

Gernot Hoffmann
PS-Swatch Spot

Colors by Lab numbers
Coated
1137 Color Patches

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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		sRGB	aRGB	
R	224	191	Out of gamut	130	125	in sRGB or aRGB,
G	0	0	if at least one value	115	115	RGB is indicated by
B	138	134	0 or 255	25	39	
	Hexachrome-Magenta			105		Name or Number
	48.49	81.28	-11.86	49.02	-1.27	48.05
Lab	L*	a*	b*	L*	a*	b*

aRGB = Adobe RGB

Asterisk can be omitted

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
178	168
146	144
0	26

457
62.23 4.14 68.35

s	a
212	207
196	195
161	162

467
80.07 1.91 19.67

s	a
156	138
78	79
27	36

470
42.72 30.77 43.19

s	a
198	189
170	168
159	158

4735
71.95 9.41 9.42

s	a
106	94
45	49
35	40

483
27.58 27.03 20.12

s	a
216	196
133	131
152	150

493
65.05 34.66 4.11

s	a
233	224
203	202
209	208

503
84.57 11.42 0.85

s	a
128	111
44	48
68	69

506
31.9 38.42 5.48

s	a
231	218
186	184
222	220

516
80.52 21.18 -11.66

s	a
89	81
44	48
94	93

519
26.14 27.47 -20.93

s	a
219	213
201	200
103	109

458
81.27 -2.82 50.57

s	a
223	219
213	211
187	187

468
85.59 0.53 13.71

s	a
183	161
83	84
19	31

471
48.24 38.76 52.89

s	a
212	205
190	189
182	180

4745
78.88 6.83 7.27

s	a
159	137
45	49
34	39

484
37.37 47.07 35.0

s	a
231	215
167	166
183	181

494
75.36 25.98 1.55

s	a
67	61
29	35
31	36

4975
16.85 18.44 8.0

s	a
212	194
141	140
167	165

507
66.84 30.22 -2.16

s	a
235	226
203	202
227	226

517
85.13 14.65 -7.8

s	a
104	92
48	52
115	113

520
30.21 33.46 -28.11

s	a
224	219
210	209
125	129

459
84.24 -3.47 43.99

s	a
76	69
36	41
19	27

4625
20.01 18.13 20.03

s	a
227	209
154	153
107	109

472
70.56 24.44 36.42

s	a
221	216
206	204
198	197

4755
83.91 4.65 5.54

s	a
219	188
34	39
31	36

485
48.35 68.09 51.69

s	a
237	223
185	184
198	197

495
80.36 20.6 0.74

s	a
133	119
74	75
81	82

4985
39.08 26.11 7.32

s	a
227	212
174	172
194	191

508
76.53 22.3 -2.32

s	a
75	68
37	42
62	63

5115
21.02 20.75 -7.74

s	a
172	160
133	132
185	182

521
60.84 22.37 -21.74

s	a
229	225
219	218
151	153

460
87.27 -3.82 34.68

s	a
145	131
90	91
52	57

4635
44.23 20.28 31.41

s	a
237	223
185	183
151	151

473
79.41 16.08 24.88

s	a
81	75
50	53
39	44

476
24.69 13.45 12.92

s	a
235	214
149	148
135	134

486
70.81 31.84 21.81

s	a
238	227
196	195
207	205

496
83.38 16.59 0.56

s	a
161	146
104	103
112	111

4995
50.52 24.42 5.33

s	a
231	219
186	184
203	201

509
80.14 18.89 -2.16

s	a
111	100
65	67
100	99

5125
34.42 24.52 -11.98

s	a
190	180
159	157
201	198

522
69.43 17.51 -17.54

s	a
232	230
227	226
180	181

461
89.83 -3.5 23.57

s	a
176	162
126	125
92	94

4645
57.61 16.81 26.81

s	a
239	227
197	196
169	169

474
83.01 12.23 20.02

s	a
94	85
47	51
37	42

477
26.01 20.75 16.55

s	a
236	219
171	170
158	157

487
76.23 23.0 16.67

s	a
79	72
42	46
40	45

497
22.31 16.96 8.95

s	a
182	168
131	130
139	137

5005
60.27 21.13 3.86

s	a
234	223
195	194
209	208

510
82.78 16.01 -1.66

s	a
136	125
93	94
128	125

5135
45.42 22.37 -11.92

s	a
202	194
178	176
211	209

523
75.59 13.46 -13.72

s	a
86	81
63	65
34	41

462
28.87 7.94 21.39

s	a
193	180
149	147
119	120

4655
65.44 14.13 22.23

s	a
239	231
209	207
186	186

475
86.08 8.64 15.3

s	a
114	101
54	57
40	45

478
30.92 25.96 21.3

s	a
236	223
188	187
176	175

488
80.58 16.31 12.82

s	a
104	93
51	54
47	51

498
28.82 23.9 13.92

s	a
207	196
169	167
175	173

5015
72.98 15.4 2.28

s	a
96	85
36	40
77	77

511
24.9 31.82 -11.79

s	a
161	151
126	125
155	152

5145
57.08 18.07 -10.19

s	a
218	212
203	201
224	222

524
83.46 8.22 -8.43

s	a
110	101
73	75
32	40

463
34.91 13.01 30.34

s	a
209	199
174	172
150	150

4665
73.99 10.71 17.41

s	a
82	75
40	44
33	38

4695
22.18 19.61 14.0

s	a
173	160
127	126
107	107

479
57.71 16.3 18.44

s	a
236	226
204	203
195	194

489
84.8 10.29 8.94

s	a
118	105
57	60
50	53

499
32.48 26.78 17.72

s	a
218	209
188	186
192	191

5025
79.09 11.81 1.81

s	a
125	108
35	40
112	110

512
31.48 45.72 -24.03

s	a
192	184
166	165
188	186

5155
71.22 12.57 -7.54

s	a
70	65
41	45
59	61

5185
21.1 16.22 -5.48

s	a
133	121
88	88
36	44

464
41.88 15.6 37.03

s	a
221	213
194	193
176	175

4675
80.66 7.67 12.85

s	a
127	114
76	78
62	65

4705
38.42 20.53 18.0

s	a
198	191
176	175
189	187

5225
74.34 9.69 -3.65

s	a
44	46
38	42
75	75

5255
17.54 10.62 -22.32

s	a
148	150
161	159
194	191

535
66.1 0.87 -18.76

s	a
191	196
212	211
230	229

545
83.82 -4.43 -11.84

s	a
0	0
64	66
87	87

548
22.84 -24.12 -22.33

s	a
189	195
212	211
216	215

5513
83.45 -7.29 -4.72

s	a
35	62
96	96
72	75

554
36.49 -25.32 7.54

s	a
168	173
188	187
181	180

5575
74.85 -8.34 1.19

s	a
26	39
49	52
38	43

5605
18.4 -12.08 4.25

s	a
117	145
198	197
189	188

570
74.65 -27.59 -3.69

s	a
213	207
197	195
206	205

5235
81.18 7.05 -2.6

s	a
67	67
60	63
104	102

5265
27.89 11.41 -24.8

s	a
165	167
177	175
205	202

536
72.01 0.23 -15.74

s	a
0	22
36	41
56	58

5395
12.97 -6.93 -16.69

s	a
92	113
152	150
176	174

549
59.54 -14.9 -19.46

s	a
207	210
222	221
224	223

5523
87.49 -4.92 -3.06

s	a
22	63
106	105
78	81

555
39.64 -30.7 8.26

s	a
192	195
207	206
202	201

5585
82.07 -6.04 0.89

s	a
92	98
112	112
97	97

5615
45.56 -10.58 6.08

s	a
157	175
215	214
208	207

571
81.98 -20.25 -2.97

s	a
223	219
212	211
218	217

5245
86.12 4.78 -1.46

s	a
88	87
83	84
124	122

5275
37.21 9.57 -22.78

s	a
190	191
199	197
218	216

537
80.06 -0.05 -10.74

s	a
63	77
101	101
126	125

5405
40.9 -8.09 -18.8

s	a
133	145
176	175
197	195

550
69.49 -11.25 -15.69

s	a
21	38
53	56
50	53

5467
19.78 -12.71 -2.15

s	a
117	131
163	161
143	142

556
63.34 -19.34 5.16

s	a
211	213
221	220
217	216

5595
87.42 -3.71 0.54

s	a
112	117
131	130
116	116

5625
53.1 -9.43 5.52

s	a
180	192
223	222
218	217

572
85.83 -15.21 -2.27

s	a
82	74
40	44
92	91

525
24.05 26.69 -22.78

s	a
133	131
130	129
163	160

5285
55.66 6.76 -17.17

s	a
210	210
215	214
227	225

538
86.06 -0.13 -6.38

s	a
88	99
122	121
147	145

5415
49.52 -7.39 -17.65

s	a
160	169
193	192
210	208

551
76.2 -8.73 -12.3

s	a
61	72
90	91
88	89

5477
36.27 -11.83 -2.42

s	a
152	161
186	184
171	170

557
72.78 -14.34 3.63

s	a
34	51
71	72
62	65

560
27.35 -15.85 1.0

s	a
154	157
168	167
157	156

5635
67.76 -6.91 3.95

s	a
192	202
227	226
221	221

573
87.69 -12.35 -1.44

s	a
96	84
33	38
126	123

526
26.88 40.19 -40.49

s	a
170	168
167	166
192	190

5295
69.59 4.67 -12.31

s	a
0	19
43	47
71	71

539
15.63 -7.89 -22.65

s	a
124	132
151	150
172	170

5425
61.22 -5.96 -14.35

s	a
184	190
207	206
220	218

552
81.99 -6.26 -8.94

s	a
100	107
125	124
123	122

5487
50.5 -9.59 -2.13

s	a
173	180
200	199
188	187

558
78.45 -11.18 2.84

s	a
18	58
97	97
88	89

561
36.75 -25.53 -1.82

s	a
177	179
188	187
179	178

5645
75.43 -5.46 3.0

s	a
66	72
80	81
37	44

574
32.15 -11.43 23.29

s	a
113	98
35	39
160	156

527
31.96 49.58 -53.06

s	a
192	190
190	189
208	206

5305
77.72 3.33 -8.78

s	a
0	0
48	52
94	93

540
17.9 -7.28 -34.51

s	a
166	170
185	183
200	198

5435
74.11 -4.22 -10.27

s	a
0	20
40	44
47	51

5463
13.63 -14.33 -9.57

s	a
142	146
161	159
159	158

5497
64.84 -7.11 -1.64

s	a
192	197
212	211
203	202

559
83.36 -7.99 1.83

s	a
0	66
120	119
112	112

562
44.87 -31.3 -4.43

s	a
189	190
198	197
190	189

5655
79.23 -4.55 2.82

s	a
87	96
116	116
46	55

575
45.64 -20.2 34.09

s	a
168	155
118	117
207	203

528
57.71 32.9 -38.68

s	a
213	212
212	211
222	221

5315
85.31 1.99 -5.15

s	a
0	0
61	63
121	118

541
23.33 -7.26 -43.42

s	a
189	192
203	201
214	212

5445
80.91 -3.11 -7.4

s	a
0	54
99	99
109	108

5473
37.57 -22.9 -13.62

s	a
170	172
184	183

s	a
208	210
219	219
184	185

580
86.14 -8.7 15.88

s	a
141	141
145	144
80	85

5767
58.92 -8.86 33.86

s	a
222	222
225	224
138	142

586
88.0 -10.37 42.1

s	a
237	235
233	232
164	166

601
91.61 -6.19 33.89

s	a
216	211
203	202
69	82

611
81.15 -6.6 64.83

s	a
210	212
222	221
217	217

621
87.6 -4.78 0.7

s	a
75	119
184	183
209	207

631
69.55 -26.64 -22.42

s	a
0	0
113	113
177	174

641
41.22 -33.28 -48.92

s	a
156	160
176	174
205	203

651
71.14 -2.36 -17.47

s	a
0	0
56	59
145	141

661
24.53 10.55 -56.44

s	a
65	69
73	75
37	44

5743
29.95 -8.42 20.27

s	a
167	167
171	169
116	118

5777
68.8 -7.9 28.1

s	a
227	227
229	228
159	161

587
89.67 -8.48 33.97

s	a
238	236
232	231
141	145

602
91.13 -7.28 44.71

s	a
197	190
178	176
0	26

612
72.48 -4.19 78.16

s	a
190	194
210	208
203	202

622
82.55 -7.86 0.77

s	a
0	71
158	156
191	188

632
58.65 -33.8 -29.04

s	a
207	209
217	216
229	228

642
86.43 -2.06 -7.13

s	a
114	122
142	141
183	180

652
58.33 -2.72 -24.6

s	a
0	0
38	42
125	122

662
17.68 16.85 -55.36

s	a
94	96
101	101
56	61

5753
41.54 -8.71 24.23

s	a
193	193
196	195
154	154

5787
78.28 -6.26 20.93

s	a
76	75
69	71
22	32

5815
29.46 -2.15 28.48

s	a
236	233
226	225
92	103

603
89.09 -8.26 64.41

s	a
179	172
157	156
0	0

613
65.26 -1.9 77.46

s	a
157	165
187	186
178	177

623
73.69 -11.83 1.09

s	a
0	0
123	122
163	160

633
44.89 -37.06 -34.53

s	a
196	199
210	209
226	225

643
83.82 -2.6 -9.68

s	a
41	62
88	88
141	138

653
36.39 -1.97 -34.77

s	a
222	219
216	215
228	227

663
87.33 3.52 -5.15

s	a
112	113
119	118
73	77

5763
48.67 -8.37 24.3

s	a
208	207
210	209
178	178

5797
83.53 -4.8 15.74

s	a
127	123
119	118
47	55

5825
49.66 -3.8 39.46

s	a
233	228
218	217
28	59

604
86.52 -7.78 81.59

s	a
227	226
224	223
192	192

614
89.04 -2.81 16.42

s	a
121	132
160	158
148	147

624
62.83 -15.9 1.58

s	a
0	0
98	98
139	137

634
35.55 -33.4 -35.34

s	a
148	155
176	175
206	203

644
70.7 -4.77 -18.5

s	a
0	27
49	52
100	99

654
19.93 1.75 -35.57

s	a
216	213
209	208
224	223

664
84.89 4.61 -6.83

s	a
146	147
152	151
112	113

5773
61.76 -7.23 20.37

s	a
218	218
220	219
196	196

5807
87.28 -3.57 11.64

s	a
158	155
151	150
84	89

5835
62.19 -4.55 35.87

s	a
224	217
201	200
0	0

605
81.18 -4.47 97.9

s	a
222	220
218	217
175	176

615
86.63 -3.45 21.4

s	a
81	98
129	128
115	115

625
50.45 -19.64 2.16

s	a
171	186
221	220
233	232

635
85.05 -14.65 -11.44

s	a
115	126
151	149
189	186

645
60.98 -5.46 -24.05

s	a
0	21
36	40
82	82

655
14.23 3.8 -32.61

s	a
198	194
187	186
212	210

665
77.58 7.33 -10.94

s	a
173	173
178	177
146	146

5783
71.74 -5.95 16.1

s	a
96	94
89	90
19	32

581
37.72 -3.7 38.71

s	a
174	171
169	167
109	112

5845
68.67 -4.58 31.61

s	a
215	206
188	186
0	0

606
76.66 -1.89 97.74

s	a
216	213
210	209
158	159

616
83.79 -3.89 26.68

s	a
28	55
85	85
70	72

626
32.17 -22.26 3.03

s	a
142	165
213	212
232	230

636
81.22 -19.71 -16.63

s	a
86	100
129	128
173	170

646
52.41 -5.86 -28.39

s	a
212	214
221	220
234	233

656
87.98 -1.25 -7.6

s	a
164	159
148	147
185	182

666
63.96 11.52 -16.73

s	a
190	190
194	192
167	167

5793
77.69 -4.9 12.95

s	a
136	134
134	133
0	26

582
54.79 -8.91 60.24

s	a
199	196
195	194
151	151

5855
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s	a
181	170
145	143
192	188

7439
64.82 20.37 -19.14

s	a
56	53
30	35
49	52

7449
15.58 15.5 -7.35

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186	183

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134	137

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170	169
77	84

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208	207

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220	207
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114	116

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s	a
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73	74
60	63

7519
32.95 7.12 11.2

s	a
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167	166

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73.78 3.49 7.43

s	a
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122	122
168	165

7440
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193	192
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203	200

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7490
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64.43 18.09 48.57

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196	195
185	184

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150	148
136	135

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98	98
197	193

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225	222

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s	a
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197	194

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223	222
220	219

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188	186
84	92

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7491
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210	209
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107	107
22	36

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s	a
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159	158

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93	94

7531
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188	183

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144	143
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93	93
150	146

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191	190

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218	217

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155	154

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205	201

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110	111

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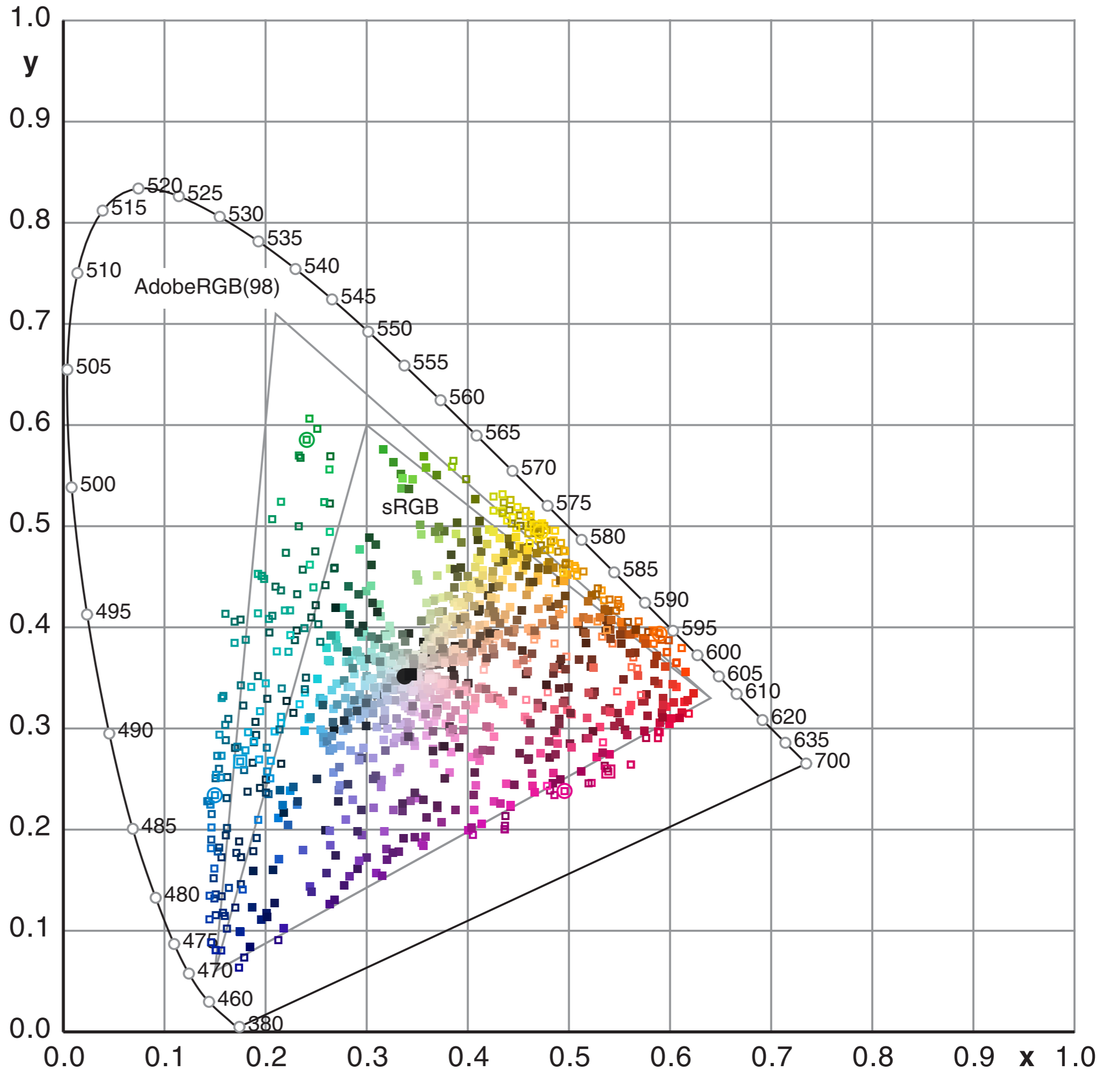
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81	84

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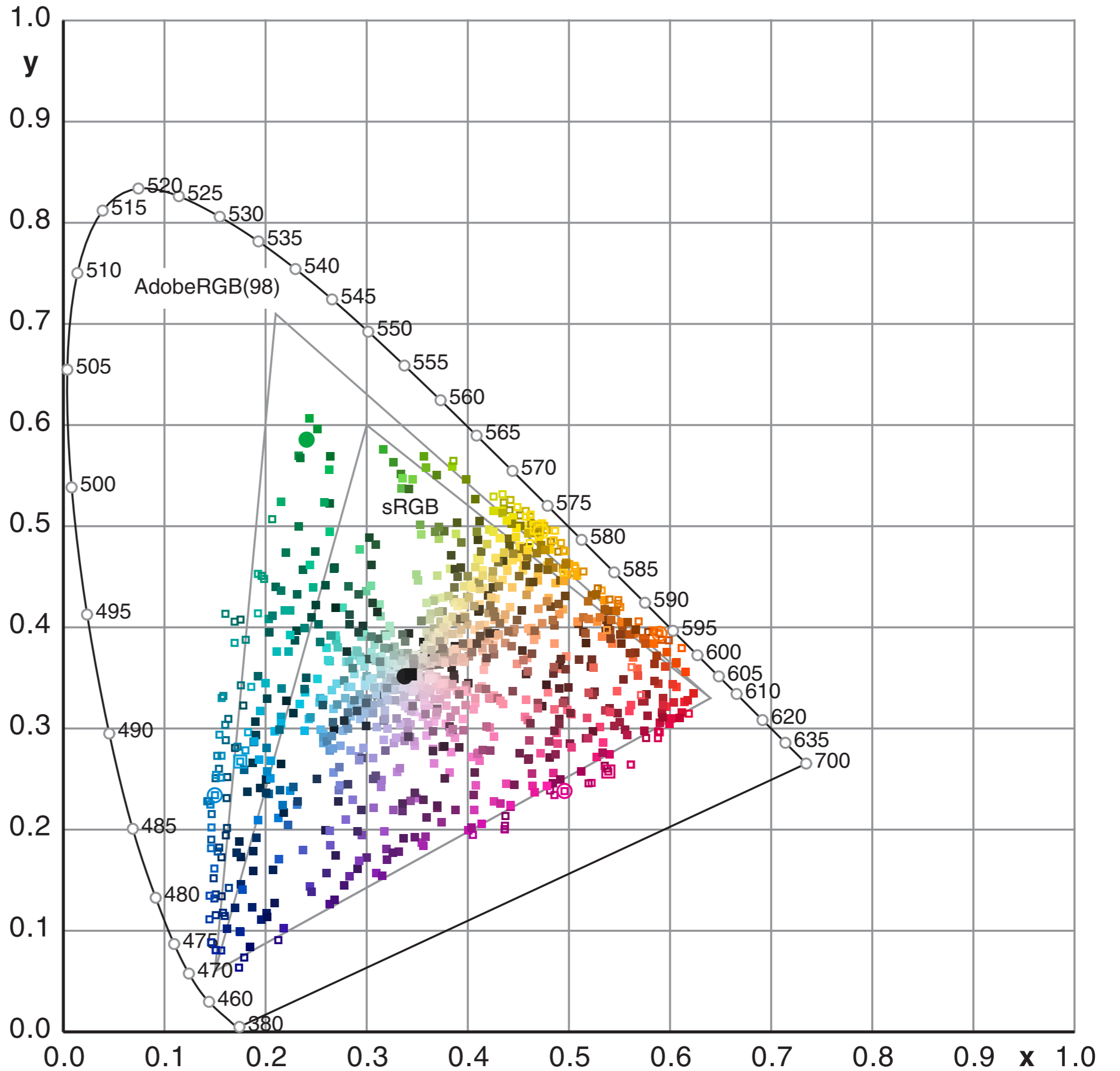
877
61.73 -0.91 -2.59



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:

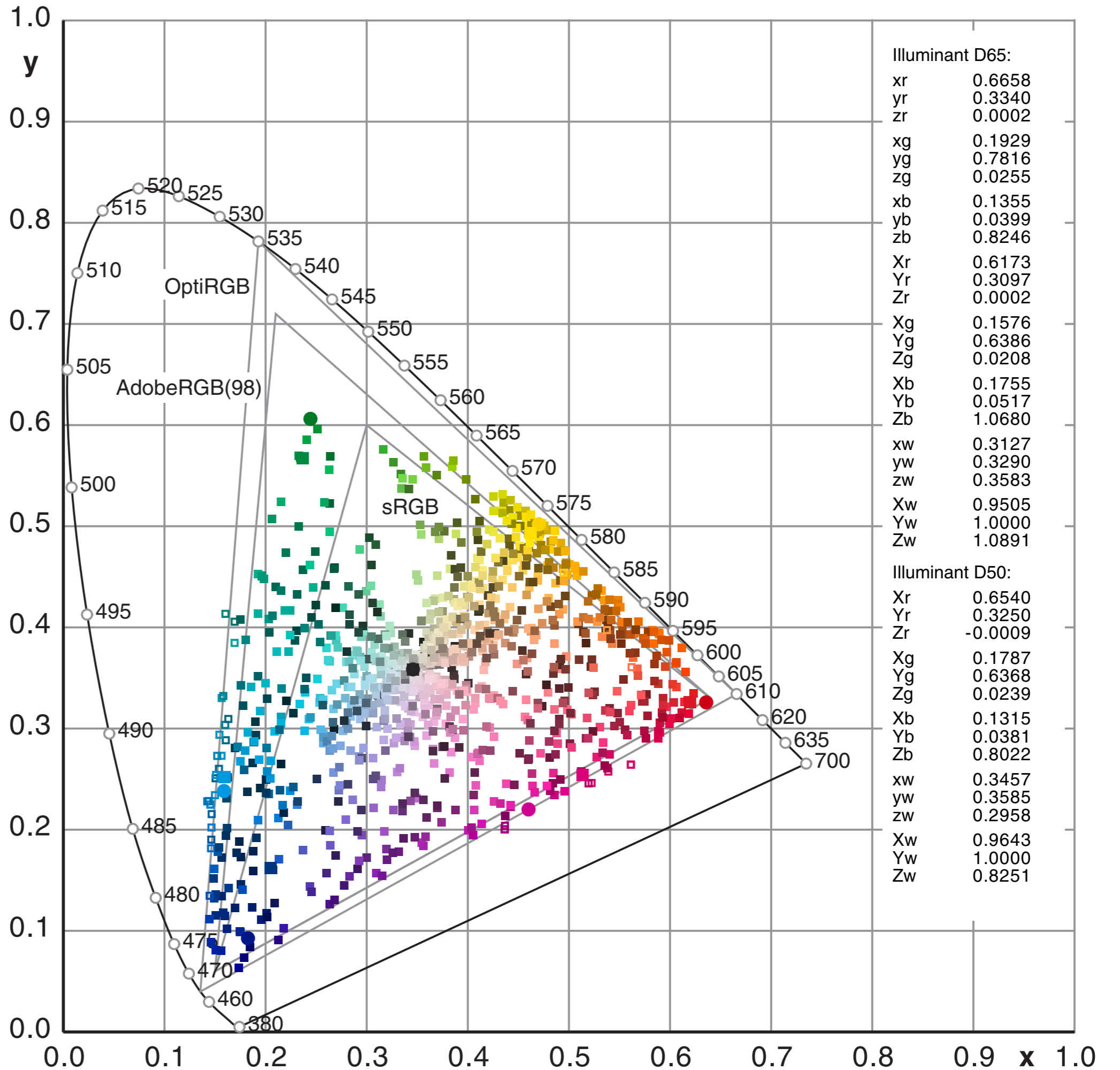
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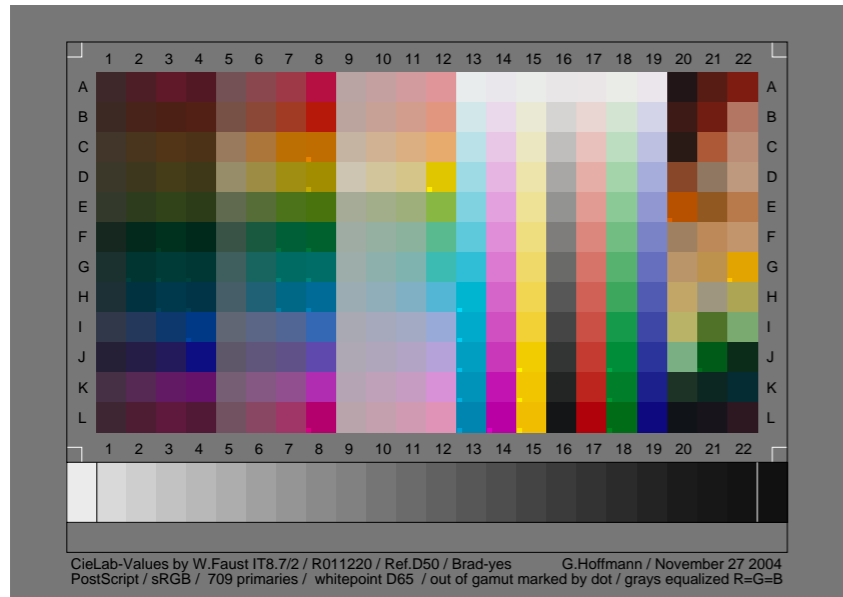
Spot colors and printer inks in the CIE chromaticity diagram

For OptiRGB

Filled In gamut
 Stroked Out of gamut

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





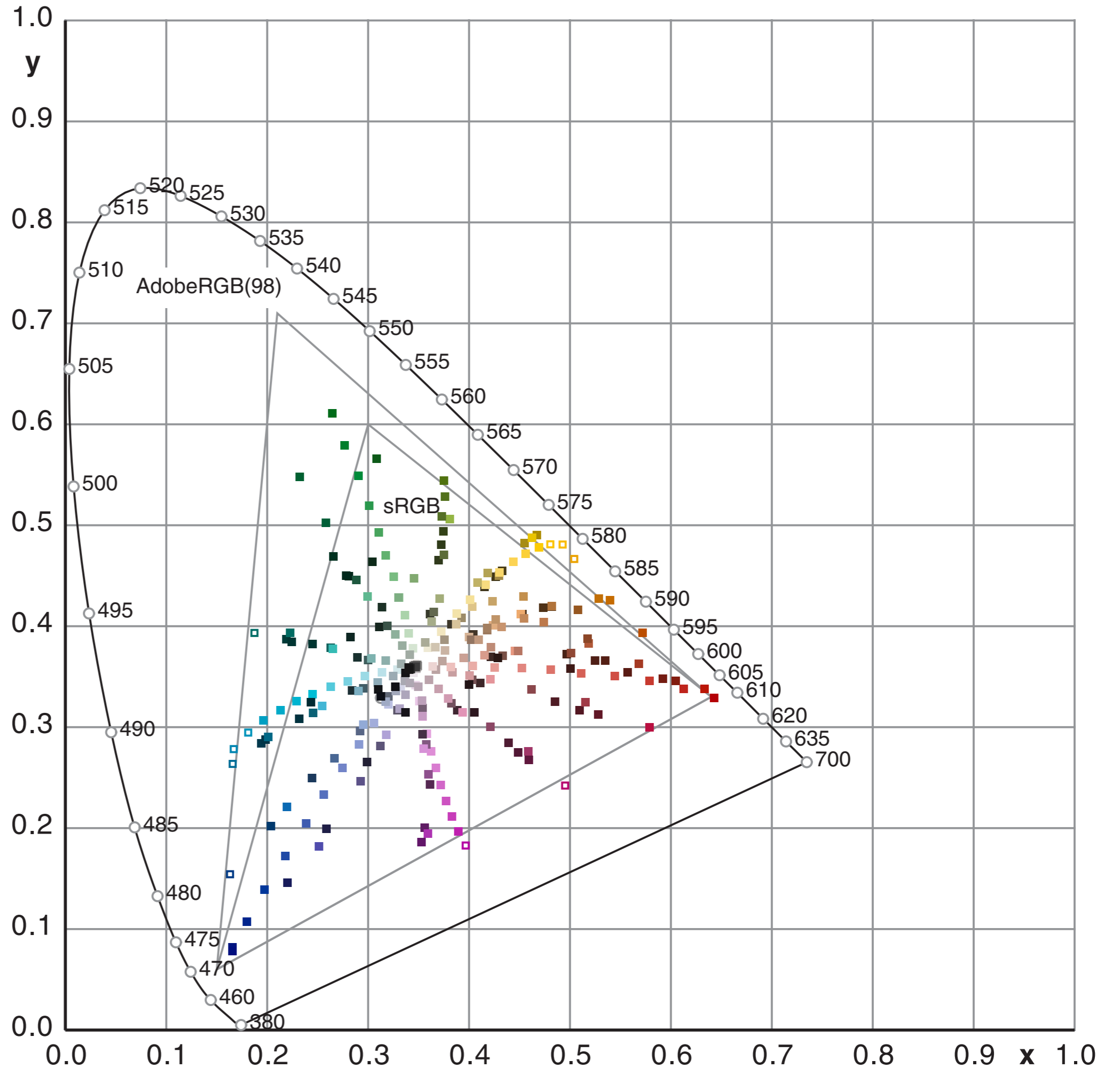
The target above, which is used in many docs by the author, was made by the reference file for a real target, using measured Lab values.

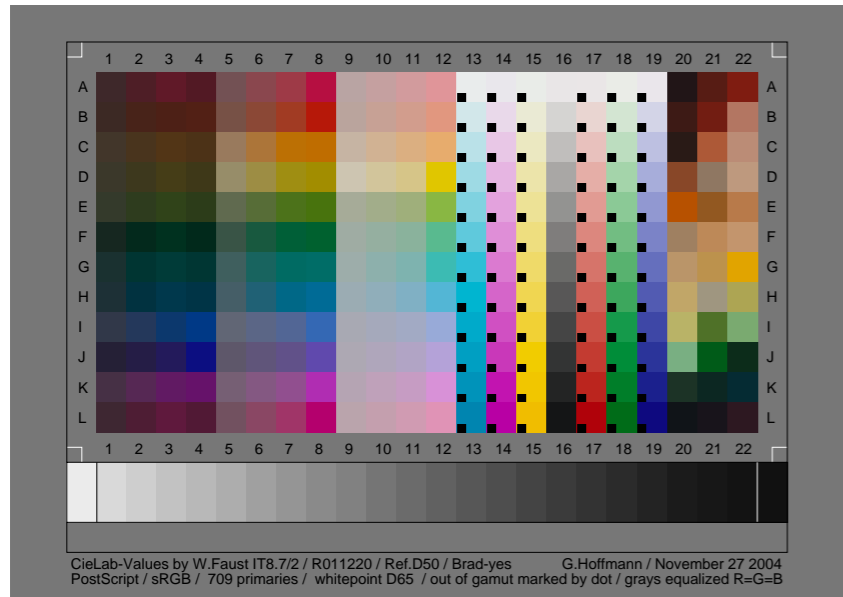
The chromaticity diagram shows these measured Lab values.

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.

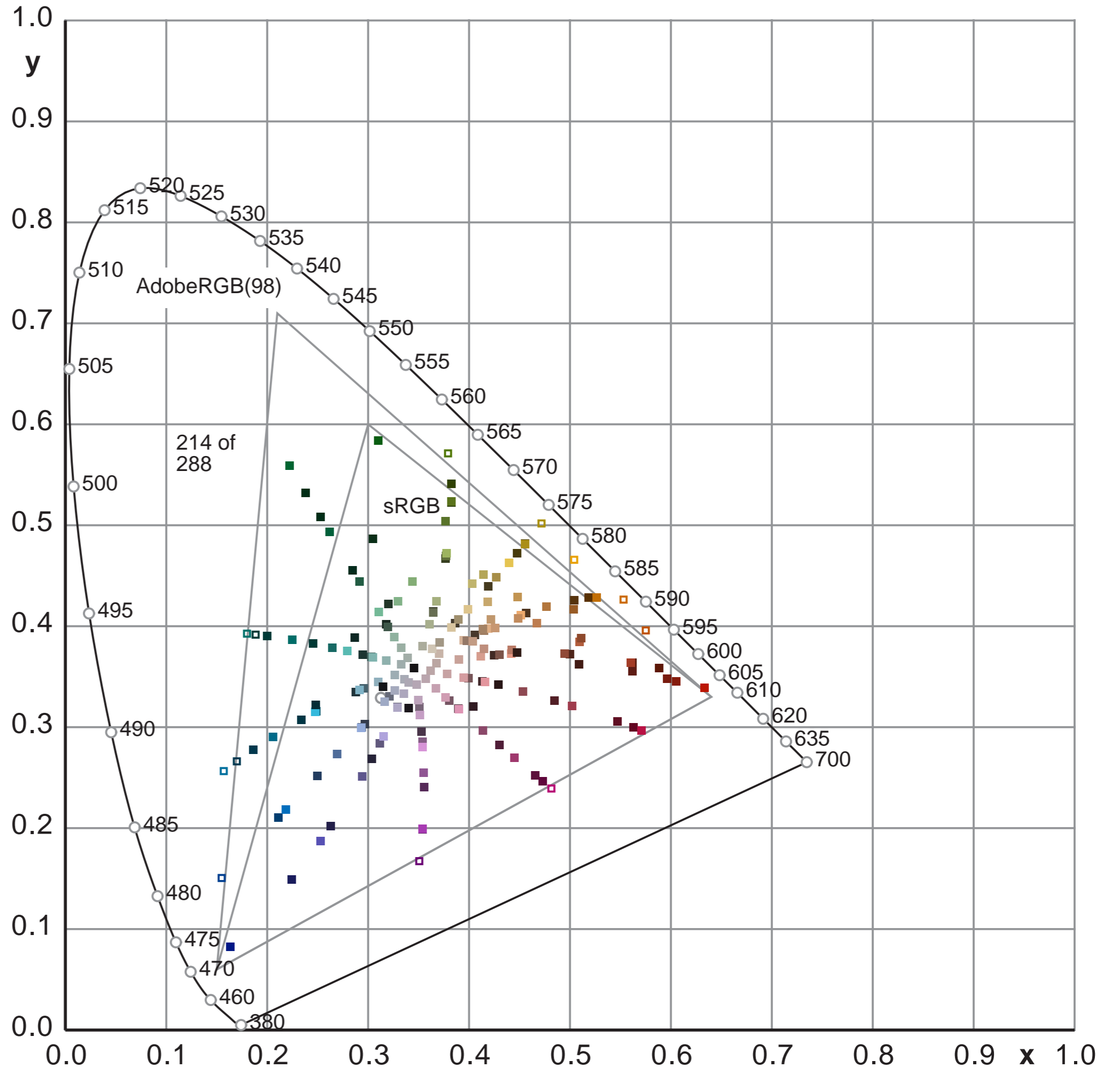
The chromaticity diagram shows a subset of 214 of 288 IT8.7/2 colors according to the standard.

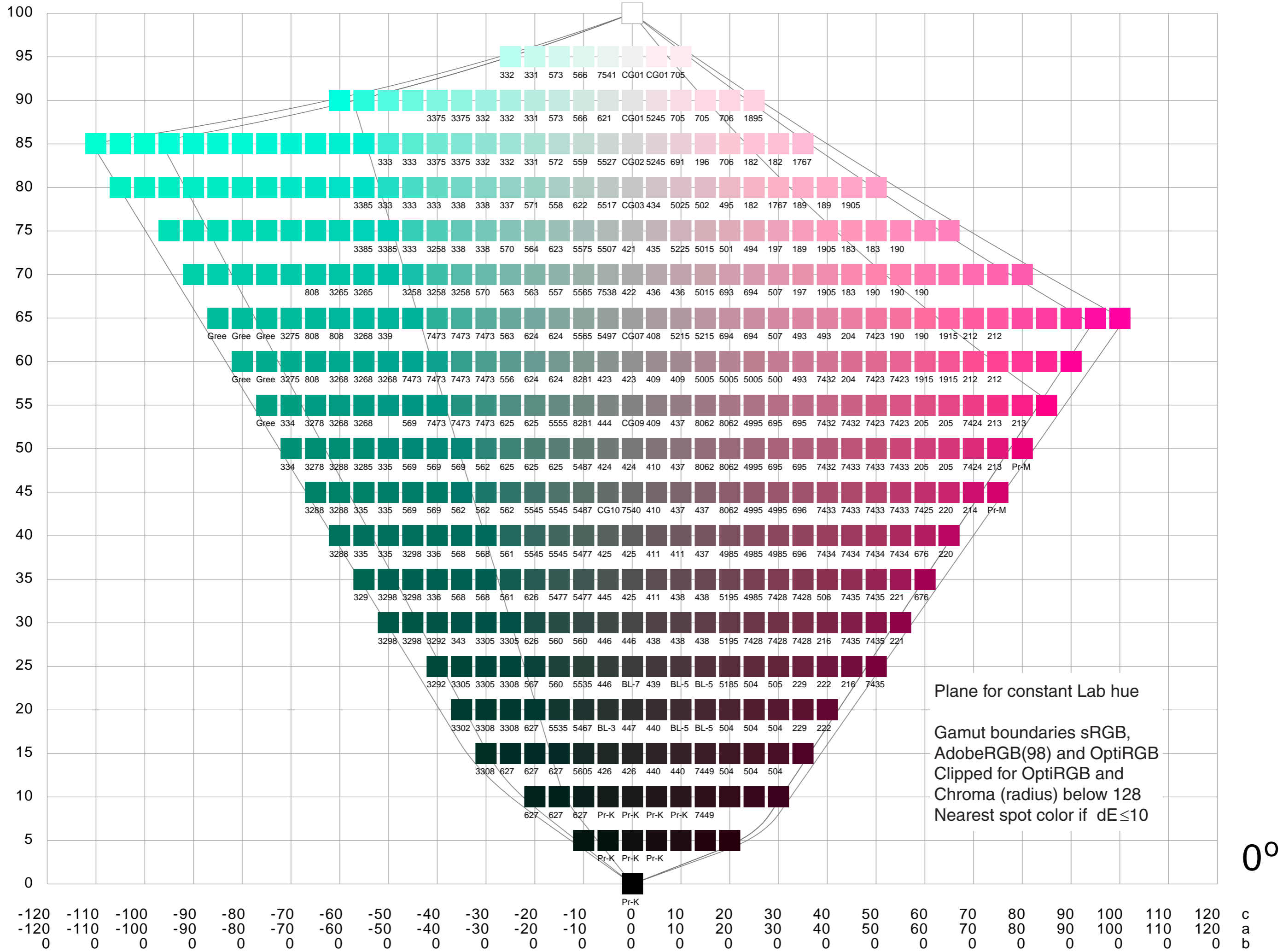
For the remaining colors GS0, GS23 and six step wedges (marked by a black square in the target) reference values are not available.

IT8.7/2 colors in the CIE chromaticity diagram

For AdobeRGB(98)

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





Pr-K

Pr-K

Pr-K

Pr-K

Pr-K

Pr-K

Pr-K

Pr-K

Pr-K

Pr-K

Pr-K

Pr-K

Pr-K

Pr-K

Pr-K

Pr-K

Pr-K

Pr-K

Pr-K

Pr-K

Pr-K

Pr-K

Pr-K

Pr-K

Pr-K

Pr-K

c

a

b

-120

-110

-100

-90

-80

-70

-60

-50

-40

-30

-20

-10

0

10

20

30

40

50

60

70

80

90

100

110

120

0

0

0

0

-120

-110

-100

-90

-80

-70

-60

-50

-40

-30

-20

-10

0

10

20

30

40

50

60

70

80

90

100

110

120

0

0

0

0

0

0

0

0

0

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0

0

0

0

0

0

0

0

0

0

0

0

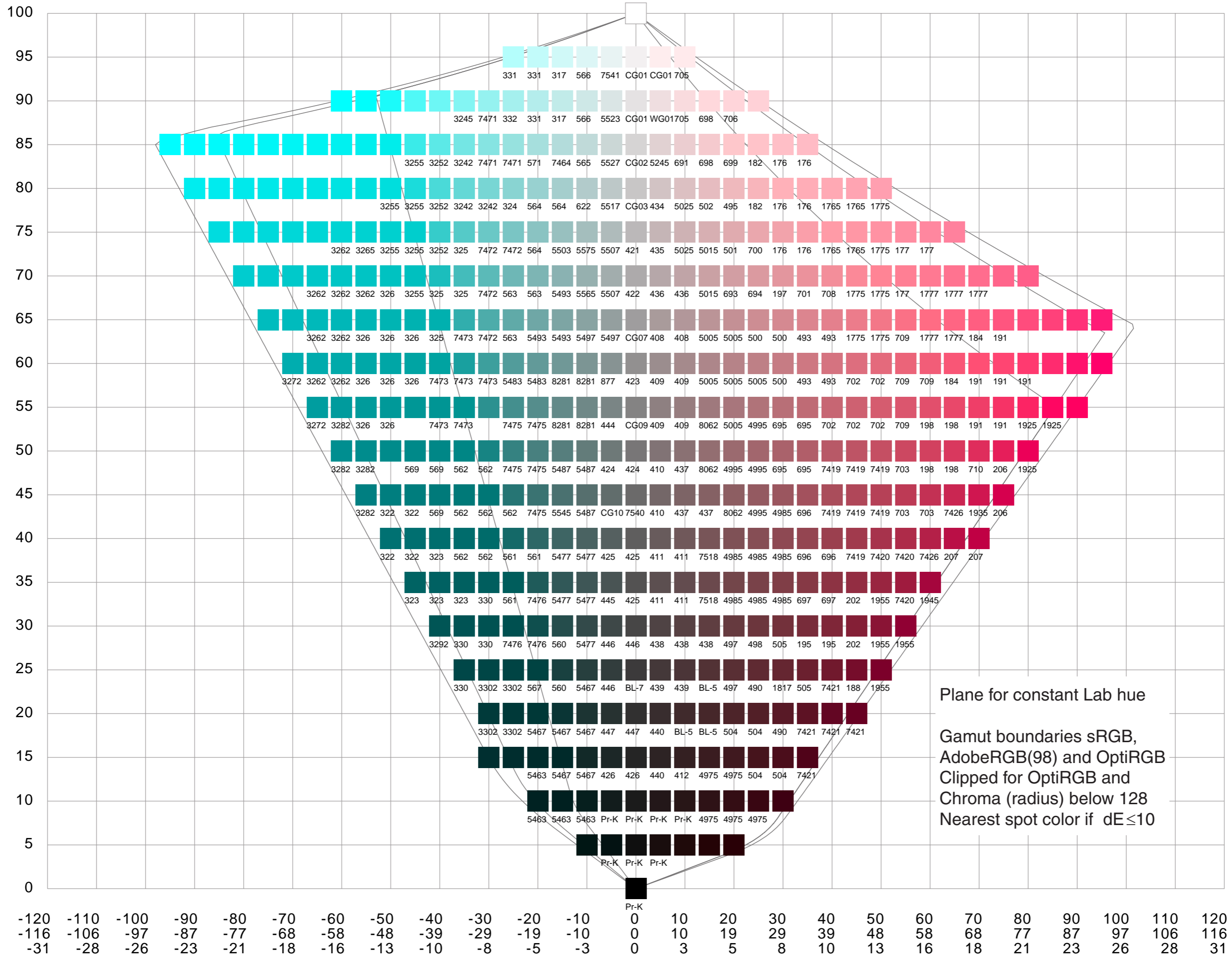
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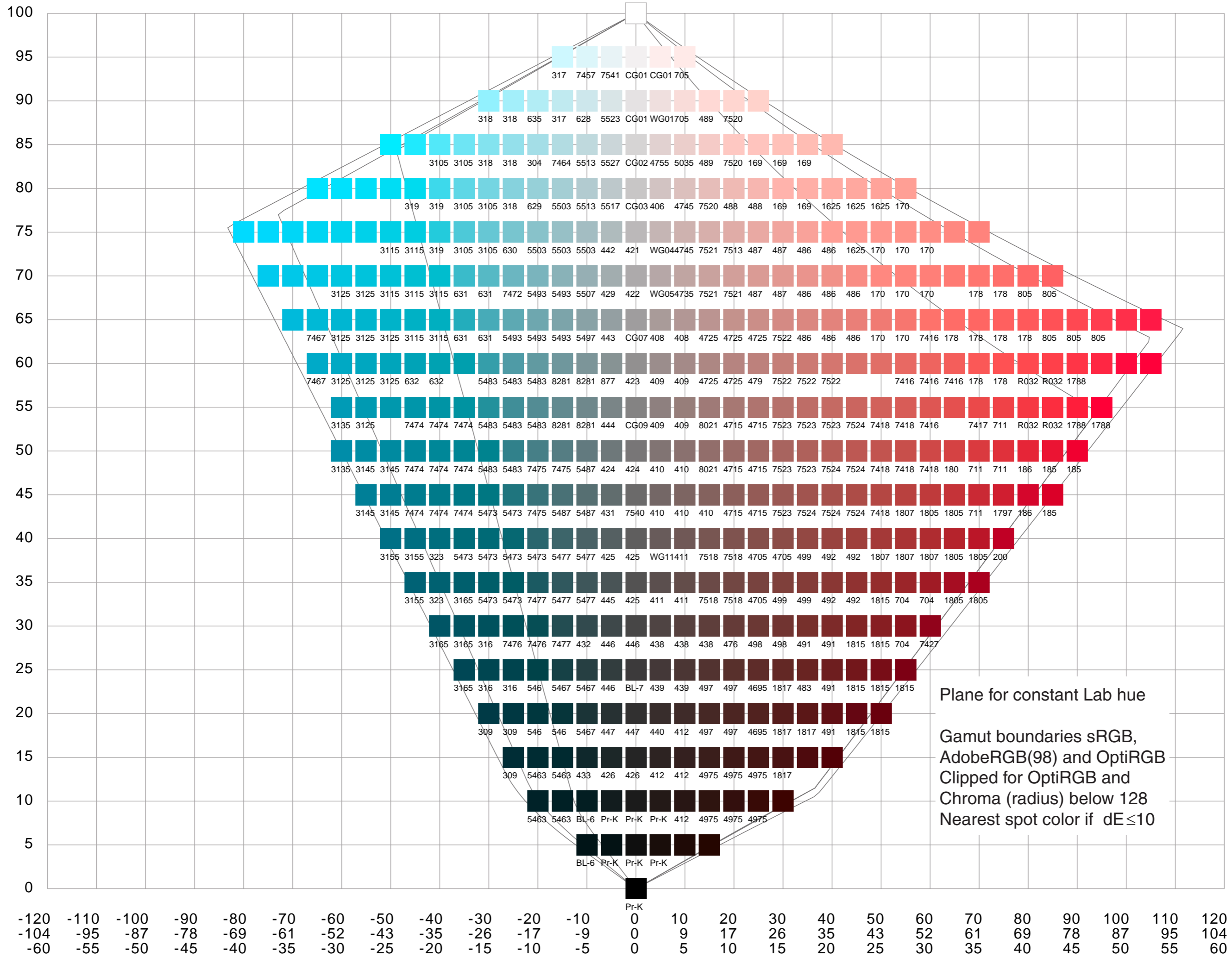
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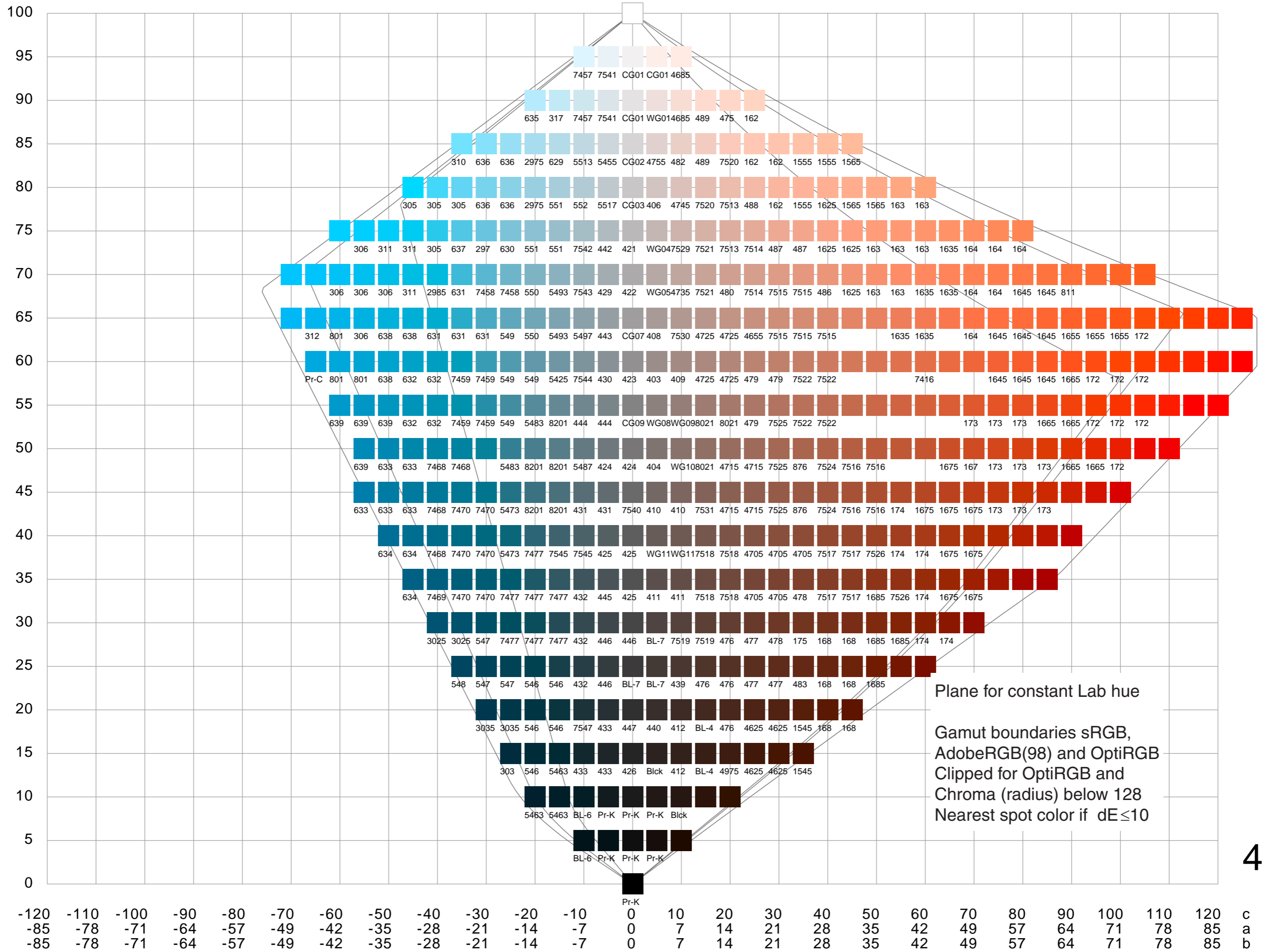
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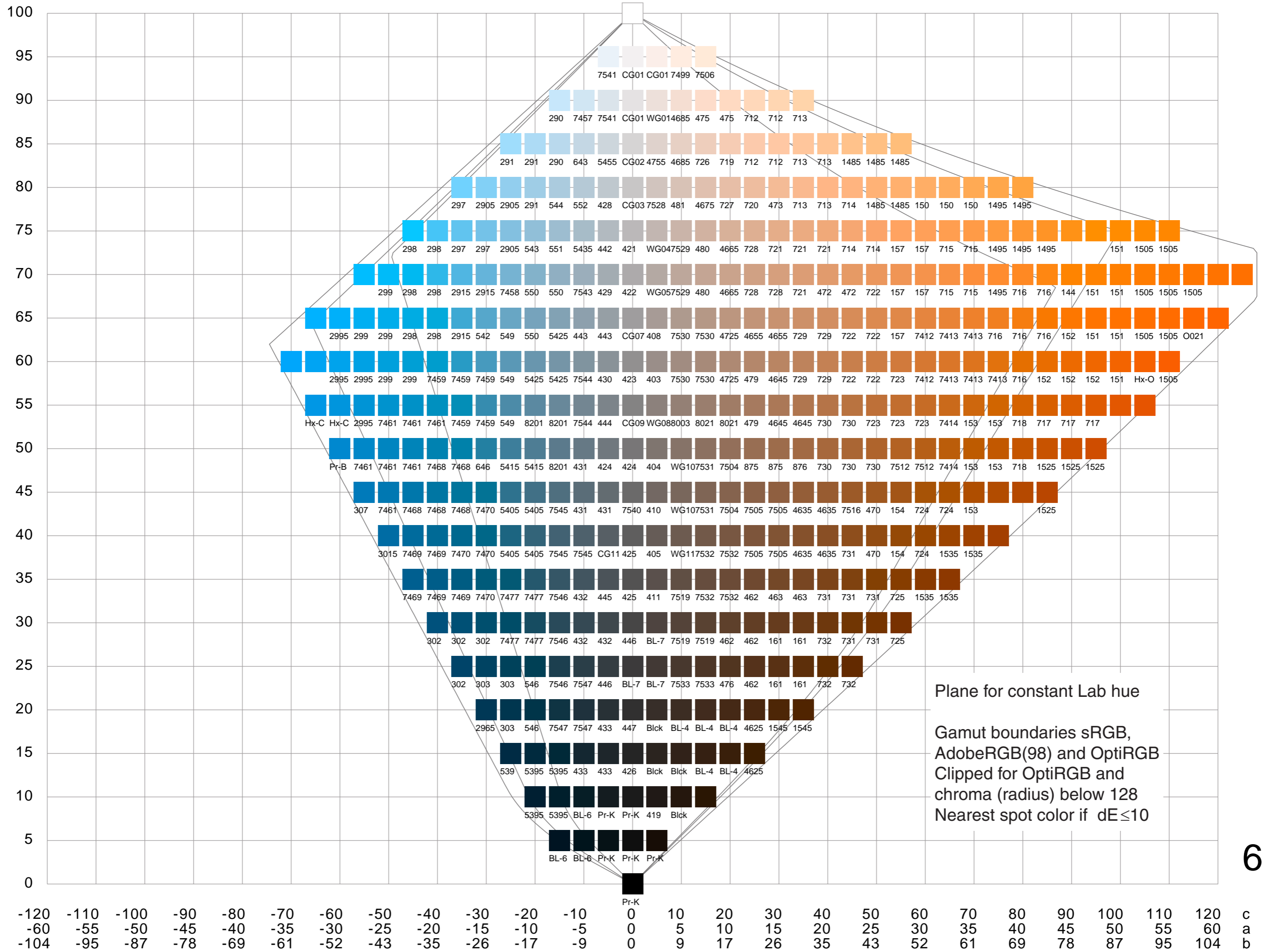


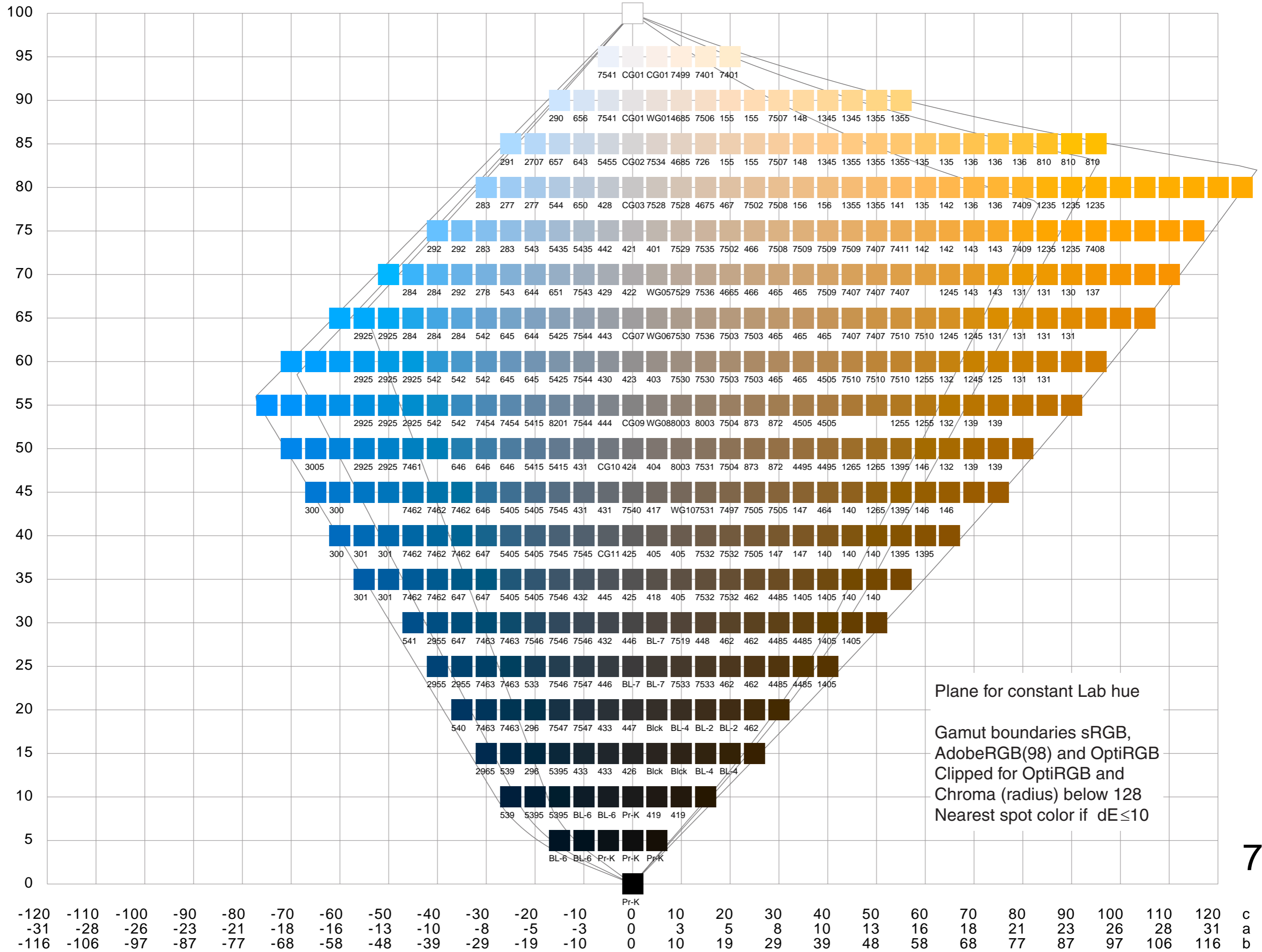


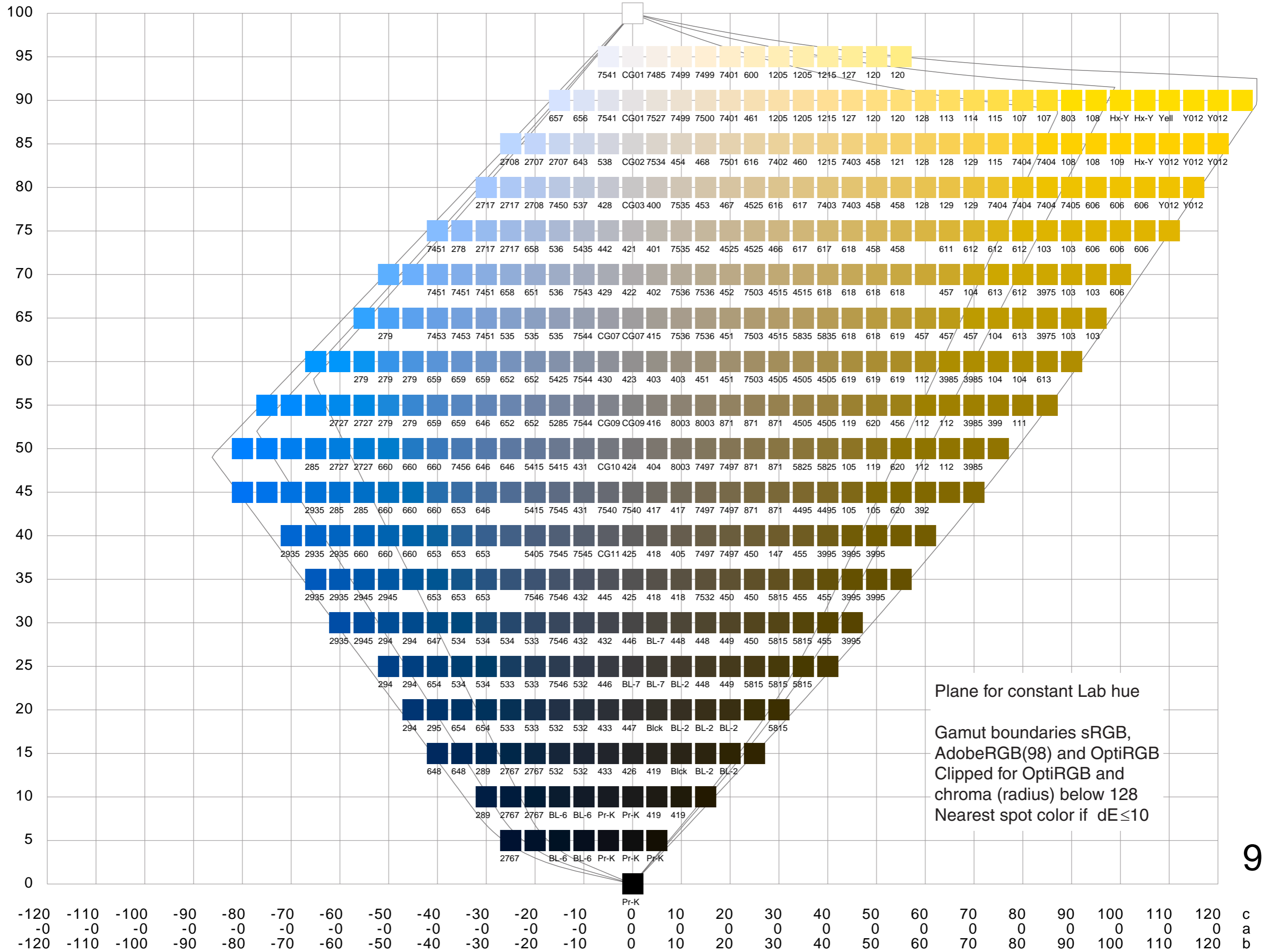
30°



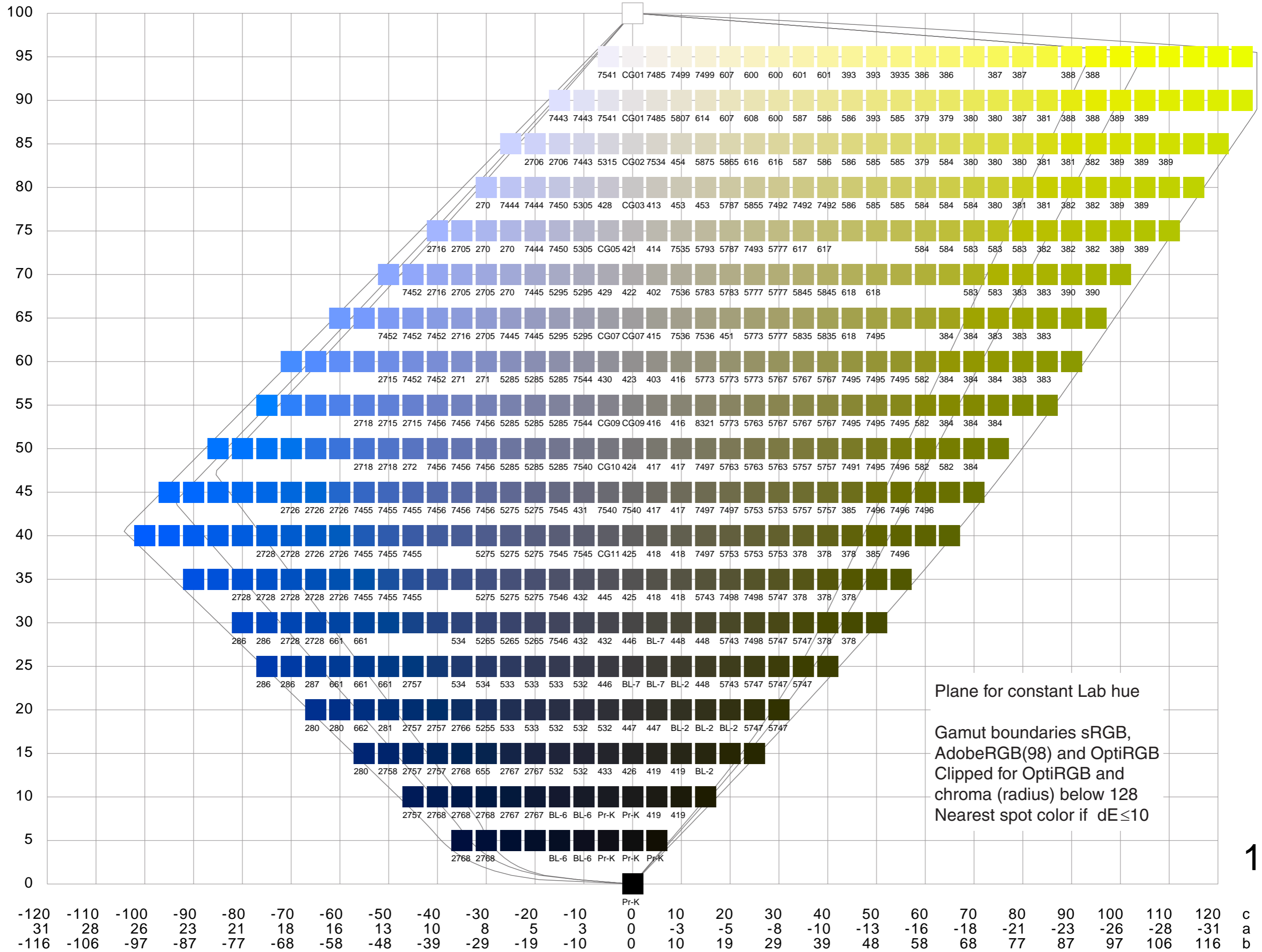
45°



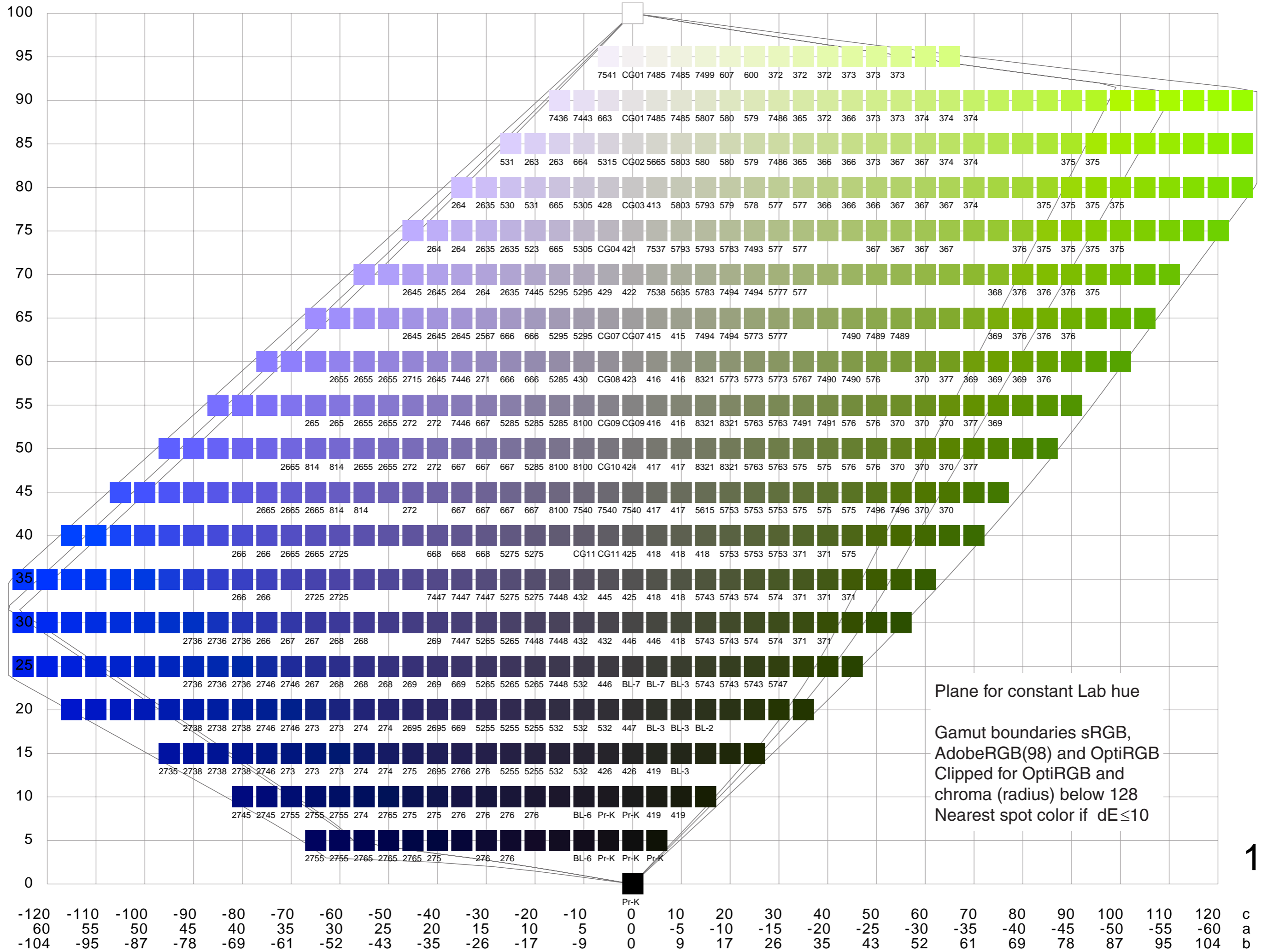




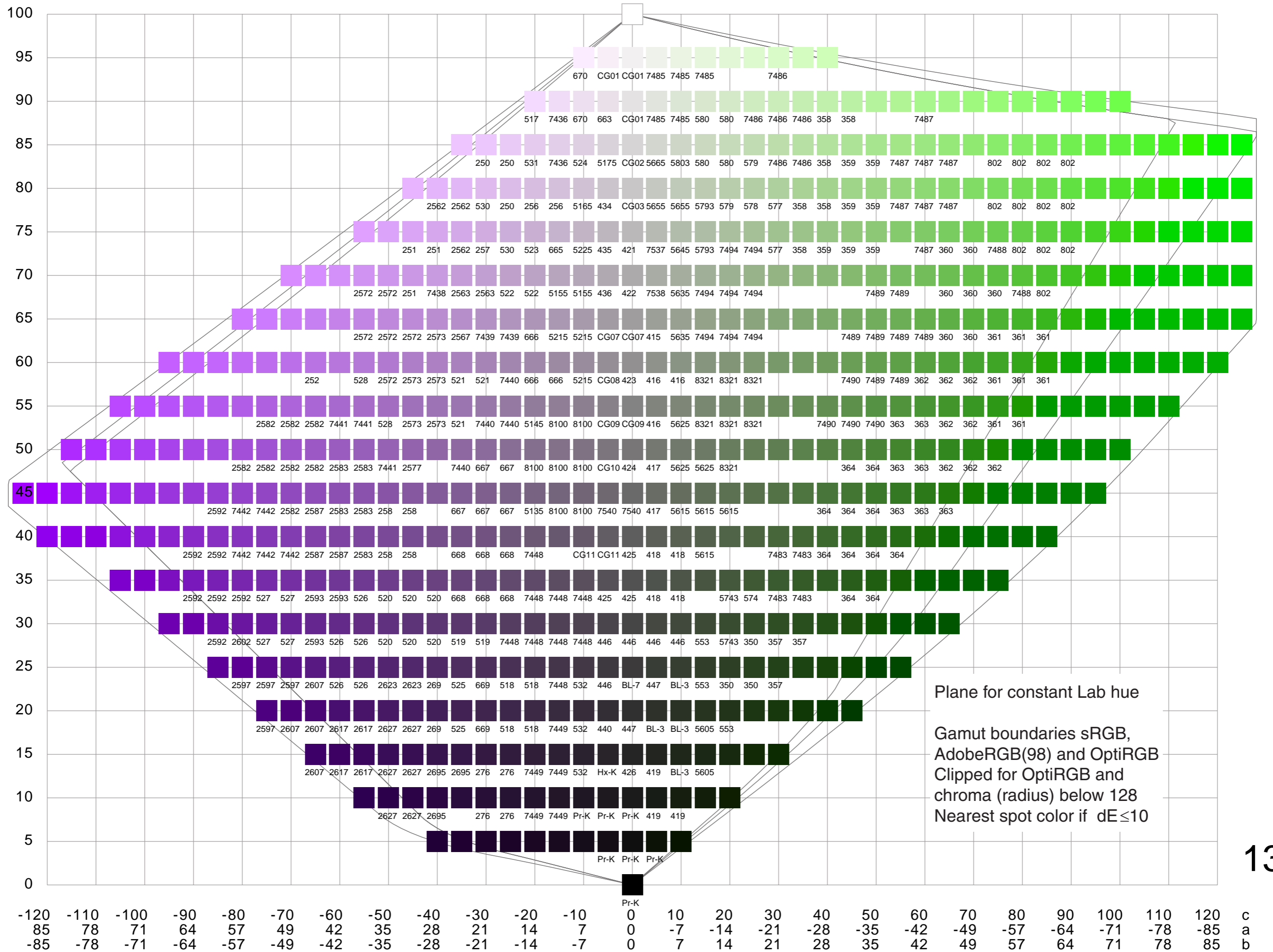
90°



105°



120°



135°

