

Gernot Hoffmann
PS-Swatch Spot

Colors by Lab numbers
Coated
1137 Color Patches

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March 27 / 2015

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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

Introduction

■ This document contains on page 3 to 14 altogether 1137 color patches (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 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>

Gernot Hoffmann

<pre>s a 240 238 234 234 119 126</pre>	<pre>s a 151 147 143 141 134 134</pre>	<pre>s a 55 55 43 47 39 44</pre>	<pre>s a 168 167 170 168 171 170</pre>	<pre>s a 66 71 76 77 86 87</pre>	<pre>s a 179 180 188 186 190 189</pre>	<pre>s a 179 175 170 168 164 163</pre>	<pre>s a 189 188 189 188 191 190</pre>	<pre>s a 61 60 45 49 32 38</pre>	<pre>s a 213 211 212 210 193 192</pre>	3935 91.64 -9.03 55.71	403 59.94 2.02 5.47	412 18.97 5.21 4.48	422 69.61 -0.33 -0.99	432 31.99 -2.43 -7.44	442 75.64 -2.78 -2.47	WARM-GRAY-5 70.28 2.55 4.2	COOL-GRAY-4 76.92 0.06 -0.89	BLACK-4 20.4 6.22 11.34	454 84.64 -2.02 9.53
<pre>s a 239 236 229 228 0 46</pre>	<pre>s a 123 119 114 113 104 104</pre>	<pre>s a 200 199 200 199 194 193</pre>	<pre>s a 145 145 147 146 149 148</pre>	<pre>s a 31 39 40 44 47 51</pre>	<pre>s a 152 154 162 161 166 164</pre>	<pre>s a 170 166 160 159 154 153</pre>	<pre>s a 178 176 178 177 180 179</pre>	<pre>s a 70 66 48 51 50 54</pre>	<pre>s a 92 87 71 72 24 33</pre>	3945 89.75 -10.53 89.74	404 48.7 2.4 6.47	413 80.73 -0.75 2.91	423 61.1 -0.46 -1.23	433 15.7 -2.19 -6.3	443 66.14 -3.18 -3.25	WARM-GRAY-6 66.88 2.78 4.46	COOL-GRAY-5 72.82 0.01 -1.07	BLACK-5 22.68 10.6 2.42	4485 31.84 5.55 30.72
<pre>s a 236 233 225 224 0 0</pre>	<pre>s a 100 97 90 91 81 82</pre>	<pre>s a 182 180 182 180 175 174</pre>	<pre>s a 120 120 123 122 125 124</pre>	<pre>s a 212 207 201 200 205 204</pre>	<pre>s a 123 125 133 132 137 136</pre>	<pre>s a 158 154 148 147 141 140</pre>	<pre>s a 176 174 176 175 179 177</pre>	<pre>s a 16 26 28 34 39 43</pre>	<pre>s a 132 125 109 109 43 51</pre>	3955 88.22 -10.43 102.74	405 39.21 2.66 6.99	414 74.04 -1.02 3.65	424 51.58 -0.61 -1.6	434 82.13 4.24 -0.56	444 54.91 -3.26 -3.58	WARM-GRAY-7 62.28 3.1 5.03	COOL-GRAY-6 72.15 0.06 -1.39	BLACK-6 9.75 -2.73 -9.14	4495 47.63 3.37 39.27
<pre>s a 234 230 220 219 0 0</pre>	<pre>s a 50 51 43 47 36 41</pre>	<pre>s a 157 156 158 156 149 148</pre>	<pre>s a 86 88 89 90 91 92</pre>	<pre>s a 199 194 186 184 191 189</pre>	<pre>s a 78 81 84 85 87 88</pre>	<pre>s a 145 141 134 133 126 126</pre>	<pre>s a 159 158 160 158 163 161</pre>	<pre>s a 64 65 60 62 56 58</pre>	<pre>s a 155 149 136 134 71 76</pre>	3965 86.84 -9.49 106.89	BLACK-C.1 18.25 2.57 5.76	415 64.94 -1.28 4.4	425 37.9 -0.77 -1.74	435 76.82 5.75 -0.95	445 35.57 -2.15 -2.78	WARM-GRAY-8 56.88 3.32 5.6	COOL-GRAY-7 65.95 0.04 -1.63	BLACK-7 25.73 1.23 3.21	4505 57.49 1.47 37.11
<pre>s a 187 180 168 166 0 0</pre>	<pre>s a 202 198 194 193 191 190</pre>	<pre>s a 135 134 136 135 126 126</pre>	<pre>s a 35 41 38 42 39 43</pre>	<pre>s a 183 177 166 164 172 171</pre>	<pre>s a 62 65 67 69 66 68</pre>	<pre>s a 136 132 124 123 116 116</pre>	<pre>s a 146 145 147 146 151 149</pre>	<pre>s a 71 71 62 64 39 45</pre>	<pre>s a 179 174 164 162 110 112</pre>	3975 68.78 -3.73 84.49	406 79.21 2.35 2.57	416 56.61 -1.56 5.16	426 14.99 -0.74 -1.54	436 69.82 7.19 -1.14	446 28.0 -2.23 -0.63	WARM-GRAY-9 53.16 3.54 5.94	COOL-GRAY-8 61.27 0.04 -1.92	448 26.95 1.34 15.49	4515 67.91 0.06 30.02
<pre>s a 155 149 137 136 0 0</pre>	<pre>s a 185 181 176 174 172 171</pre>	<pre>s a 111 111 112 111 101 102</pre>	<pre>s a 211 211 214 213 217 216</pre>	<pre>s a 131 124 109 108 116 115</pre>	<pre>s a 50 54 53 56 50 53</pre>	<pre>s a 122 118 110 110 102 102</pre>	<pre>s a 132 132 134 133 137 136</pre>	<pre>s a 78 76 68 70 38 44</pre>	<pre>s a 199 194 187 186 144 144</pre>	3985 57.45 -2.12 67.76	407 72.65 3.16 3.03	417 47.08 -1.79 5.75	427 85.53 -0.58 -1.92	437 48.47 10.11 -0.32	447 22.08 -1.73 1.67	WARM-GRAY-10 47.68 3.86 6.44	COOL-GRAY-9 55.98 0.06 -2.19	449 29.48 0.63 19.9	4525 76.23 -0.64 23.57
<pre>s a 105 101 91 91 6 25</pre>	<pre>s a 165 161 154 152 150 149</pre>	<pre>s a 89 90 90 91 80 81</pre>	<pre>s a 196 195 199 198 204 202</pre>	<pre>s a 82 78 63 65 65 67</pre>	<pre>s a 223 221 220 219 217 216</pre>	<pre>s a 105 102 92 93 84 85</pre>	<pre>s a 112 111 113 113 117 116</pre>	<pre>s a 82 81 73 74 37 43</pre>	<pre>s a 212 208 203 202 169 169</pre>	3995 39.24 -0.28 44.18	408 64.62 4.01 3.43	418 38.3 -1.97 5.91	428 80.38 -0.82 -2.58	438 28.93 9.12 2.18	WARM-GRAY-1 87.98 0.82 1.6	WARM-GRAY-11 40.48 4.17 6.87	COOL-GRAY-10 47.84 0.03 -2.51	450 31.4 0.16 22.86	4535 81.94 -0.96 18.38
<pre>s a 205 202 200 199 195 194</pre>	<pre>s a 148 143 135 134 131 130</pre>	<pre>s a 32 37 34 39 28 34</pre>	<pre>s a 168 168 174 172 180 179</pre>	<pre>s a 69 67 53 56 53 56</pre>	<pre>s a 217 215 213 212 210 209</pre>	<pre>s a 225 224 225 224 225 224</pre>	<pre>s a 98 98 99 99 104 103</pre>	<pre>s a 160 157 155 154 117 118</pre>	<pre>s a 223 220 217 216 193 193</pre>	400 81.07 1.04 3.21	409 57.59 4.66 3.96	419 12.95 -1.81 3.34	429 70.88 -1.29 -4.1	439 24.12 7.33 2.57	WARM-GRAY-2 85.75 1.09 2.06	COOL-GRAY-1 89.69 0.1 -0.11	COOL-GRAY-11 42.16 0.15 -2.9	451 63.84 -2.73 20.84	4545 86.87 -1.03 12.42
<pre>s a 188 185 182 180 176 175</pre>	<pre>s a 123 118 108 108 104 104</pre>	<pre>s a 203 202 203 202 203 202</pre>	<pre>s a 135 136 143 142 151 149</pre>	<pre>s a 55 55 44 48 42 46</pre>	<pre>s a 201 198 195 194 190 189</pre>	<pre>s a 214 213 215 214</pre>	<pre>s a 58 59 50 53 32 38</pre>	<pre>s a 181 179 178 176 146 146</pre>	<pre>s a 101 97 84 85 22 33</pre>	401 74.58 1.42 3.94	410 47.11 5.49 4.44	420 81.98 -0.22 -0.07	430 59.11 -1.77 -5.45	440 19.47 5.2 3.0	WARM-GRAY-3 79.41 1.73 3.15	COOL-GRAY-2 85.84 0.11 -0.44	BLACK-2 21.57 1.26 13.12	452 72.29 -2.87 16.9	455 36.81 2.2 36.73
<pre>s a 173 169 166 164 159 158</pre>	<pre>s a 98 94 82 83 78 79</pre>	<pre>s a 185 184 187 185 187 186</pre>	<pre>s a 96 99 106 106 116 115</pre>	<pre>s a 202 203 209 208 210 209</pre>	<pre>s a 190 186 182 180 176 175</pre>	<pre>s a 201 199 201 200 202 201</pre>	<pre>s a 40 46 48 51 40 44</pre>	<pre>s a 199 197 197 196 172 172</pre>	<pre>s a 153 145 128 127 11 34</pre>	402 68.59 1.7 4.51	411 36.68 5.89 4.97	421 75.82 -0.28 -0.59	431 44.53 -2.31 -6.95	441 83.49 -2.17 -1.53	WARM-GRAY-4 74.67 2.19 3.79	COOL-GRAY-3 81.09 0.07 -0.56	BLACK-3 19.11 -5.24 4.07	453 79.47 -2.52 12.98	456 54.74 2.58 57.31

s	a
156	155
158	157
155	154

7539
65.08 -1.29 1.41

s	a
109	109
110	109
115	114

7540
46.58 0.55 -3.07

s	a
221	221
226	225
230	229

7541
89.71 -1.29 -2.8

s	a
172	176
191	189
199	197

7542
76.11 -5.44 -6.51

s	a
162	164
172	171
182	180

7543
70.08 -2.16 -6.38

s	a
132	135
145	144
158	156

7544
59.62 -2.68 -8.65

s	a
80	86
98	98
114	113

7545
40.58 -3.64 -11.56

s	a
59	66
76	77
92	92

7546
31.56 -3.57 -11.83

s	a
31	41
46	50
59	61

7547
18.3 -3.26 -10.49

s	a
0	39
167	165
216	213

801
60.83 -39.8 -40.09

s	a
92	143
221	220
71	85

802
78.87 -57.29 59.31

s	a
254	254
231	231
2	54

803
92.5 -1.61 90.12

s	a
254	254
160	158
68	76

804
81.25 50.07 69.86

s	a
254	254
86	87
94	94

805
68.3 76.9 43.1

s	a
254	225
21	28
170	166

806
58.7 86.34 -14.85

s	a
212	181
6	14
176	172

807
48.86 77.56 -34.48

s	a
0	56
174	173
150	150

808
61.52 -61.15 -2.58

s	a
225	225
227	227
0	46

809
88.18 -15.47 87.87

s	a
254	254
206	205
17	52

810
88.21 18.62 87.02

s	a
254	254
117	117
81	84

811
73.13 66.63 55.63

s	a
254	234
51	54
132	129

812
61.12 81.69 11.51

s	a
232	199
20	27
173	169

813
53.0 80.2 -25.86

s	a
124	116
96	97
205	201

814
48.02 30.84 -53.49

s	a
138	131
117	117
74	78

871
50.73 3.72 26.91

s	a
141	133
116	115
76	79

872
50.73 5.76 25.98

s	a
143	134
115	114
78	81

873
50.67 7.38 24.88

s	a
144	135
111	111
78	80

874
49.88 9.9 23.96

s	a
147	136
107	107
78	80

875
49.22 13.54 23.12

s	a
149	136
99	99
66	69

876
47.06 18.47 27.37

s	a
145	145
149	148
153	152

877
61.73 -0.91 -2.59

s	a
136	132
125	124
111	111

8003
53.35 2.53 9.23

s	a
150	141
119	118
105	105

8021
52.98 11.06 12.81

s	a
151	139
107	107
120	119

8062
50.42 19.34 -0.01

s	a
135	129
116	116
138	136

8100
51.5 10.56 -9.01

s	a
92	103
126	125
145	143

8201
50.9 -8.78 -14.35

s	a
109	118
141	140
138	137

8281
56.3 -12.05 -2.59

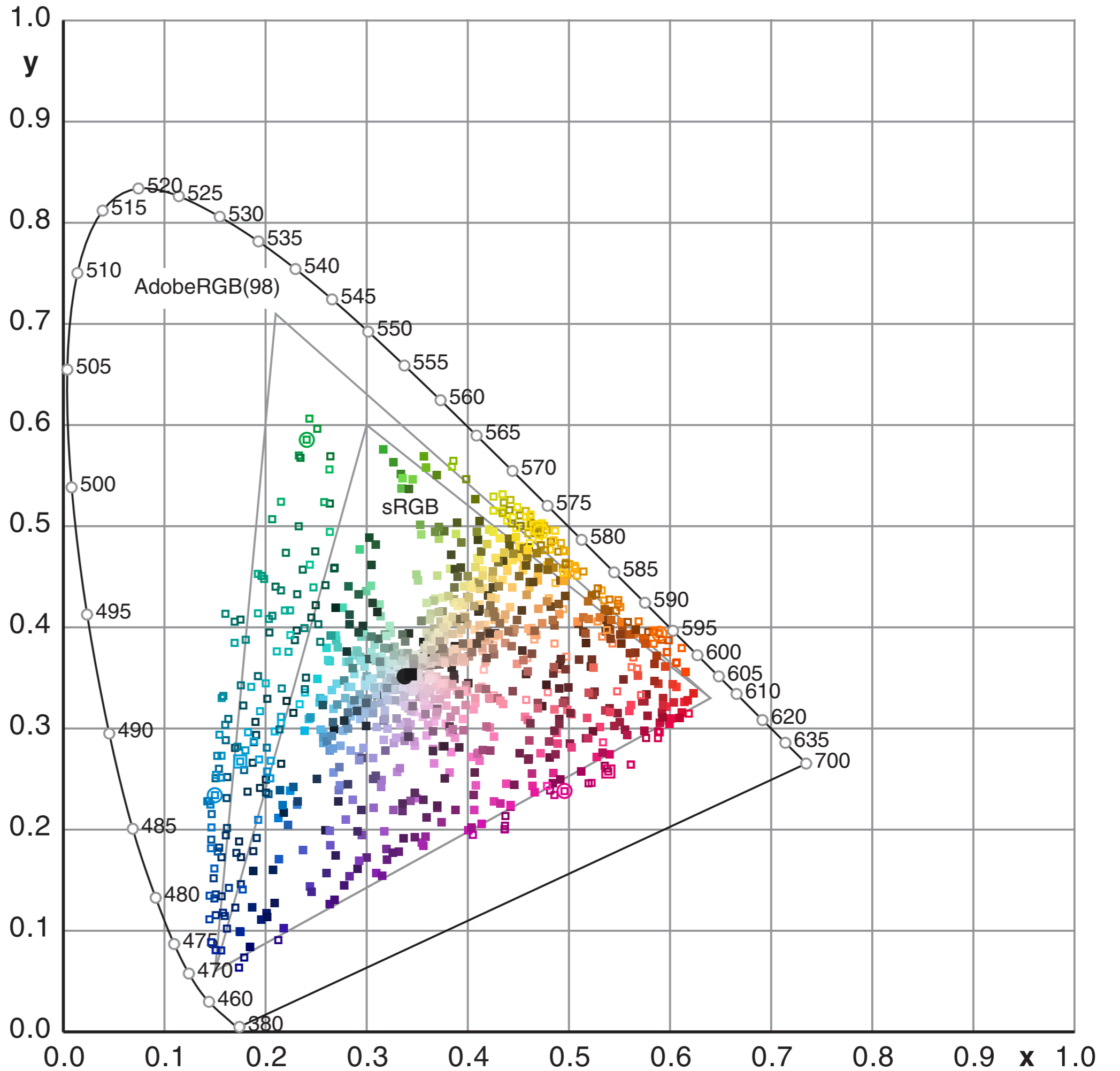
s	a
122	126
138	137
110	111

8321
55.82 -10.32 13.11

Spot colors in the CIE chromaticity diagram

For sRGB

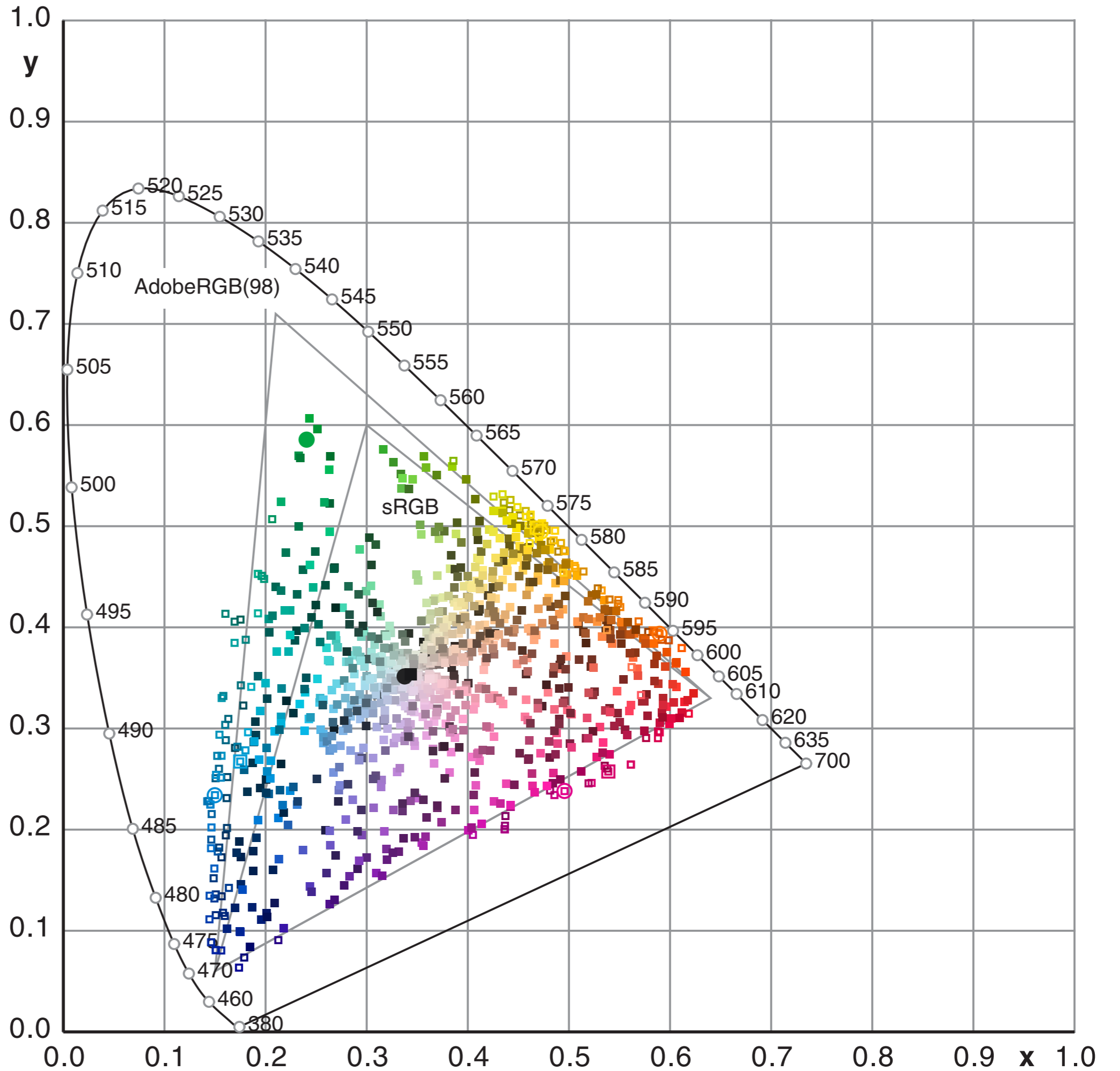
- | | |
|--------------|--------------|
| Filled | In gamut |
| Stroked | Out of gamut |
| Small square | Spot color |
| Big square | CMYK |
| Big circle | CMYKOG |



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

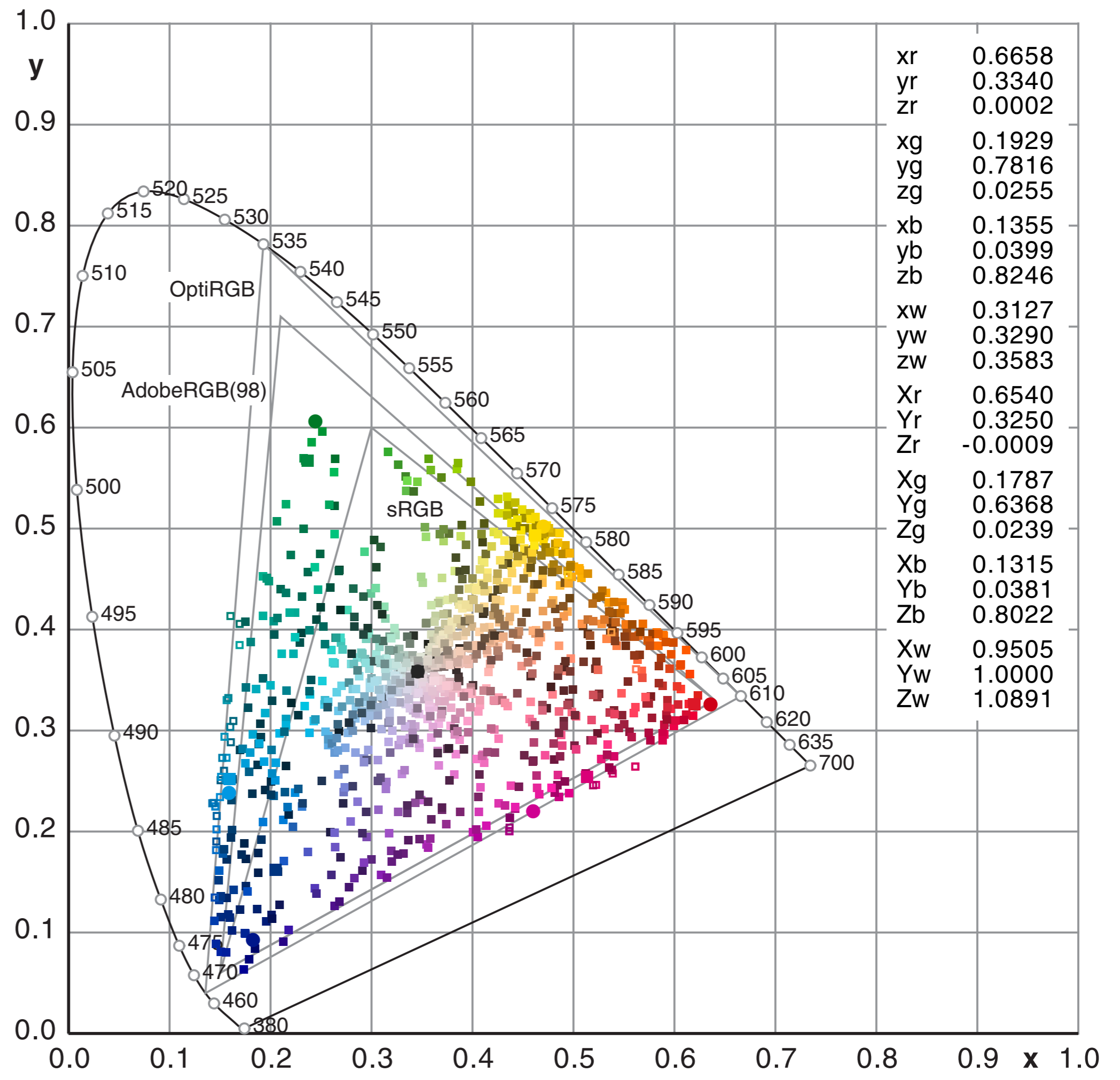
D65

Spot colors and printer inks in the CIE chromaticity diagram

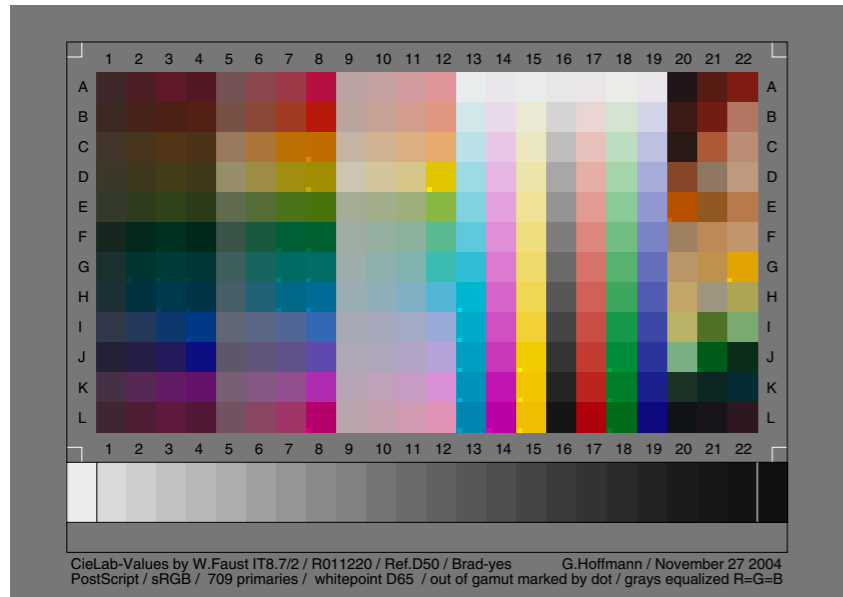
For OptiRGB

Filled	In gamut
Stroked	Out of gamut

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



xr	0.6658
yr	0.3340
zr	0.0002
xg	0.1929
yg	0.7816
zg	0.0255
xb	0.1355
yb	0.0399
zb	0.8246
xw	0.3127
yw	0.3290
zw	0.3583
Xr	0.6540
Yr	0.3250
Zr	-0.0009
Xg	0.1787
Yg	0.6368
Zg	0.0239
Xb	0.1315
Yb	0.0381
Zb	0.8022
Xw	0.9505
Yw	1.0000
Zw	1.0891



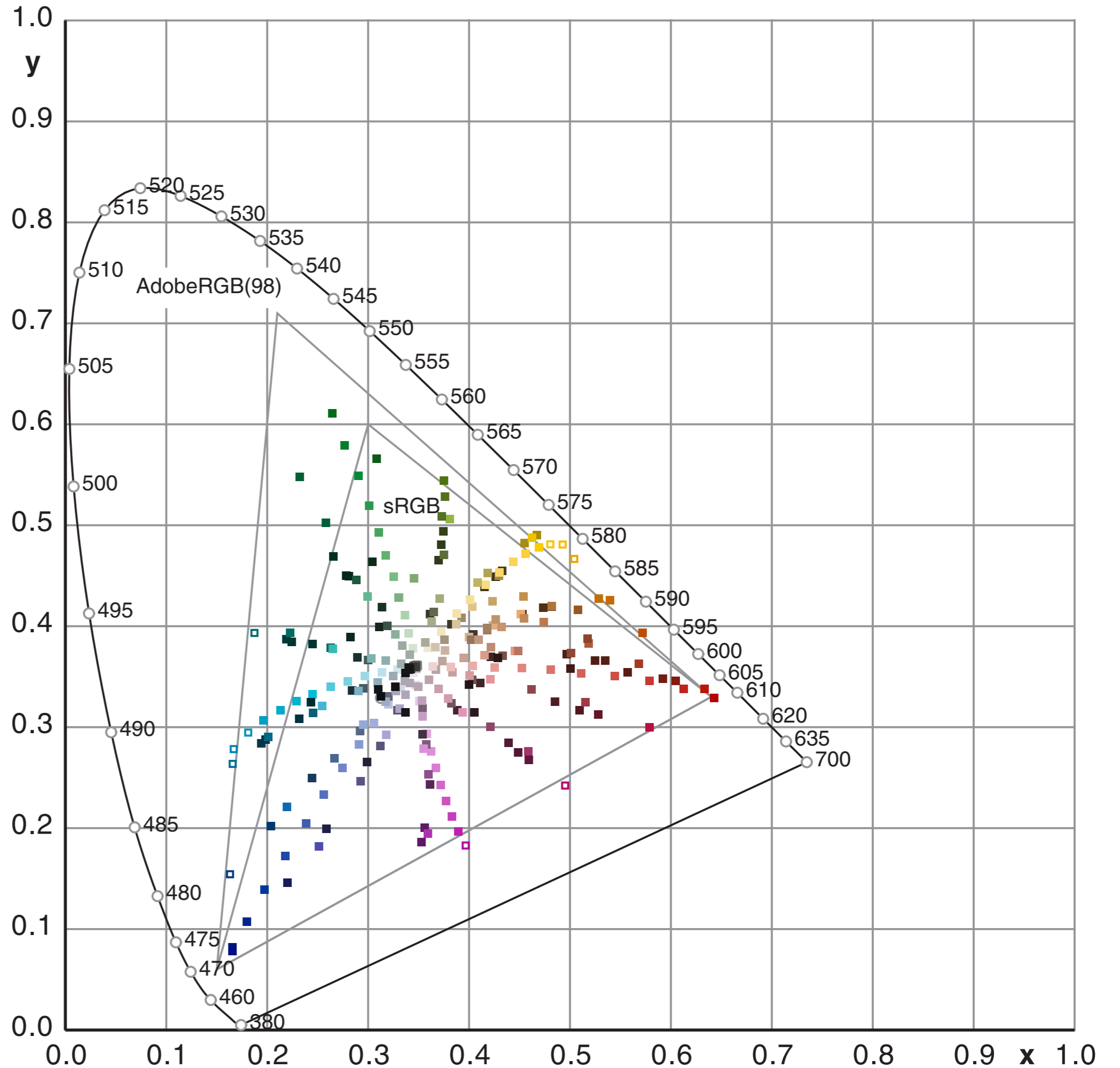
The target above, which is used in many docs by the author, was made by the reference file for a real target, using measured Lab values.

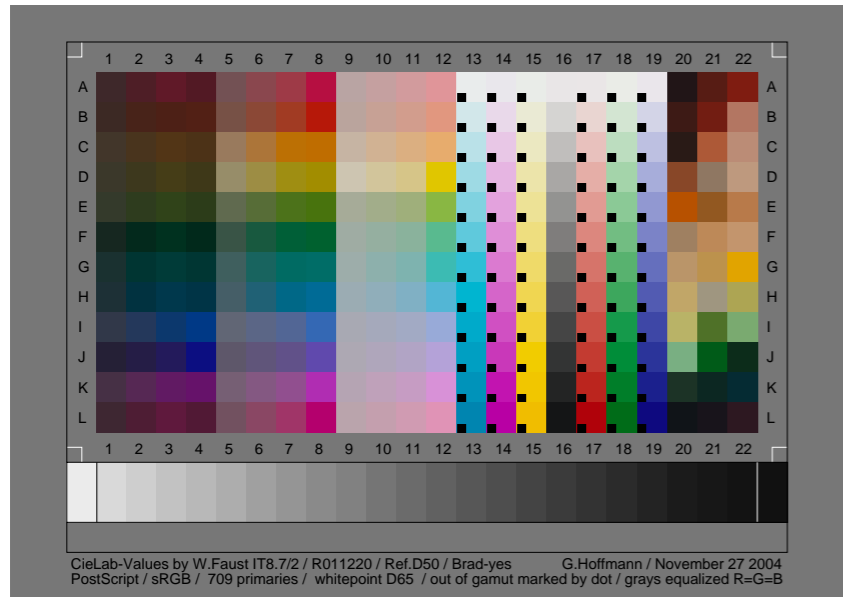
The chromaticity diagram shows these measured Lab values.

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.

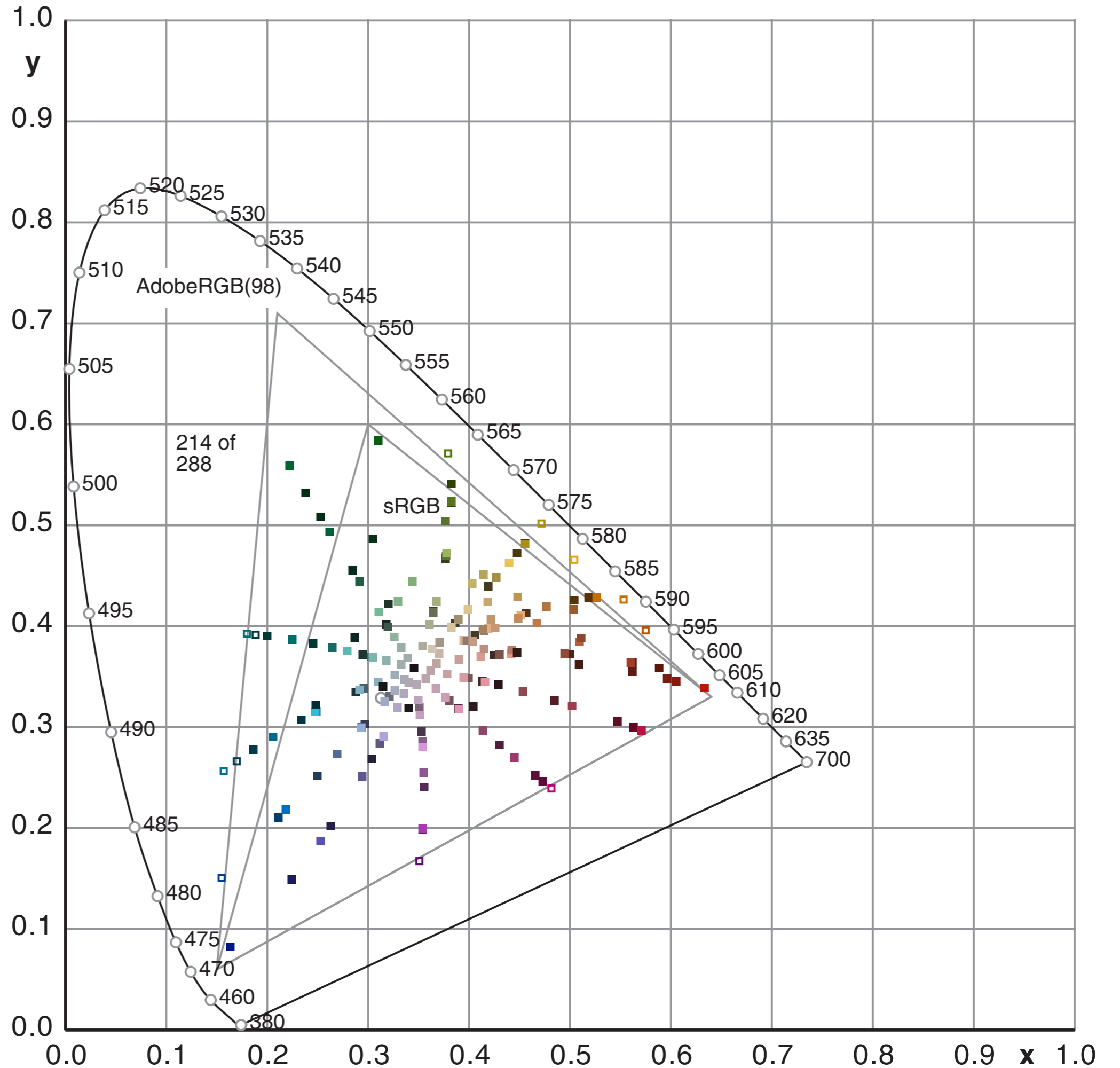
The chromaticity diagram shows a subset of 214 of 288 IT8.7/2 colors according to the standard.

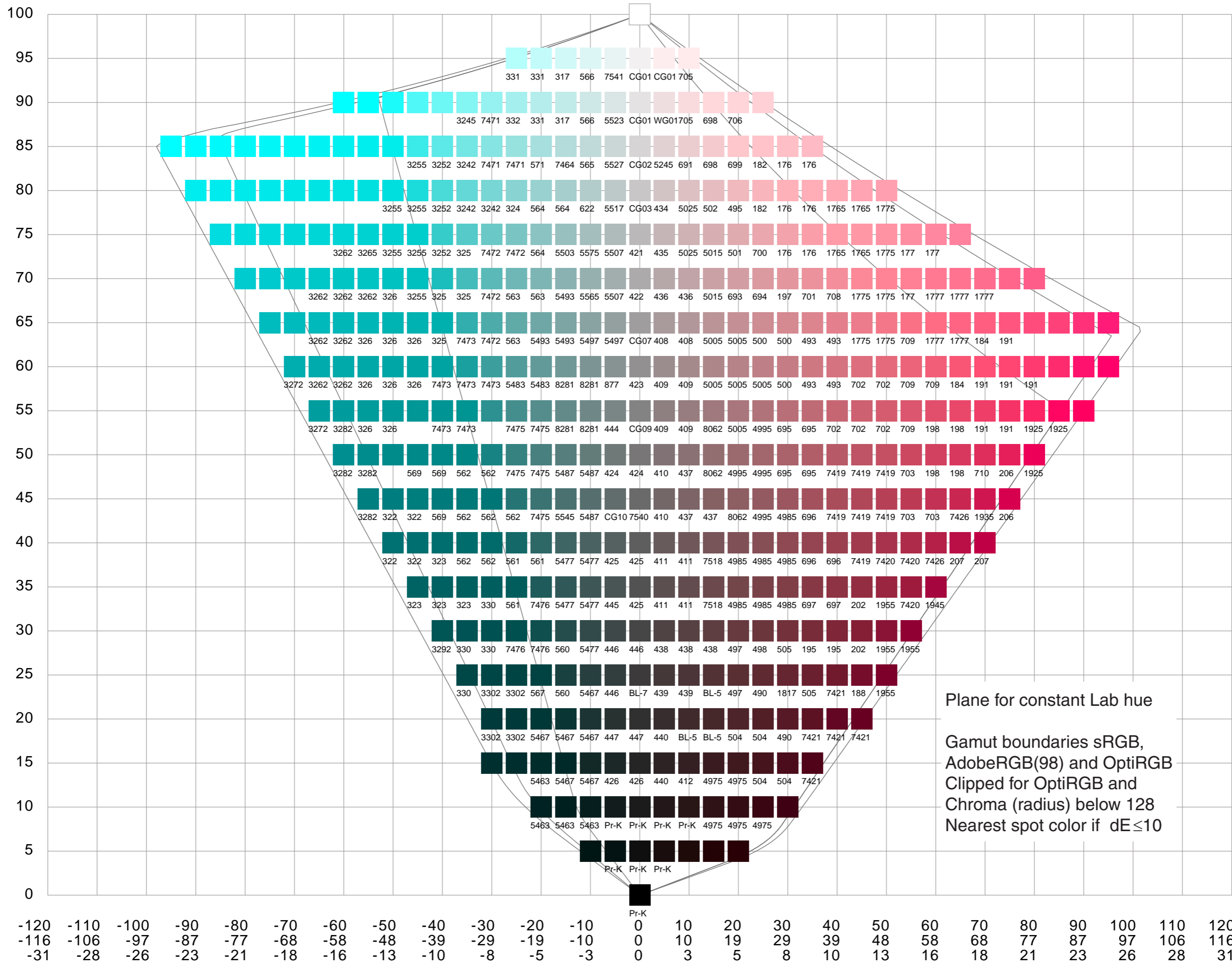
For the remaining colors GS0, GS23 and six step wedges (marked by a black square in the target) reference values are not available.

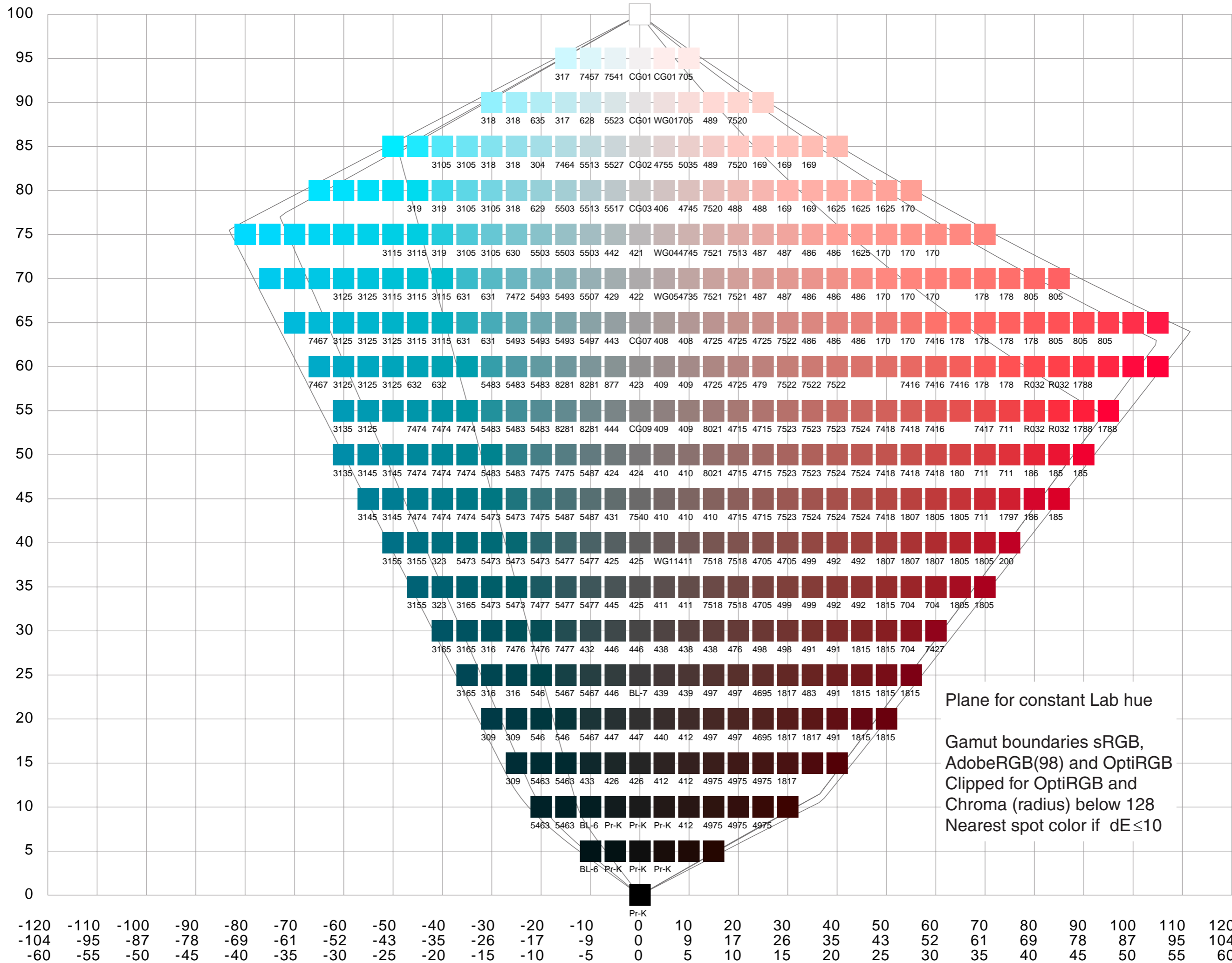
IT8.7/2 colors in the CIE chromaticity diagram

For AdobeRGB(98)

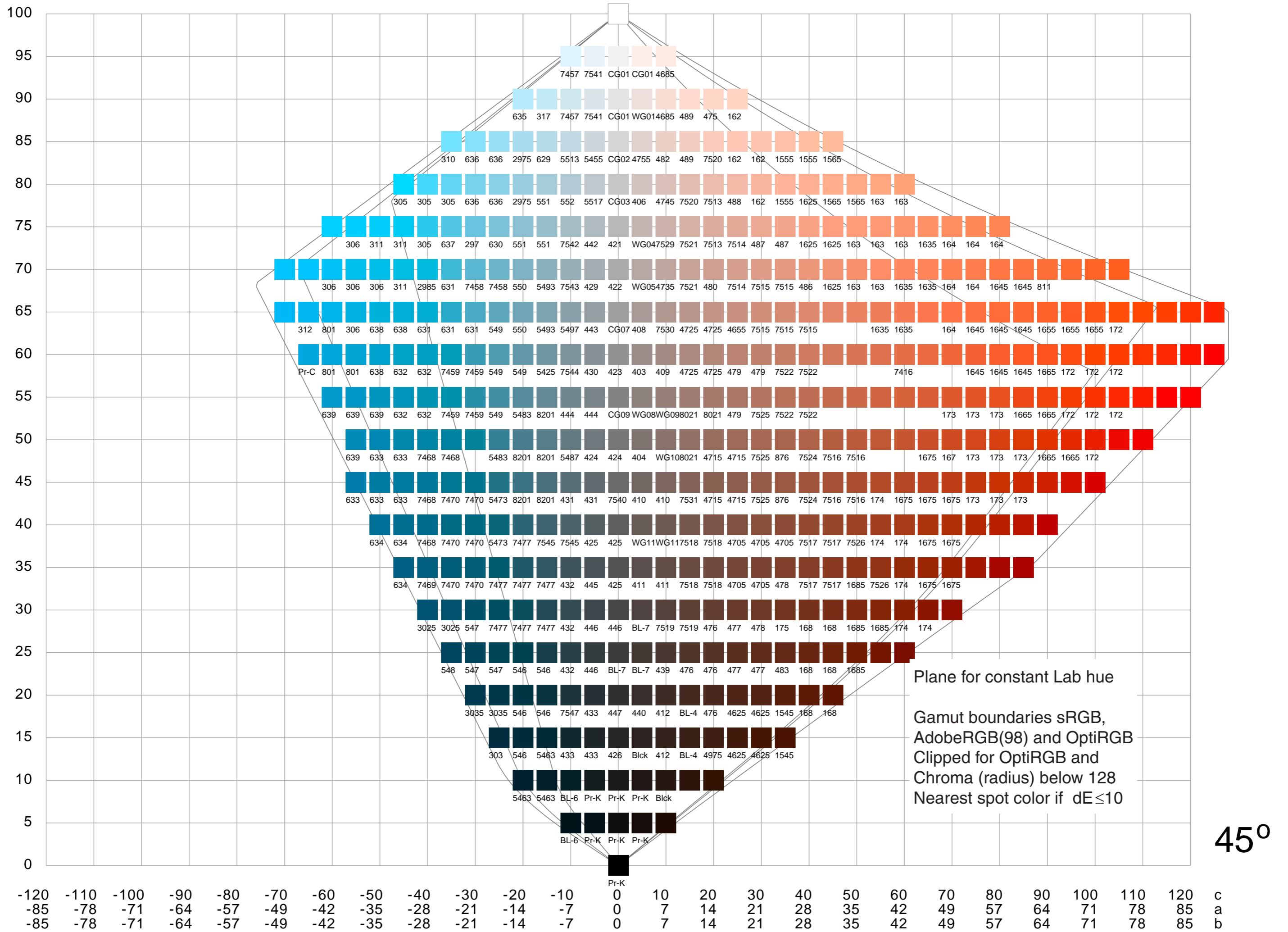
- Filled In gamut
- Stroked Out of gamut
- Small square Target color

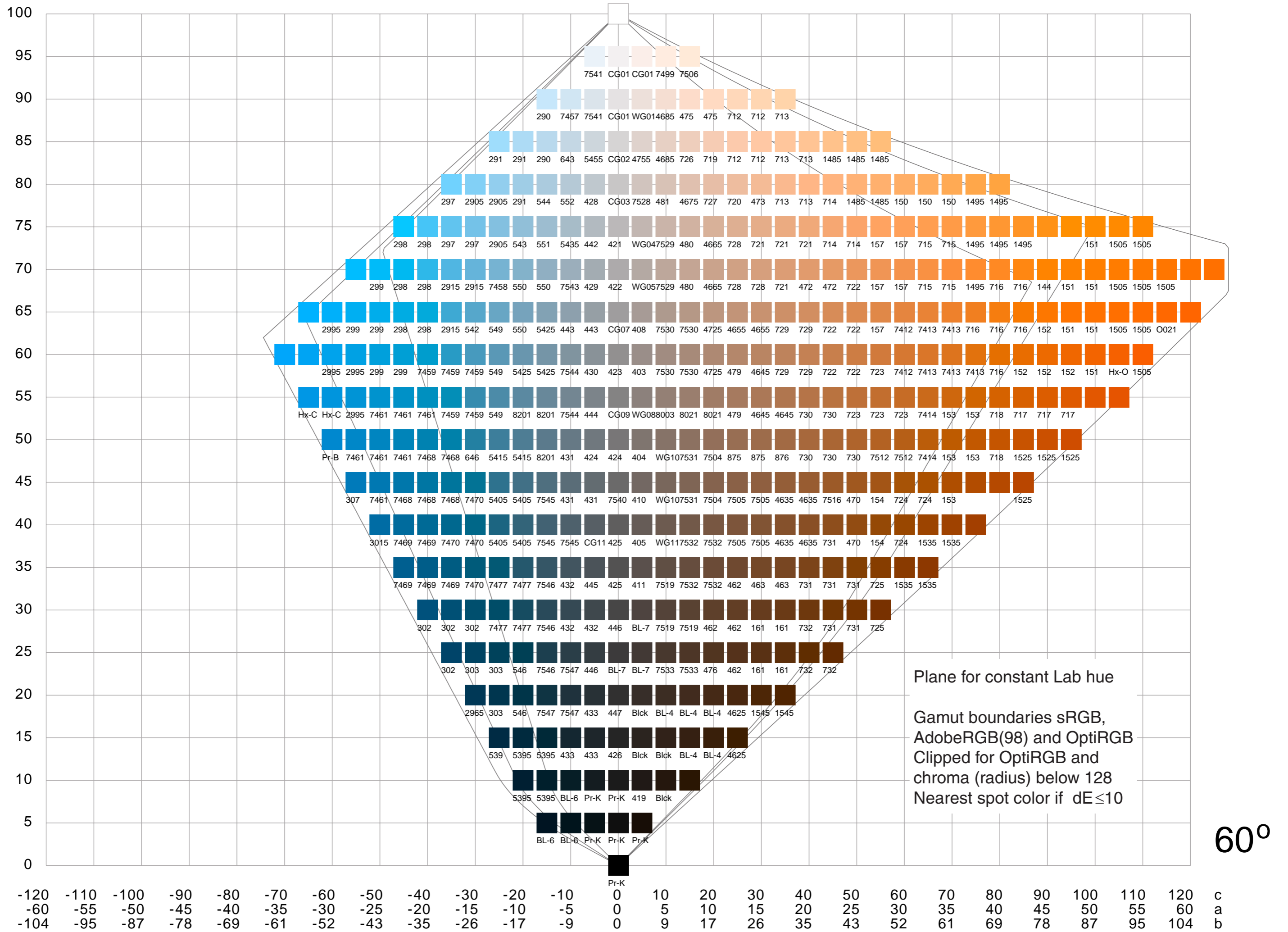


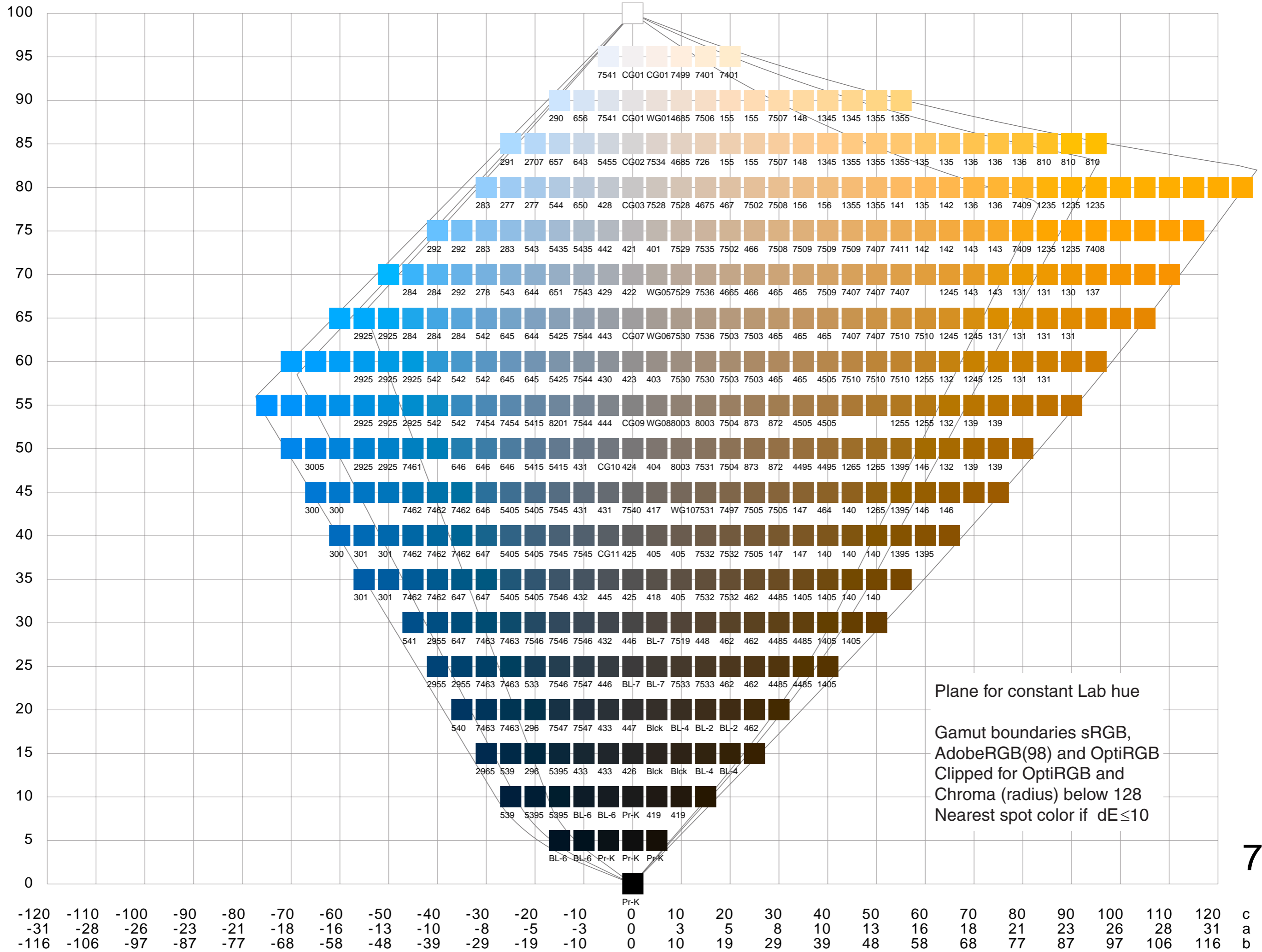




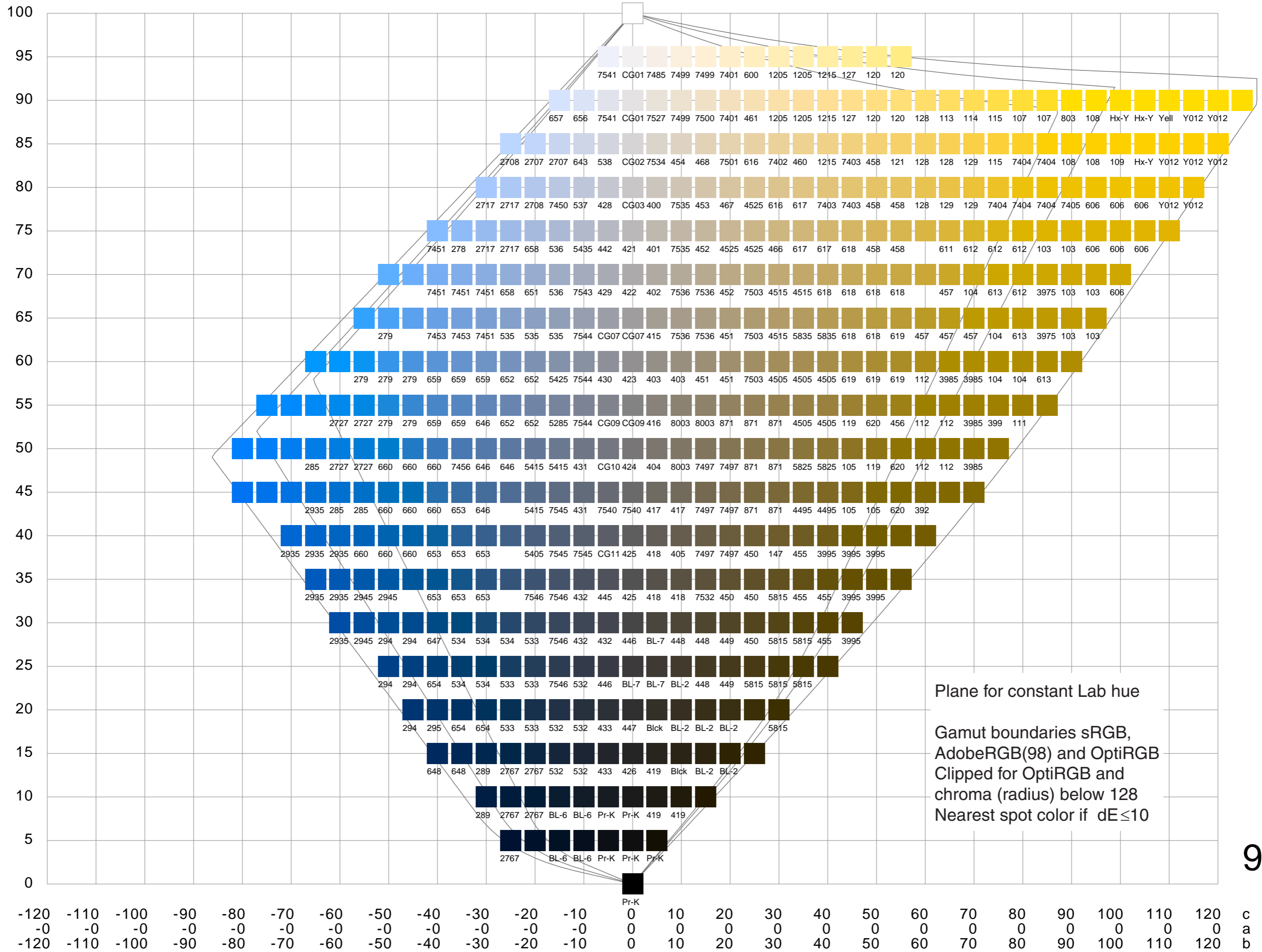
30°



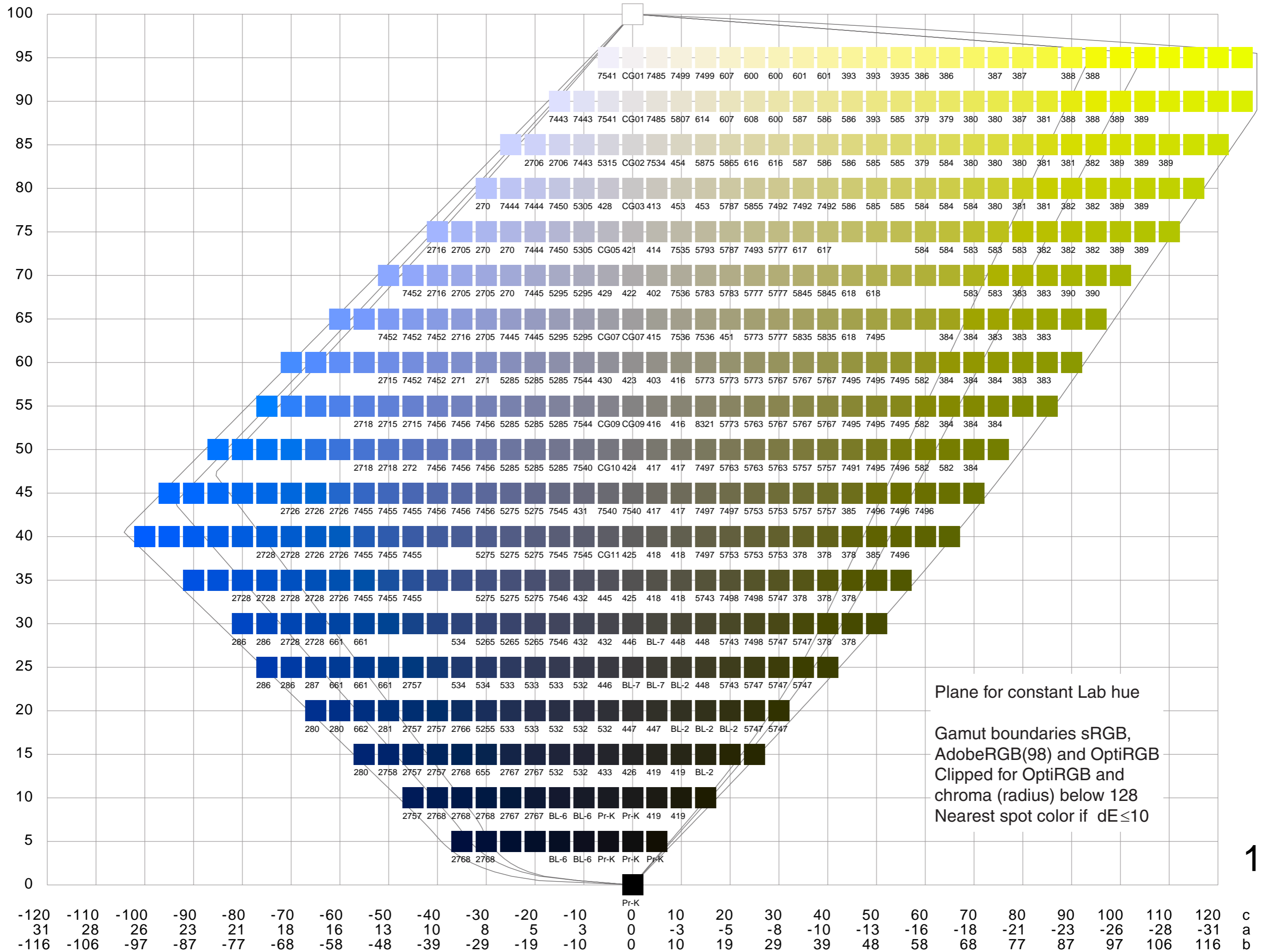


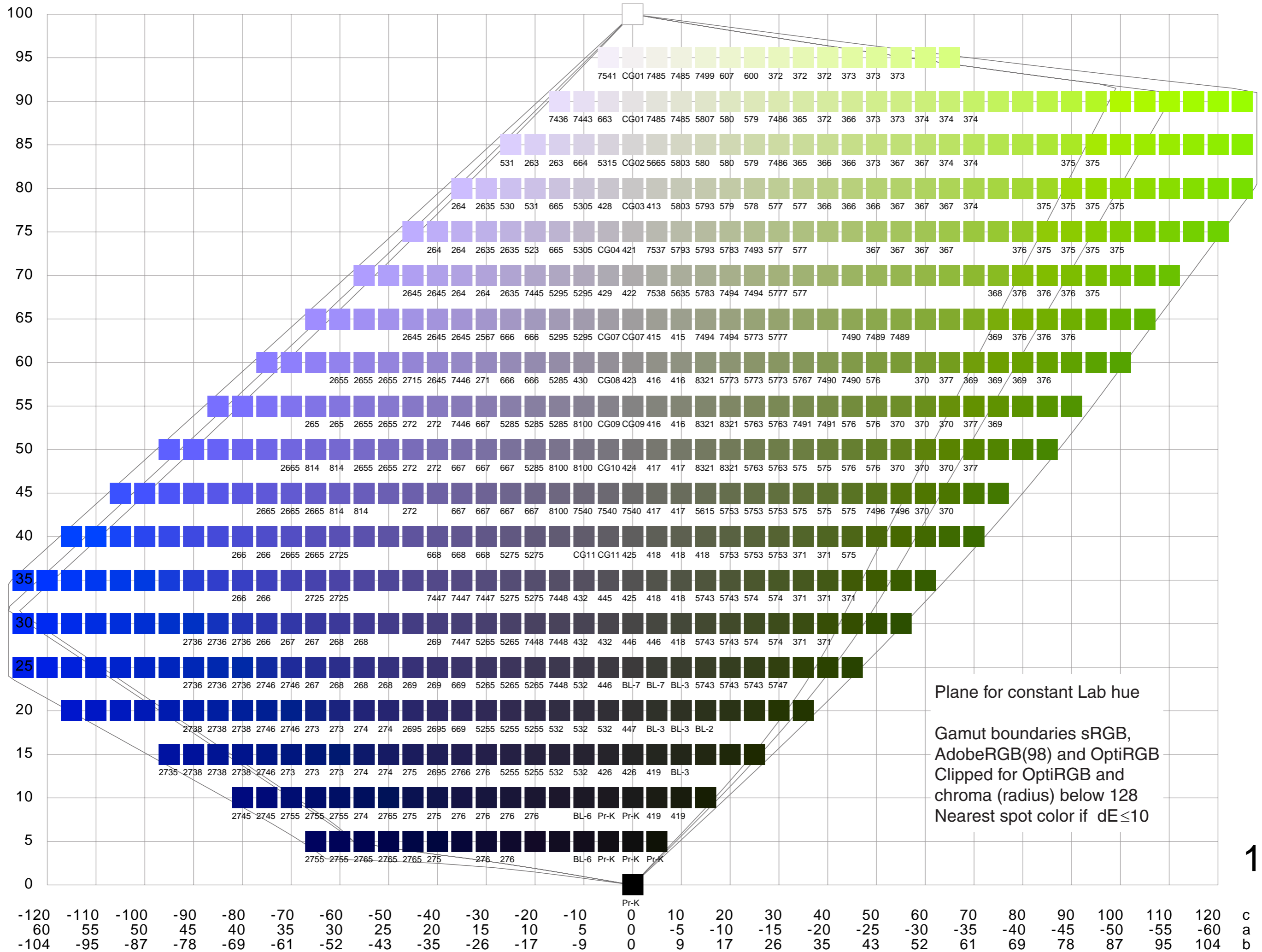


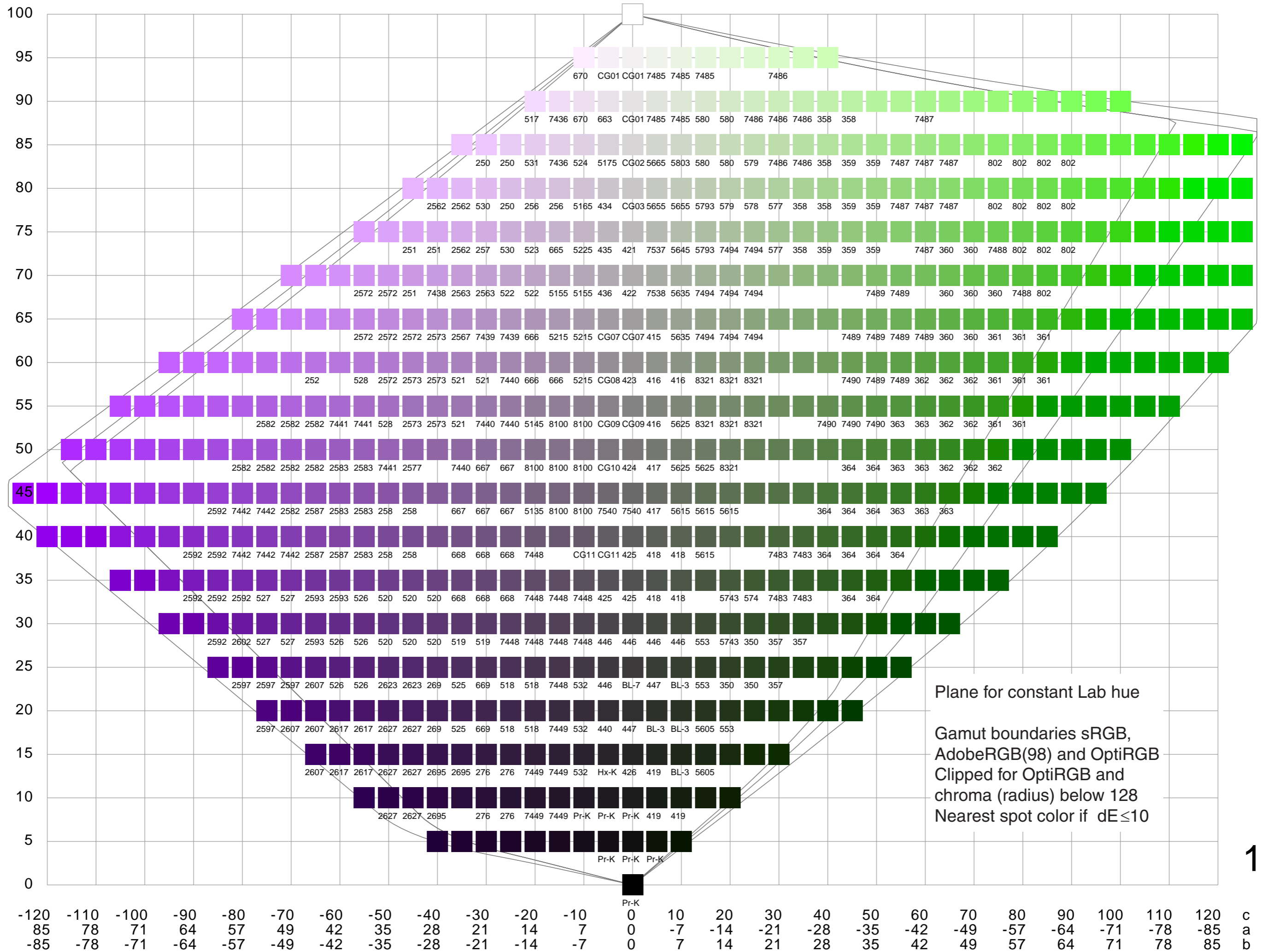
75°



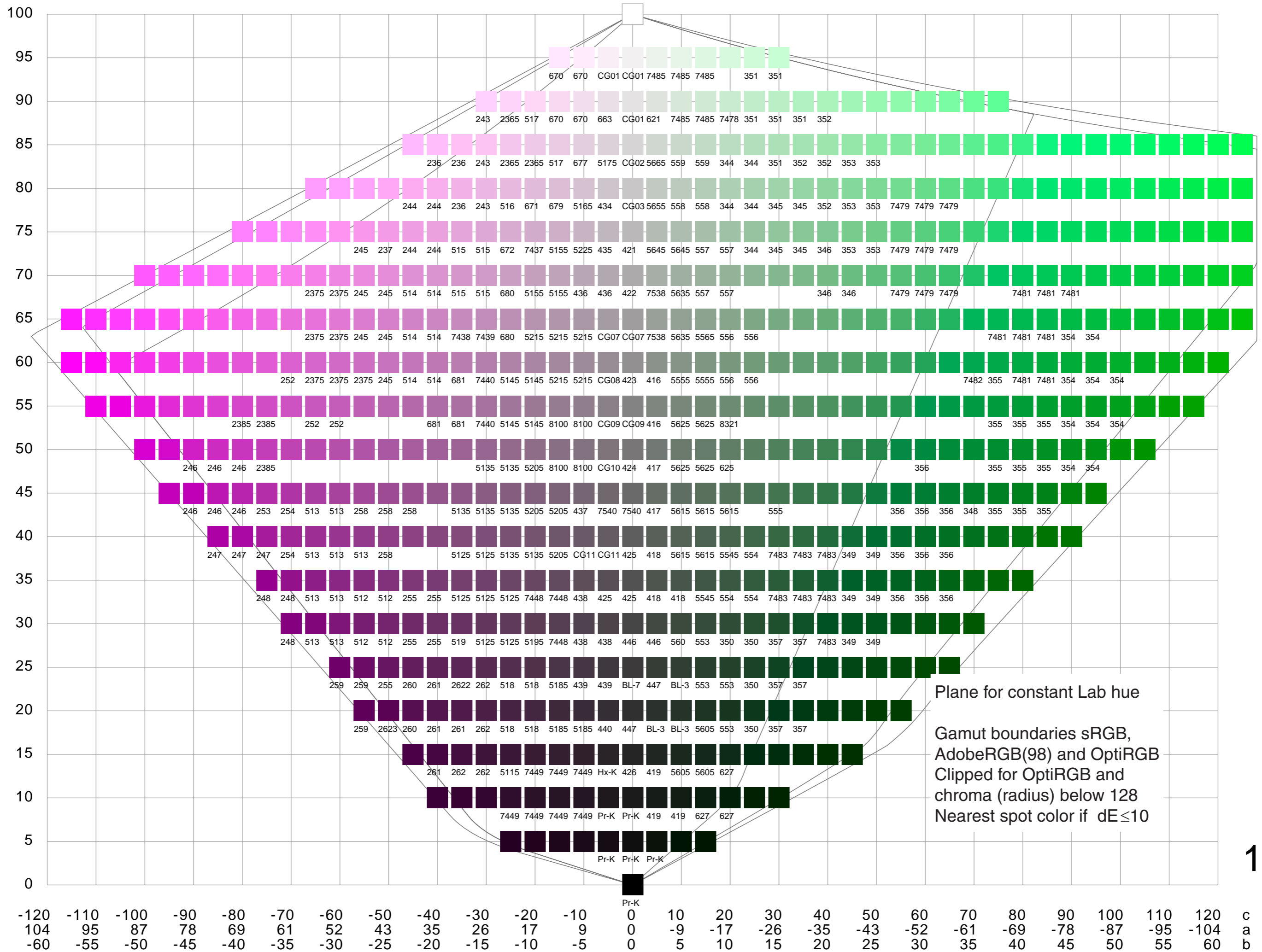
90°



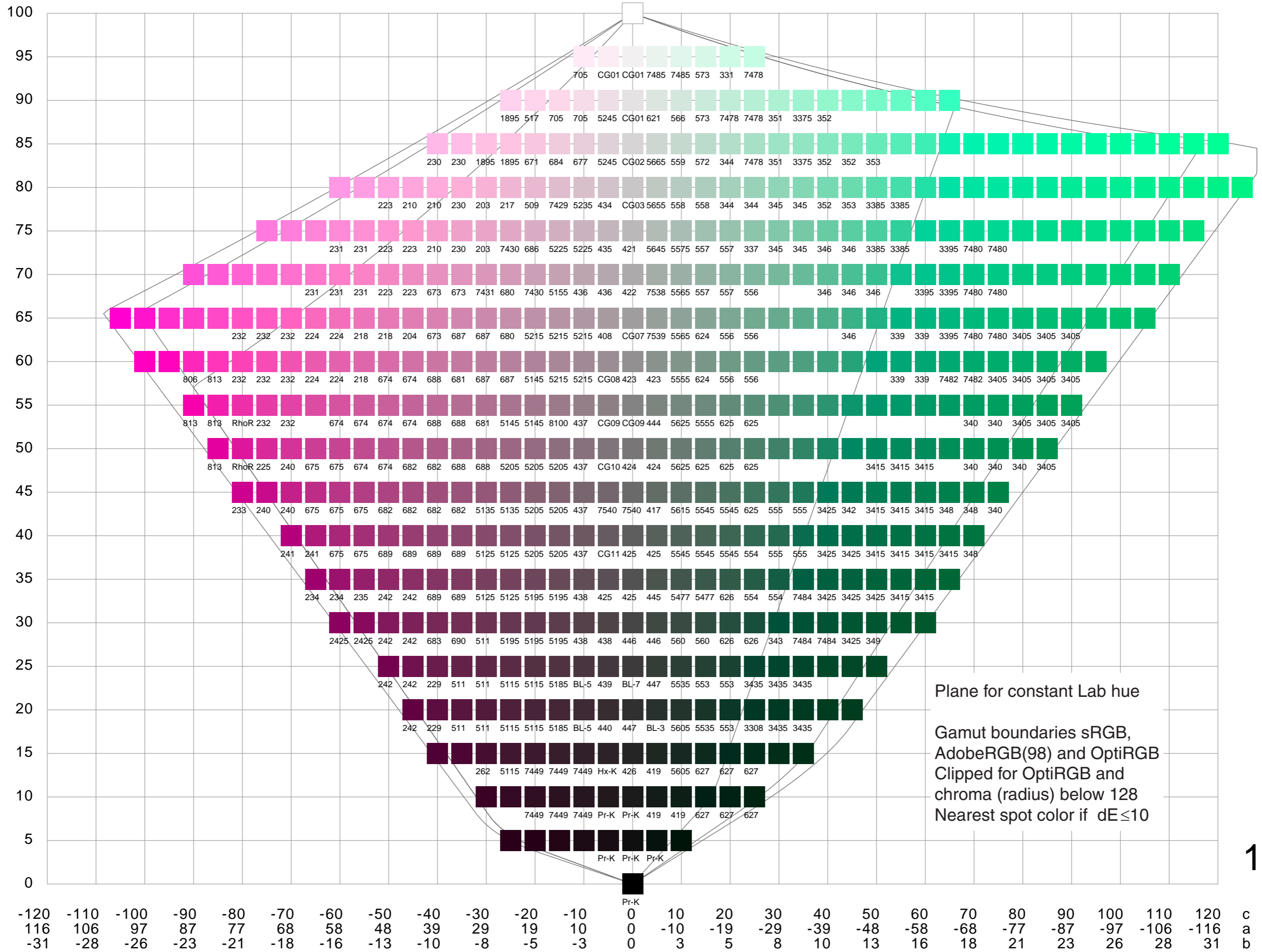




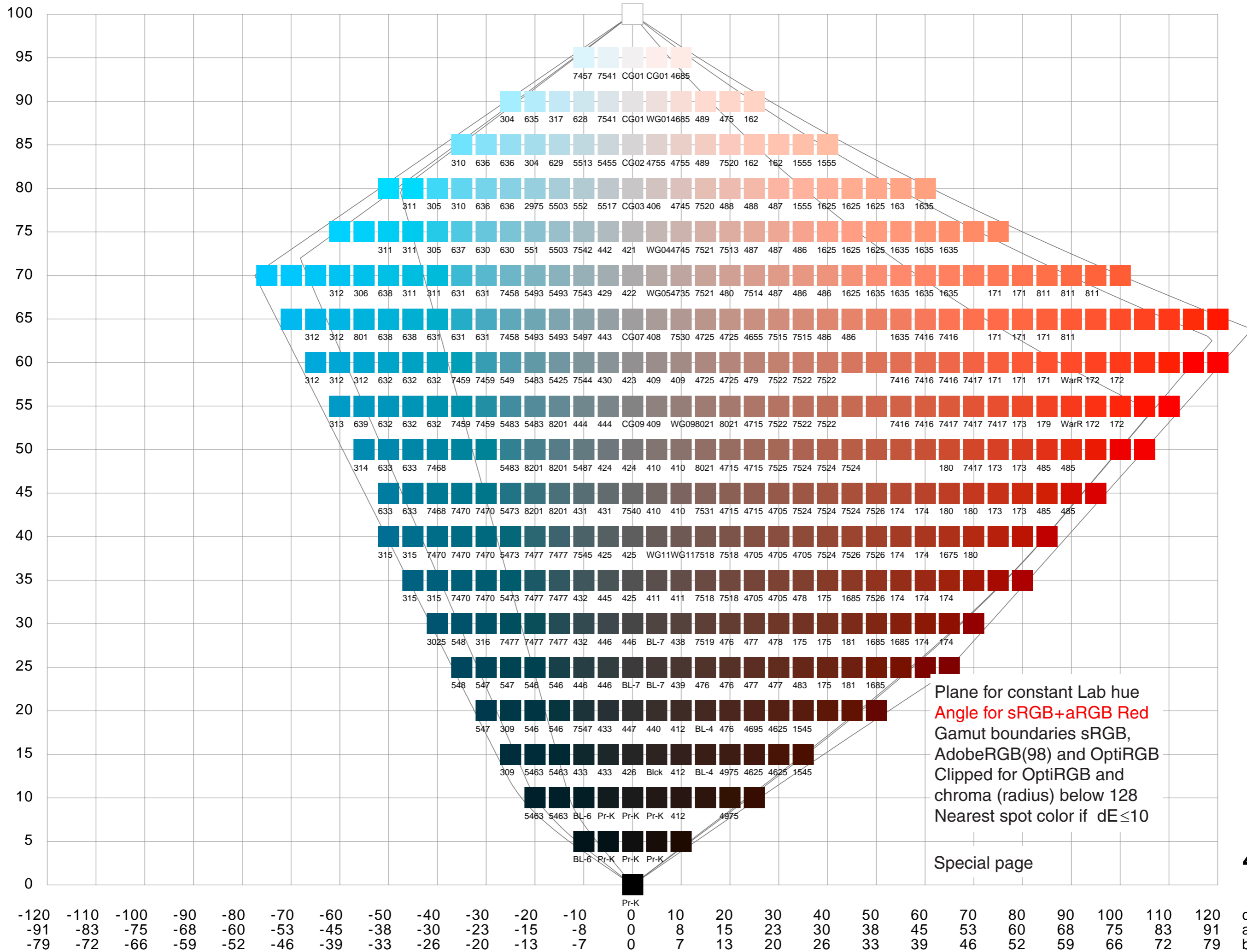
135°

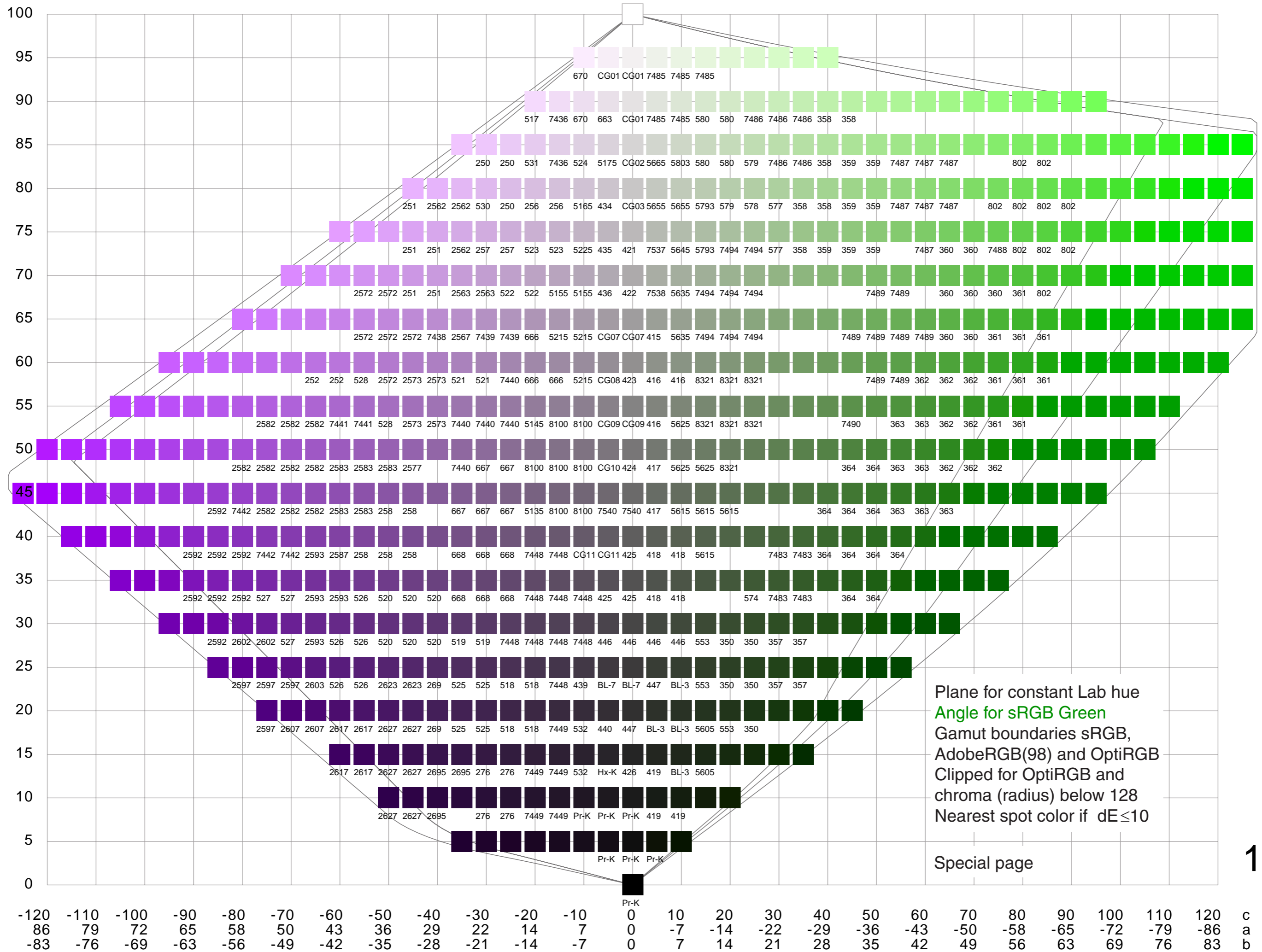


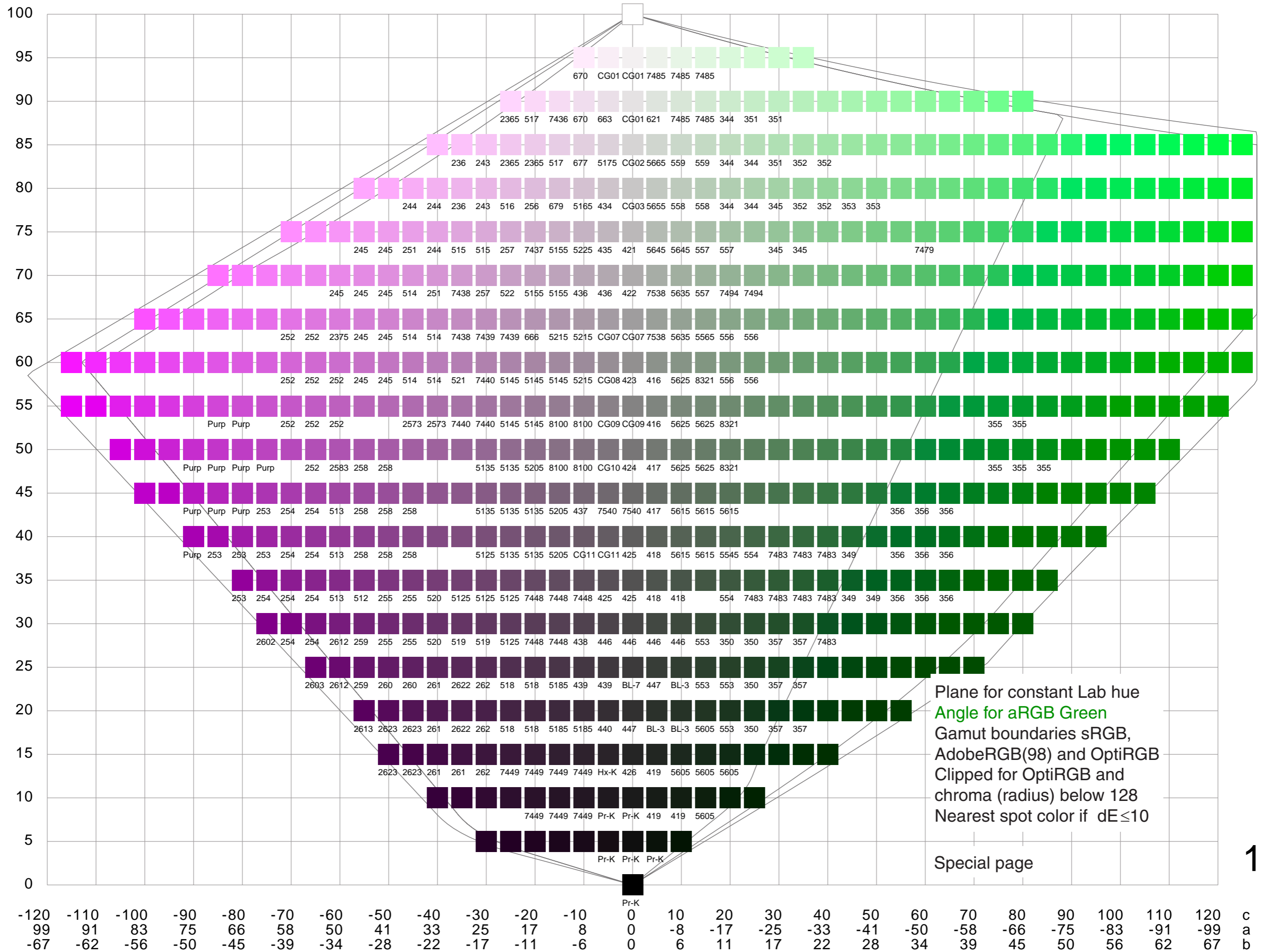
150°



165°







146°

