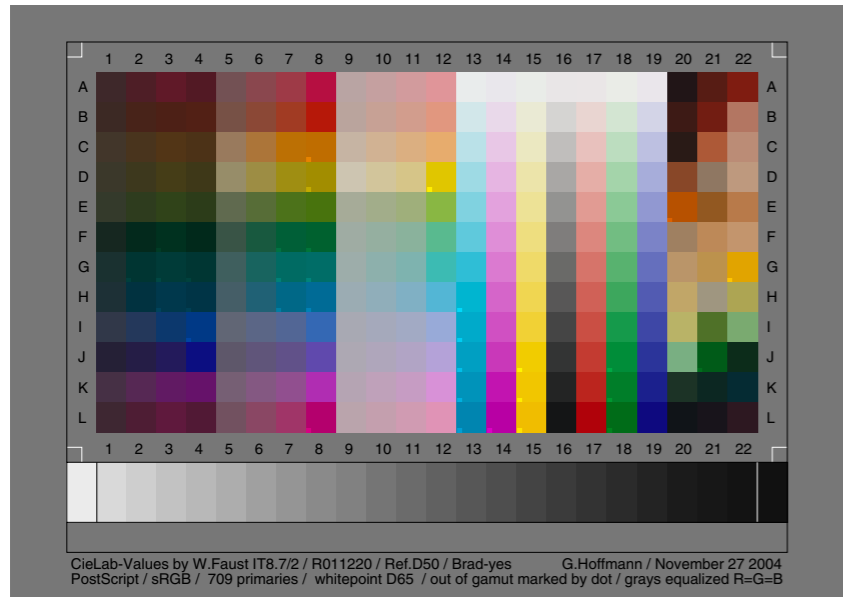
Spot colors and printer inks in the CIE chromaticity diagram

For OptiRGB

Filled In gamut
 Stroked Out of gamut

Square Spot color
 Big Square ISO Coated CMYK
 Big Circle Inkjet Mutoh RJ 6100





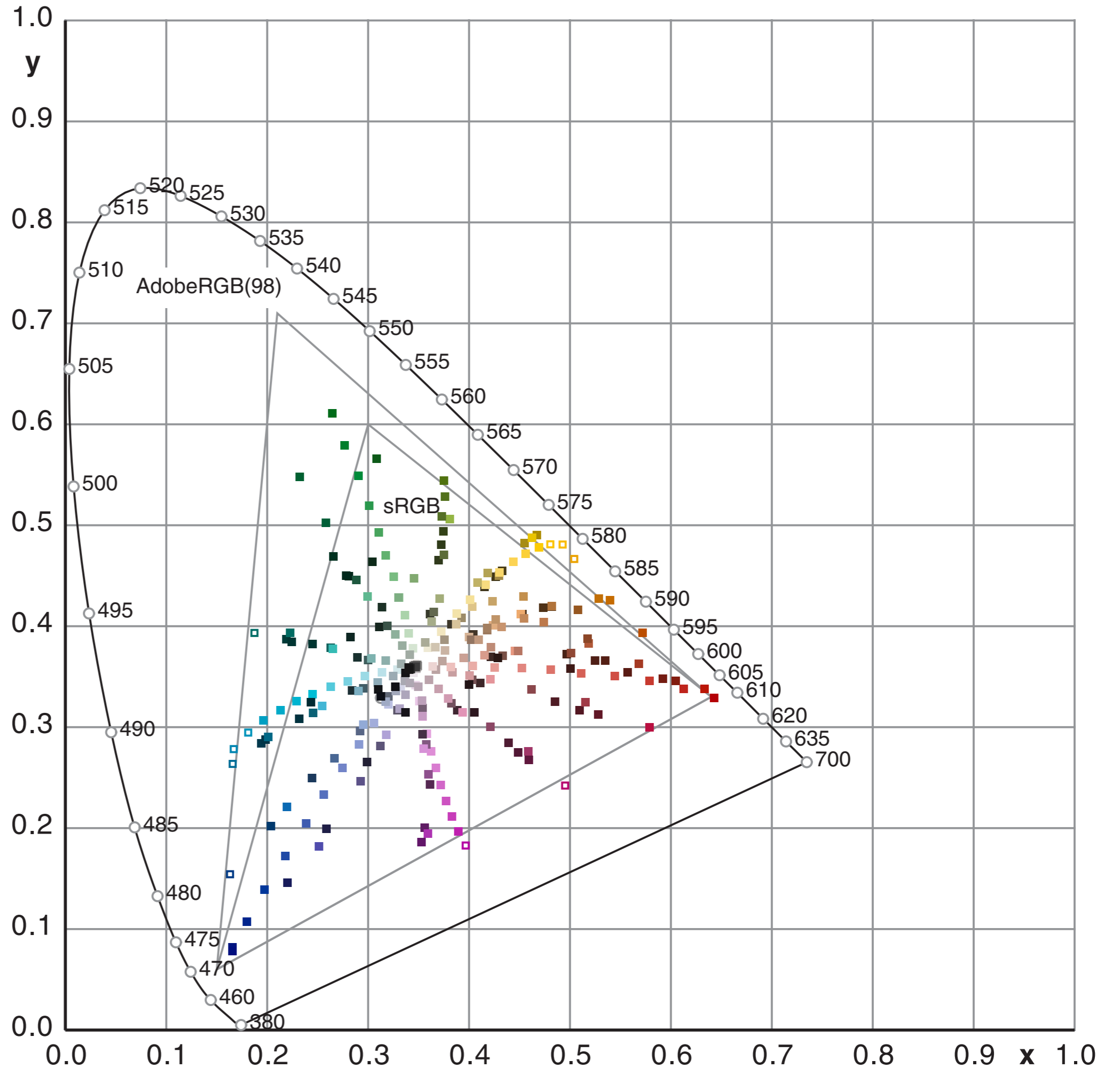
The target above, which is used in many docs by the author, was made by the reference file for a real target, using measured Lab values.

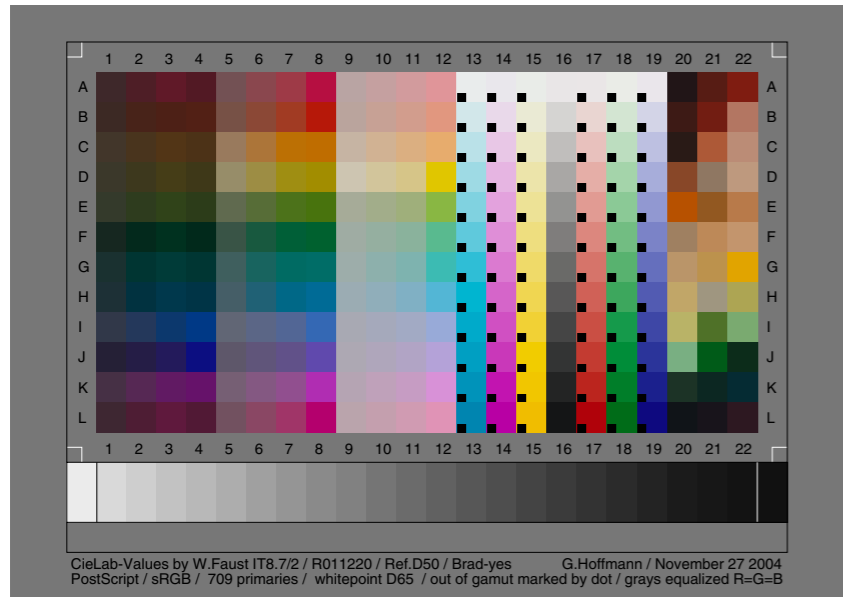
The chromaticity diagram shows these measured Lab values.

IT8.7/2 colors in the CIE chromaticity diagram

For AdobeRGB(98)

- Filled In gamut
- Stroked Out of gamut
- Small square Target color





The target above, which is used in many docs by the author, was made by the reference file for a real target, using measured Lab values.

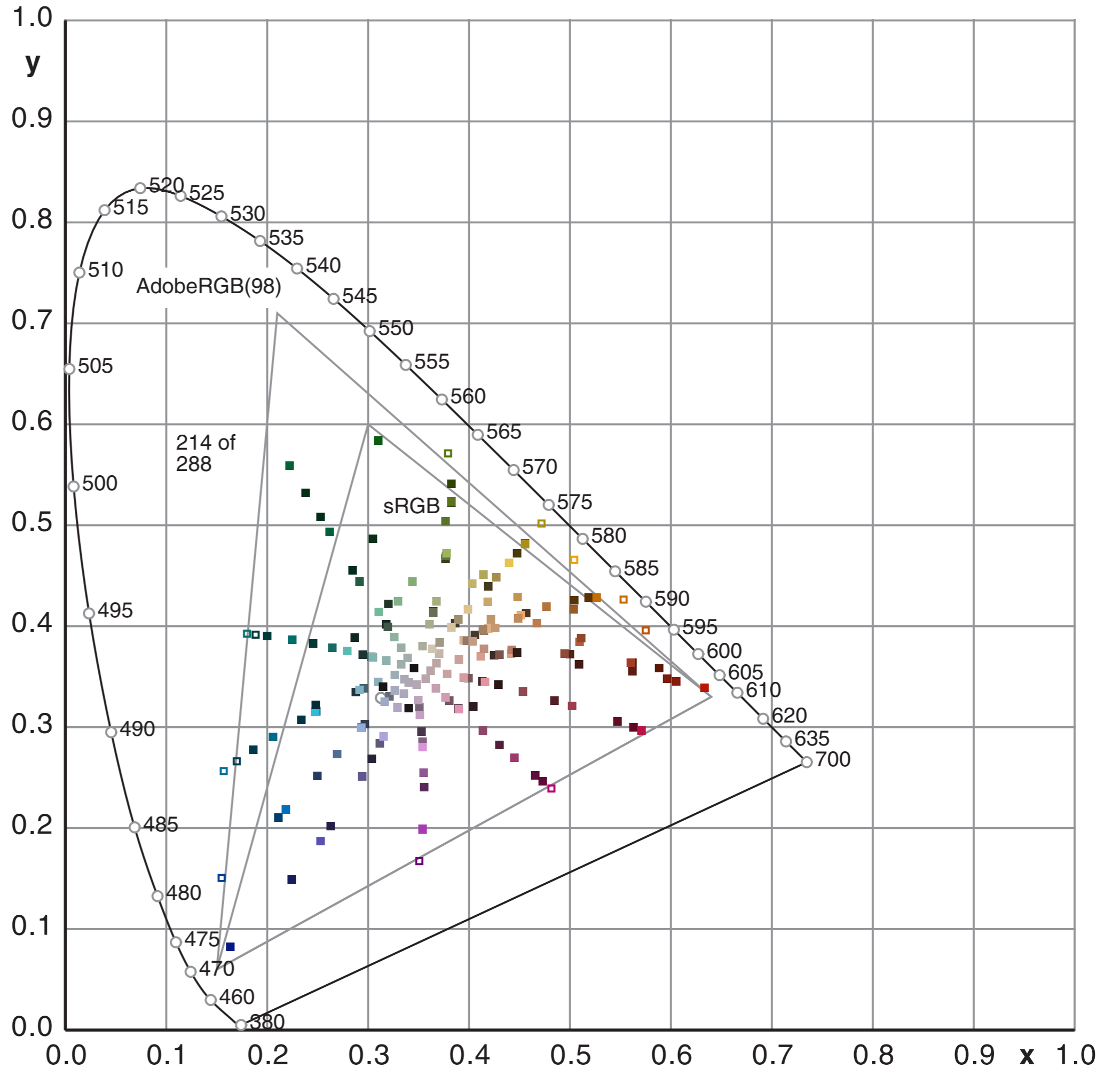
The chromaticity diagram shows a subset of 214 of 288 IT8.7/2 colors according to the standard.

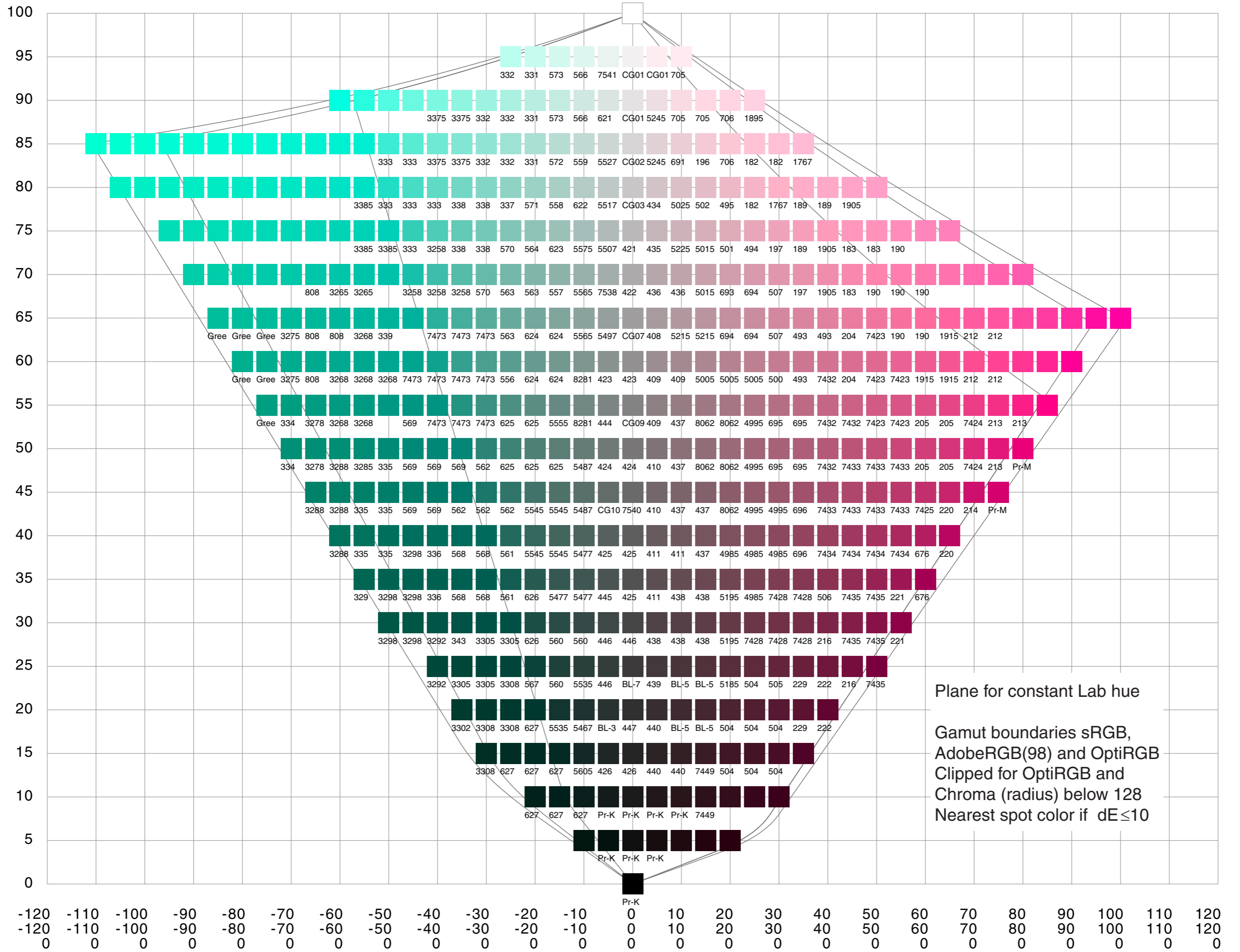
For the remaining colors GS0, GS23 and six step wedges (marked by a black square in the target) reference values are not available.

IT8.7/2 colors in the CIE chromaticity diagram

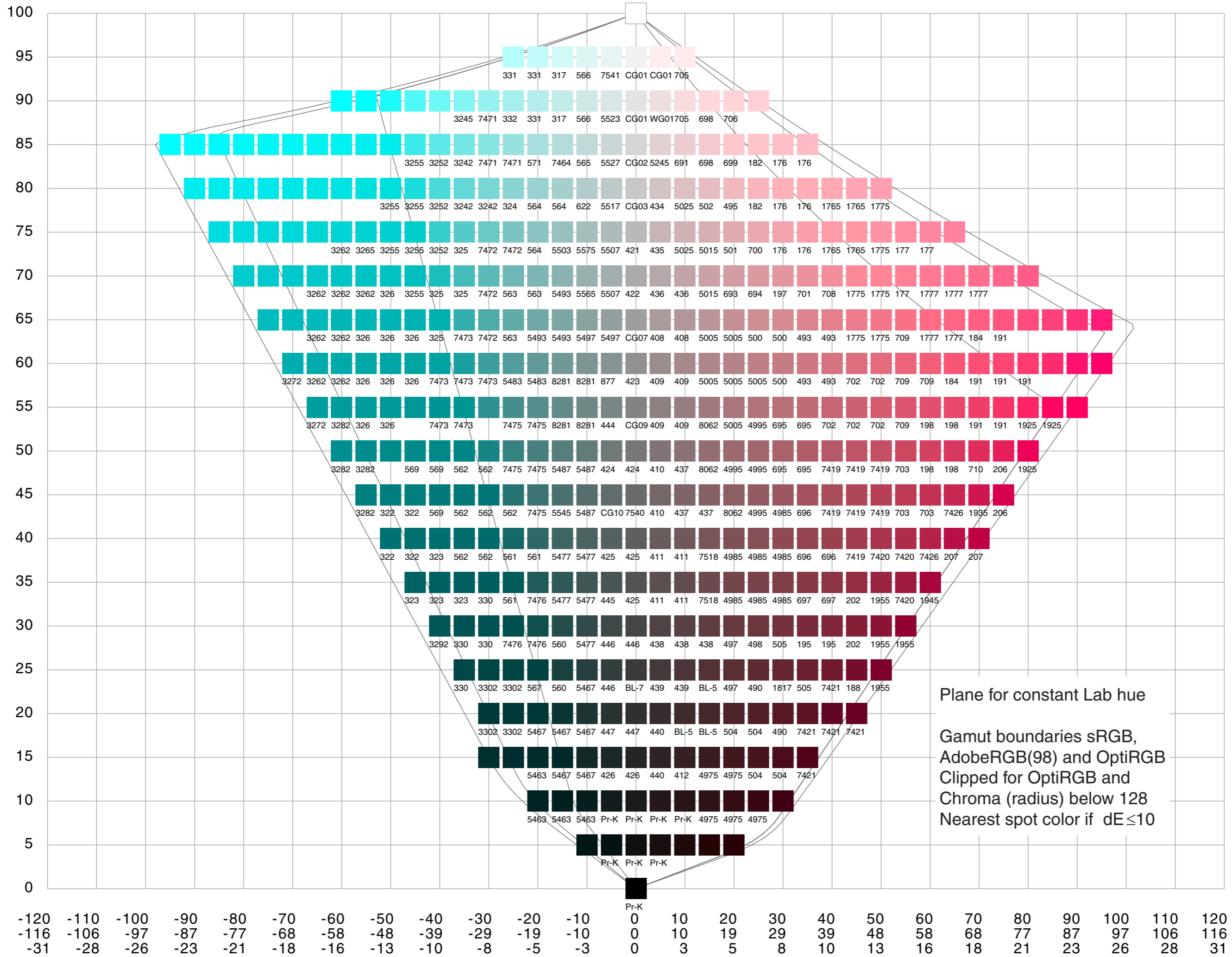
For AdobeRGB(98)

- Filled In gamut
- Stroked Out of gamut
- Small square Target color

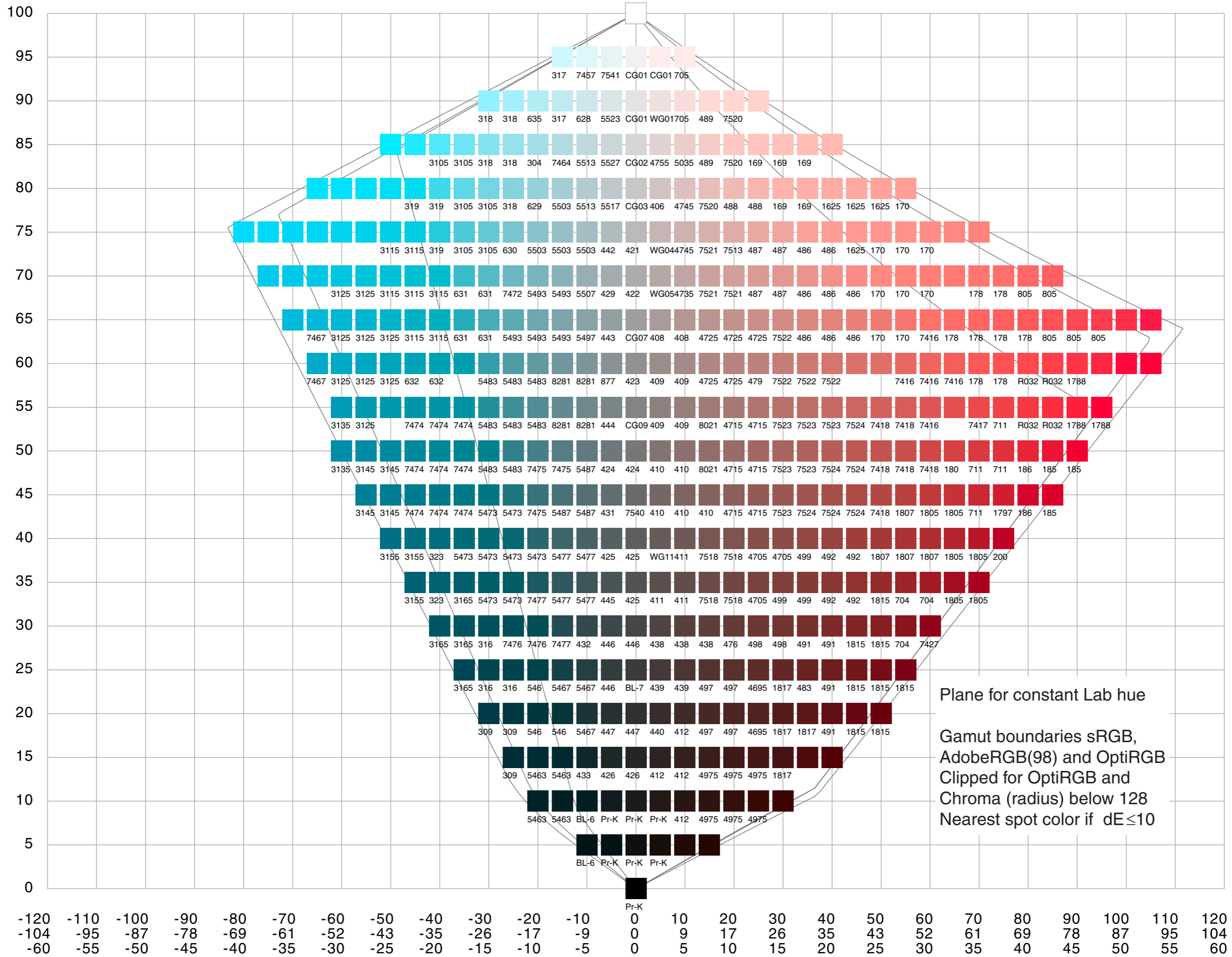


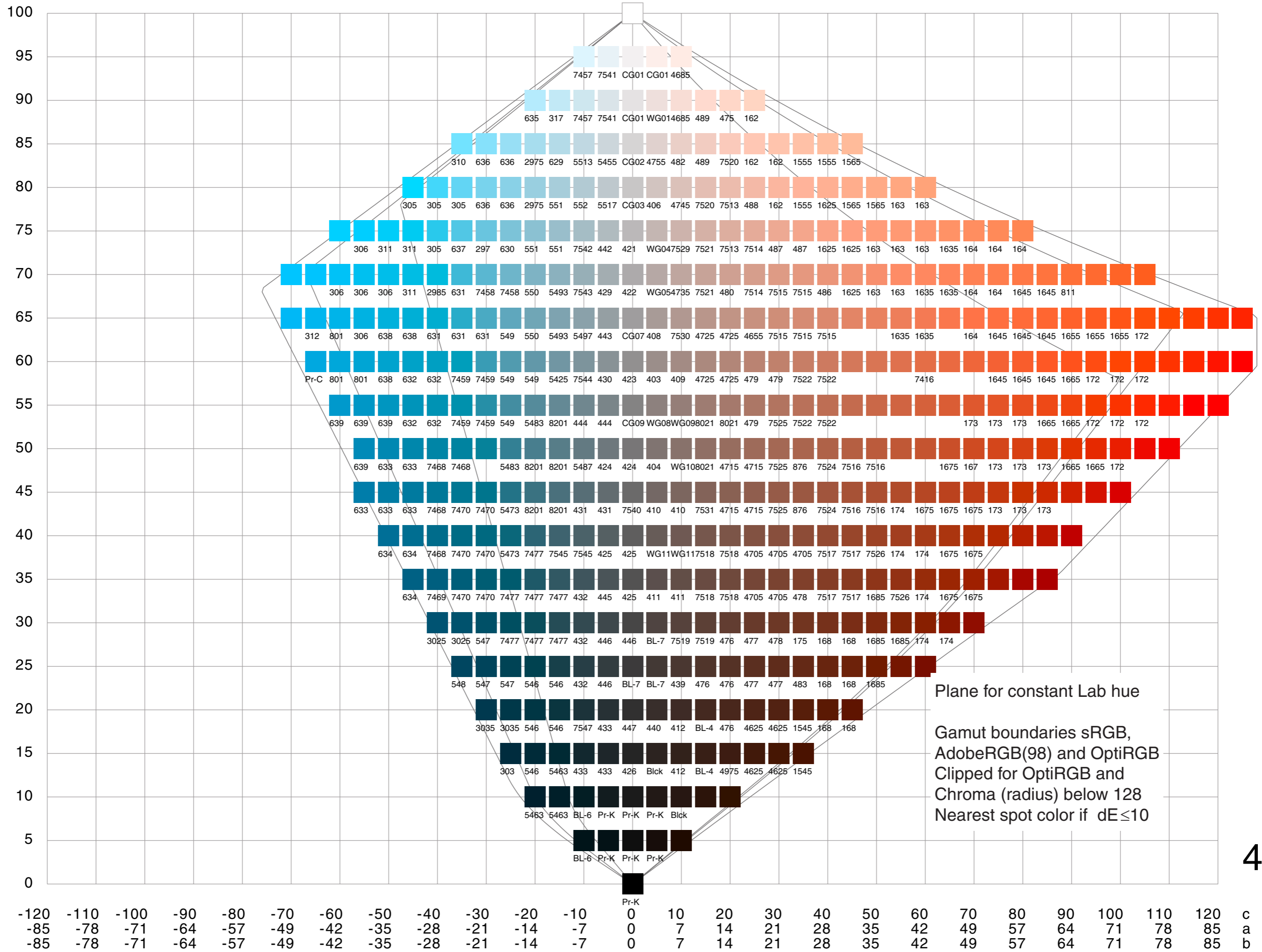


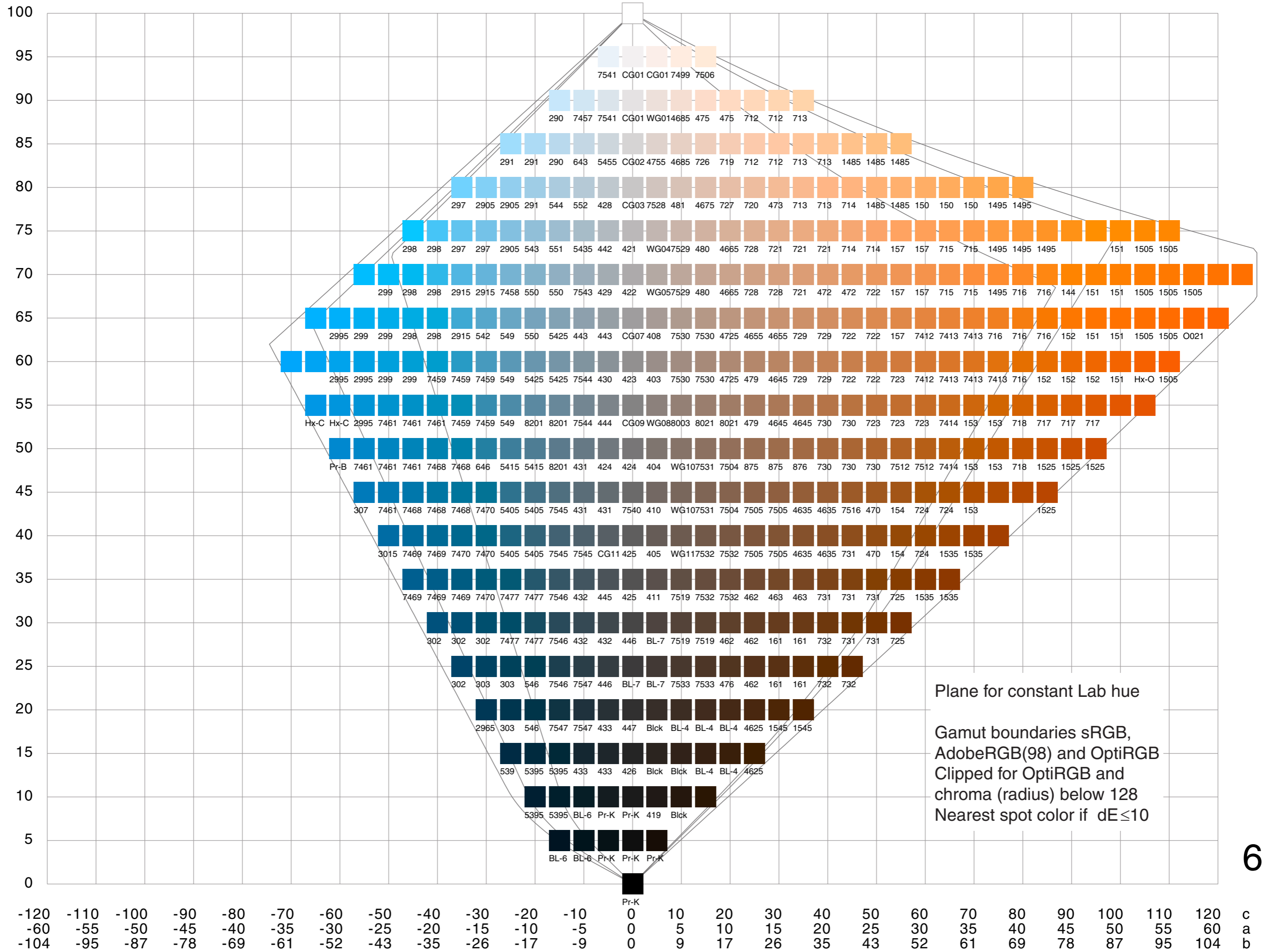
0°

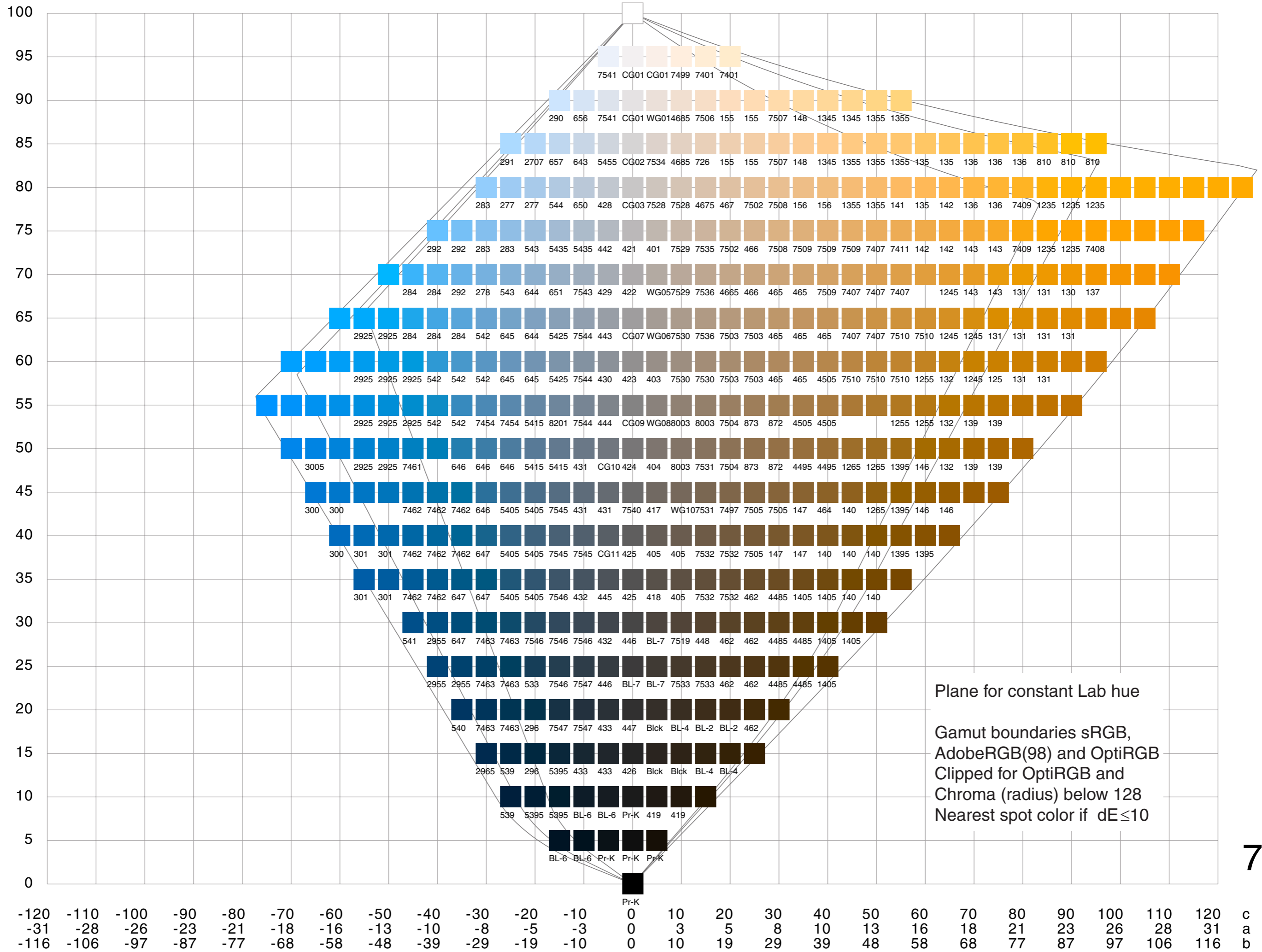


15°

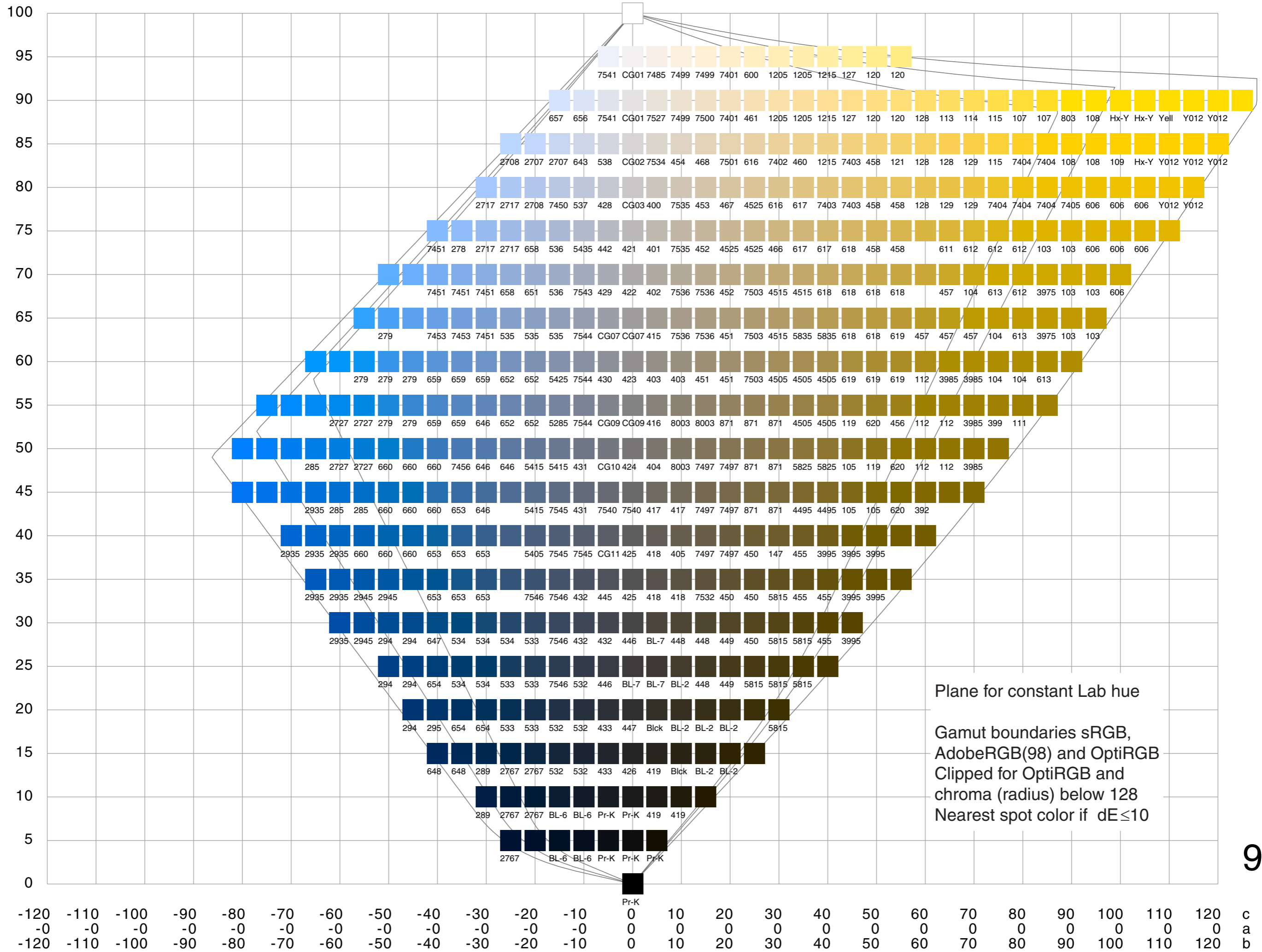


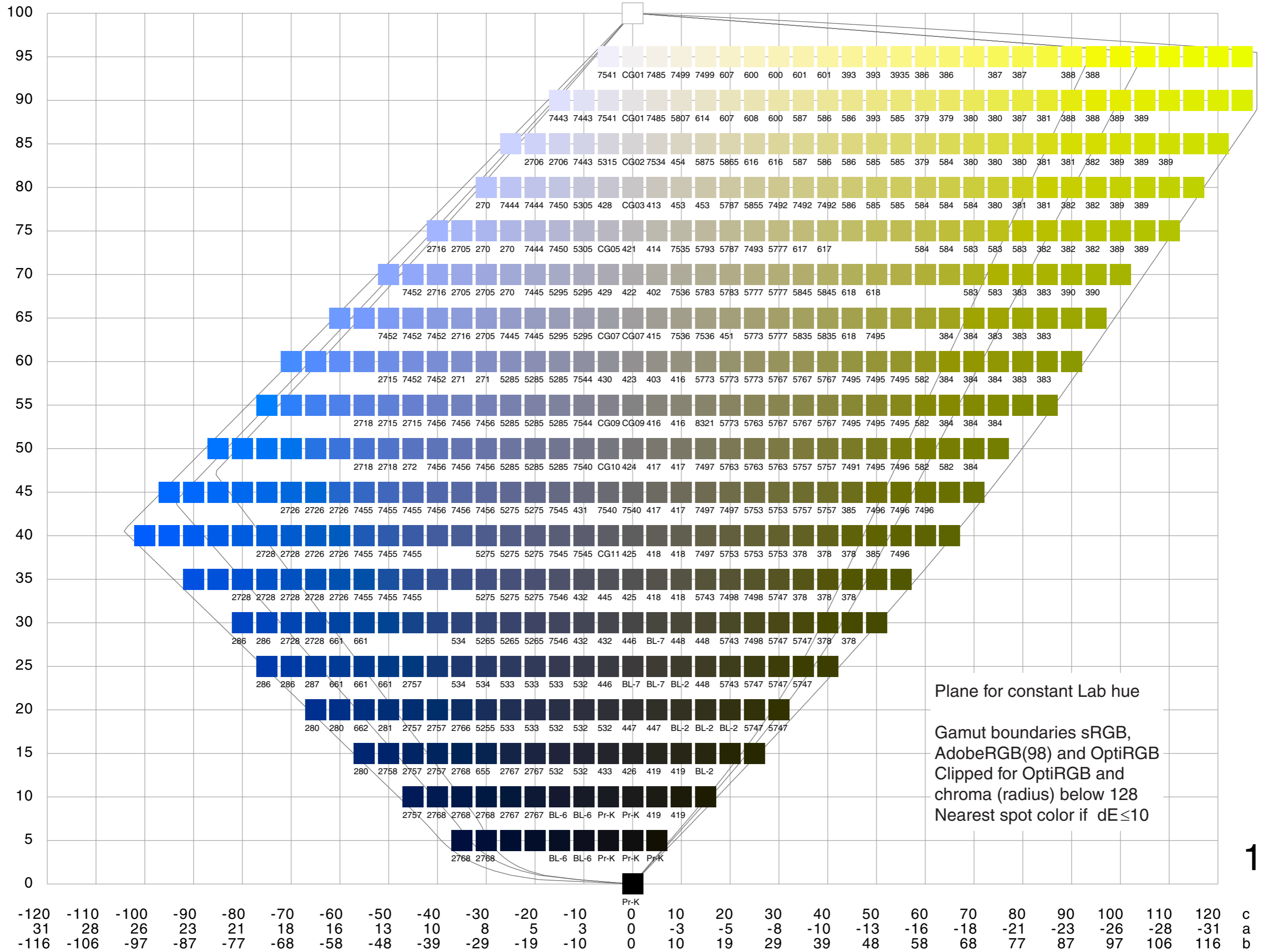




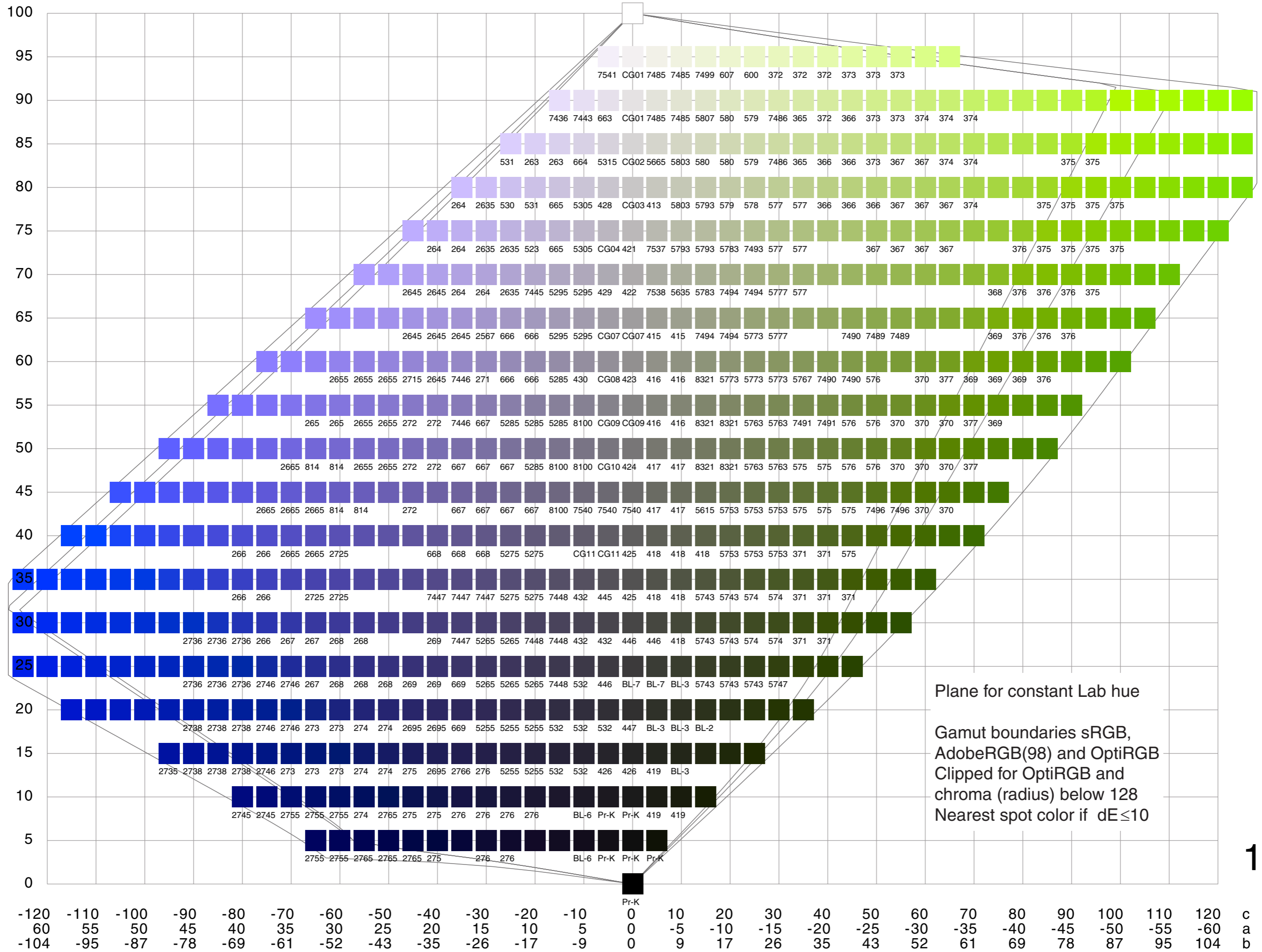


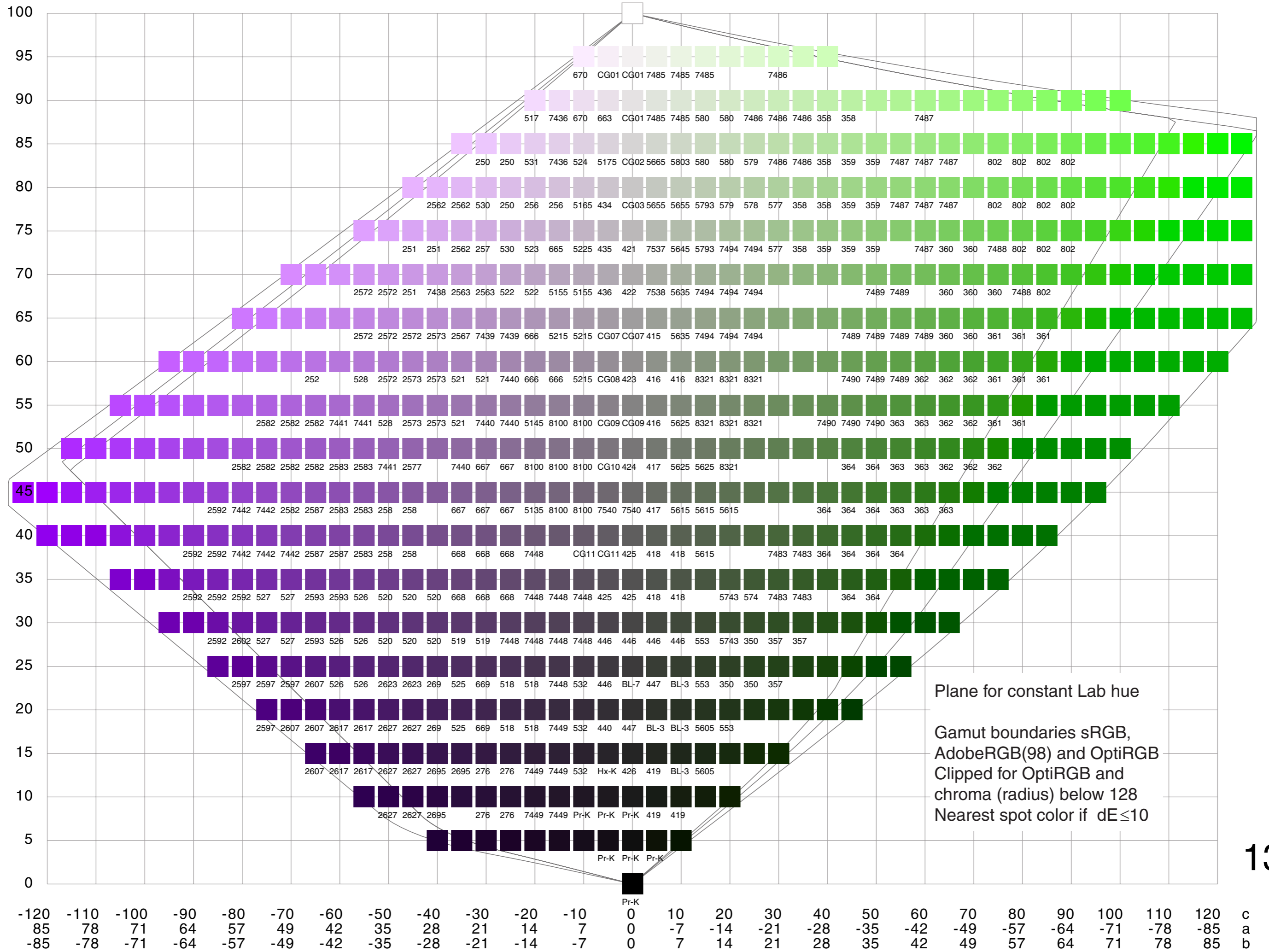
75°



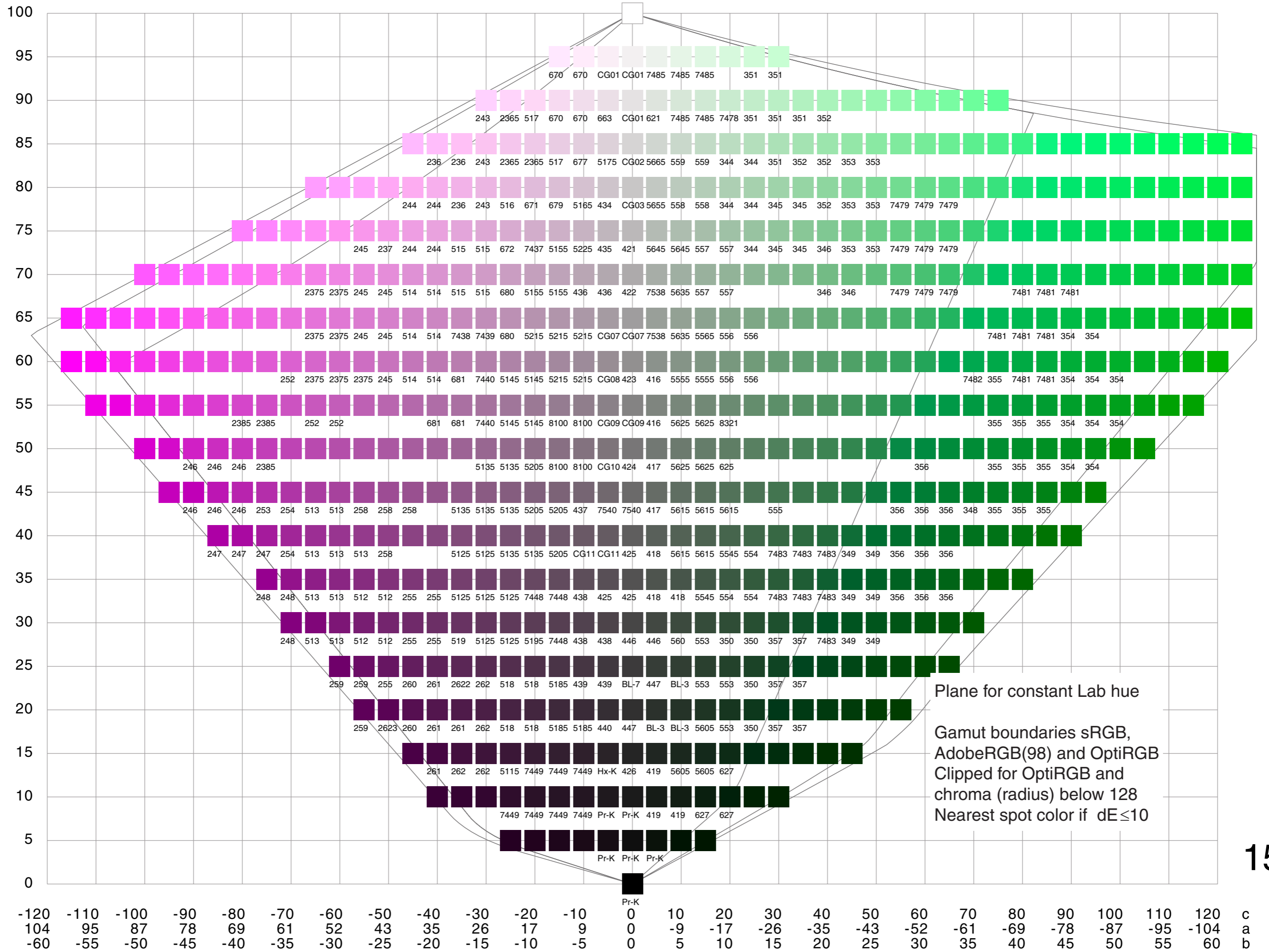


105°

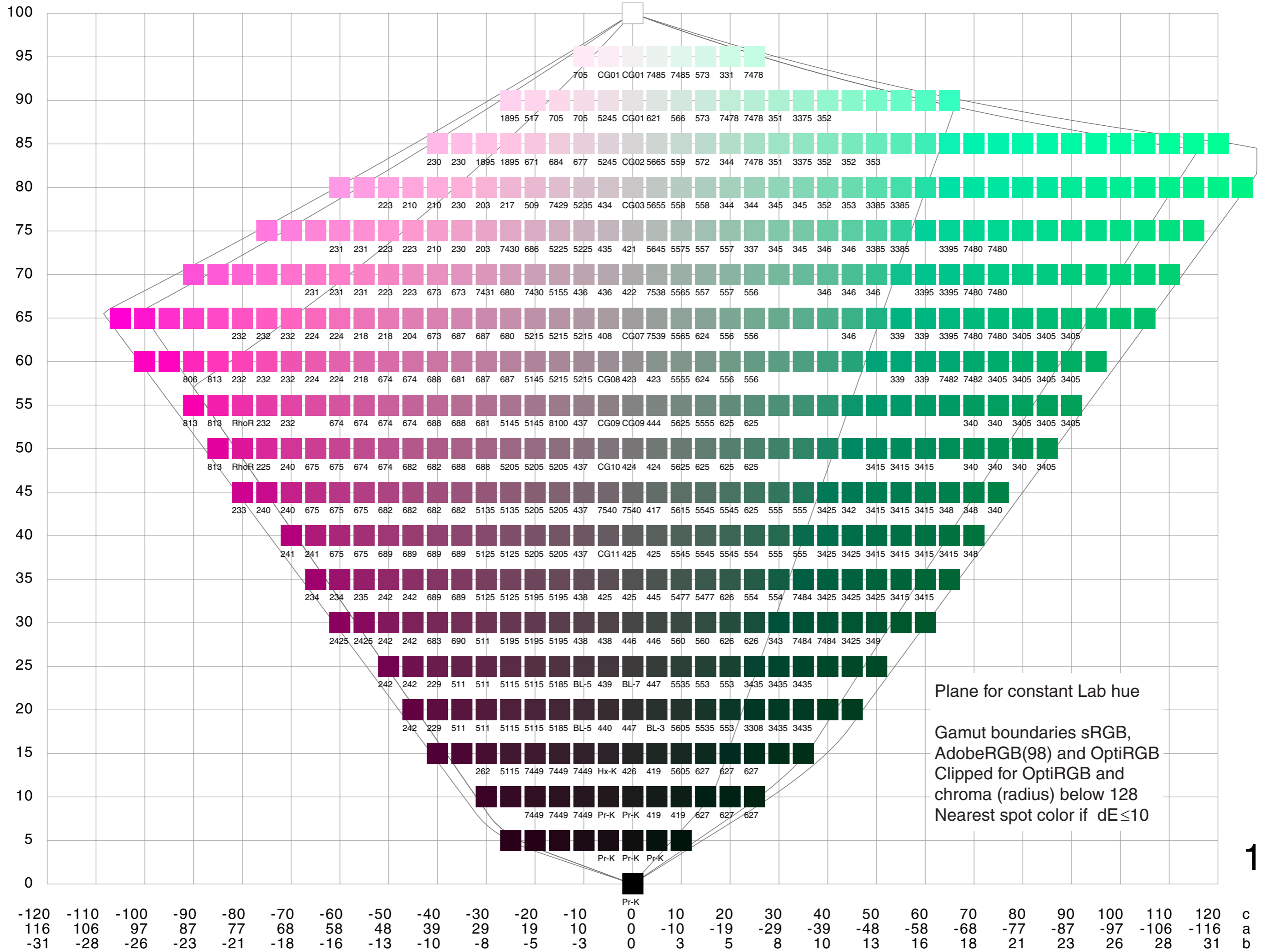




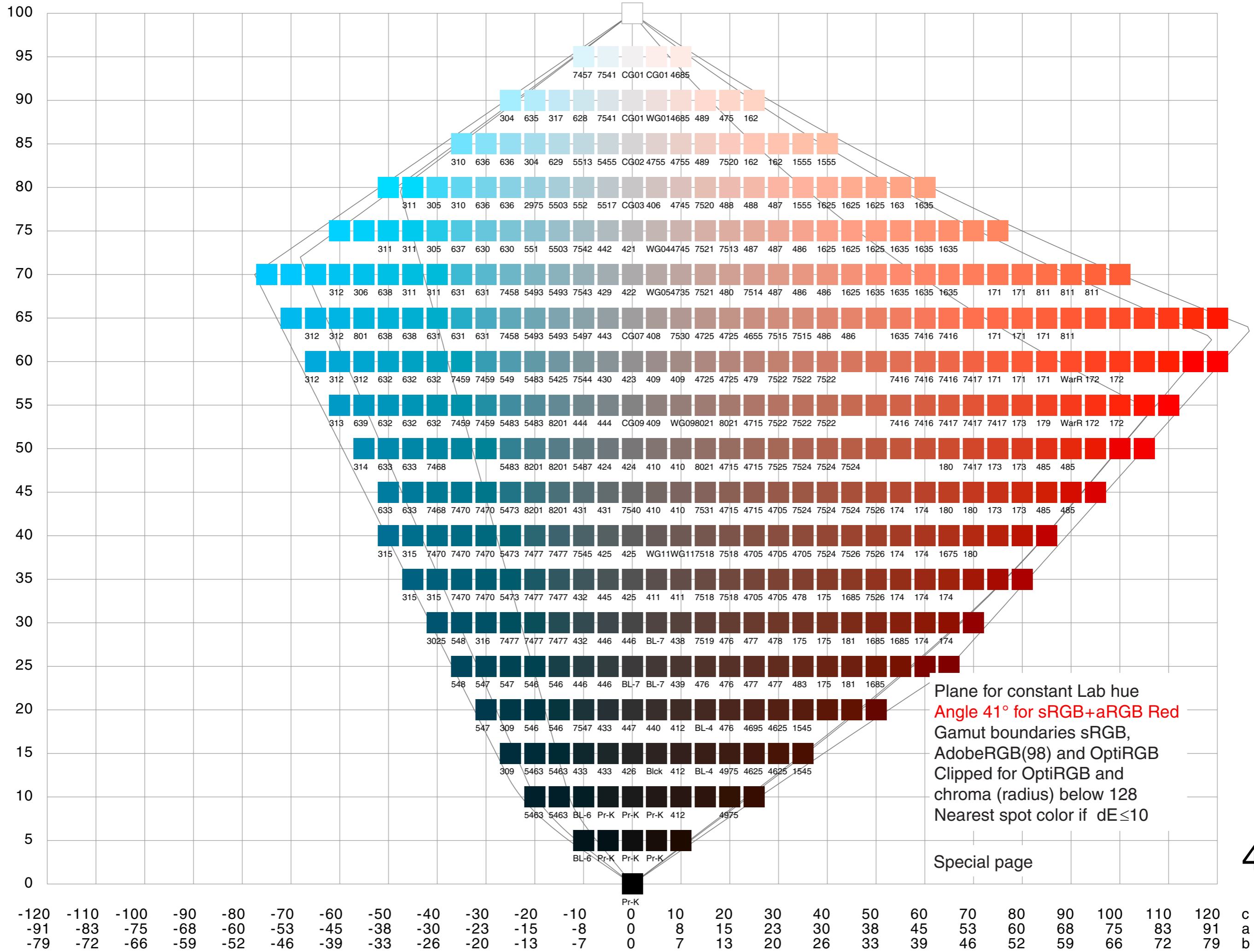
135°



150°



165°



41°

