

Color & Appearance Testing Program

Summary Report # 149 - 3rd Q 2009

[About the Color Program](#), [About CTS](#)

[Key to Tables and Graphs](#)

Analysis **Analysis Name**

[408](#) [Color & Color Difference \(Paint Chips\) - 45-0](#)

[409](#) [Color & Color Difference \(Paint Chips\) Sphere](#)

[Instrument Code List](#)

ABOUT THE PROGRAM

The Collaborative Reference Program for Color & Appearance is operated and maintained by Collaborative Testing Services, Inc. (CTS), with technical guidance and advice provided by representatives from various instrument manufacturers. The program allows laboratories to compare periodically the performance of their testing with that of other laboratories.

Paint chip samples, which have been custom-made specifically for Collaborative Testing Services by Munsell Color, X-Rite Inc., Grand Rapids, MI, are distributed four times per year to participating laboratories. Gloss participants test two pairs of paint chip samples at different gloss levels, approximately 5-10 units apart. Color & Color Difference participants measure a set of two opaque color paint chips, selected from throughout the full color spectrum, consisting of a nonmetameric match with small color differences. These data are analyzed in two separate tables based on the conditions of measurement used. Laboratories that also participate in the Spectrophotometric analyses measure one of the opaque color chips for % reflectance at 16 wavelengths.

Please refer to each test's 'Key' for definitions of terms used in the tables and graphs and guidelines to interpreting the results. Also shown are notes concerning specific laboratory results, as well as significant findings related to instrument types or other testing variations.

ABOUT CTS

Founded in 1971, CTS is a privately-owned company that specializes in interlaboratory tests for a wide variety of industries, including rubber, plastics, fasteners and metals, containerboard, paper, color, and wine as well as proficiency tests for forensic laboratories. All of the tests are designed to assist organizations in achieving and maintaining quality control objectives. Labs from the U.S., as well as more than 50 countries, currently participate in the CTS programs.

If there are any questions on the report or testing program, please contact:

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Key for Color Program Web Summary Report

WebCode	Assigned laboratory identification number (temporary) used to ensure lab confidentiality while permitting a lab to locate its data in the Color Report published on the CTS web site. The Web Code for each analysis can be found in the Performance Analysis Report mailed to each participant.
Lab Mean	The average of the 2 test results obtained by the participant for CIE L*,a*,b* color space values.
Grand Mean	The average of the LAB MEANS for all included participants. Laboratories flagged with an X or an M (see DATA FLAG column) are excluded from the GRAND MEAN.
Between-Lab Standard Deviation	An indication of the precision of measurement between the laboratories. The greater the spread of the LAB MEANS about the GRAND MEAN, the larger the BETWEEN-LAB STANDARD DEVIATION (and vice versa).
Comparative Performance Value	An indication of how well a laboratory's results agree with the other participants. The CPV is a ratio indicating the number of standard deviations from the GRAND MEAN. The closer a laboratory's COMPARATIVE PERFORMANCE VALUE is to zero, the more consistent its results are with the other participants' data (and vice versa). The critical value for each CPV will vary depending on the number of labs participating in a test.
Graphs	For each laboratory, the LAB MEAN for the first sample is plotted against the LAB MEAN for the second sample with each point representing a laboratory. The horizontal and vertical axes are the GRAND MEANS for each sample. For each test there are three plots: L*2 vs L*1, a*2 vs a*1 and b*2 vs b*1. The a* and b* plots are created using absolute values.
Inst Code	A code indicating the manufacturer of the instrument used to perform the test (see separate INSTRUMENT CODE LIST for each test section).
Data Flag	DATA FLAGS are assigned based on the simultaneous analysis of both samples tested. Refer to the following chart for an explanation of each symbol:

<u>DATA FLAG</u>	<u>STATISTICALLY INCLUDED/EXCLUDED</u>	<u>ACTION REQUIRED</u>
*	INCLUDED	CAUTION - review testing procedure and monitor future results. Results fall outside 95% ellipse but within a 99% ellipse that is calculated but not drawn.
X	EXCLUDED	STOP - immediate review of data and/or testing procedure is required. Results fall outside the 99% ellipse and one or more CPV are greater than critical value. See specific notes following each table for more information on why the data is excluded. It is also possible to have an "X" for individual color coordinate (L*, a* or b*) without overall "X" flag. It means that results fall outside the 99% ellipse for particular coordinate but have no CPV flags. Those results will not require any action.
M	EXCLUDED	PROCEED - lab was unable to report data for at least one sample. However, a lab receiving two of more M flags for a test may need to stop and review its testing procedures.

Interlaboratory Testing Program for Color & Appearance

Analysis 408

Color and Color Difference - Paint Chips - 45-0 Geometry Instruments
 CIE L*a*b* Color Space - Illuminant D65 - CIE 1964 (10 Degree) Observer

WebCode	Flag	Samples	CIE L* a* b* Color Values			Color Difference Values				InstrCode
			L*	a*	b*	ΔL^*	Δa^*	Δb^*	ΔE^*	
1J99WF		C91	52.71	-25.52	-17.18	0.91	-0.16	-0.19	0.94	XN
		C92	53.62	-25.68	-17.36					
1KWTHL		C91	53.42	-24.32	-17.55	0.91	-0.10	-0.17	0.93	HW
		C92	54.33	-24.42	-17.72					
1V7Y3G		C91	52.48	-25.51	-17.09	0.66	-0.23	-0.23	0.73	XO
		C92	53.14	-25.74	-17.32					
29JTYT		C91	52.46	-25.78	-16.86	0.96	-0.05	-0.10	0.97	GD
		C92	53.42	-25.83	-16.96					
2GLXX9		C91	52.81	-25.39	-16.80	0.85	-0.17	-0.18	0.88	XU
		C92	53.66	-25.55	-16.98					
359RTM		C91	52.92	-24.42	-17.78	0.90	-0.15	-0.18	0.93	HW
		C92	53.81	-24.57	-17.96					
3QHXCX		C91	52.65	-25.55	-17.12	0.88	-0.14	-0.11	0.89	XO
		C92	53.52	-25.69	-17.22					
49PQU8		C91	52.50	-24.45	-17.51	0.87	-0.18	-0.18	0.90	HW
		C92	53.36	-24.63	-17.68					
5BQQEH		C91	52.68	-25.28	-16.82	0.77	-0.29	-0.28	0.86	XO
		C92	53.45	-25.57	-17.09					
7LTEPK		C91	52.84	-25.31	-16.85	0.90	-0.16	-0.17	0.92	XU
		C92	53.74	-25.46	-17.02					
9BQPC2		C91	53.19	-24.92	-16.45	0.78	-0.21	-0.15	0.82	HK
		C92	53.97	-25.13	-16.60					
9XWKEB		C91	52.21	-25.93	-17.00	0.82	-0.18	-0.22	0.87	GH
		C92	53.03	-26.11	-17.21					
AB4PVG		C91	52.34	-25.13	-17.03	0.91	-0.14	-0.13	0.92	HK
		C92	53.25	-25.27	-17.15					
AJLZB4		C91	53.07	-25.01	-16.69	0.95	-0.08	-0.13	0.96	XT
		C92	54.02	-25.09	-16.82					

Interlaboratory Testing Program for Color & Appearance

Analysis 408

Color and Color Difference - Paint Chips - 45-0 Geometry Instruments
 CIE L*a*b* Color Space - Illuminant D65 - CIE 1964 (10 Degree) Observer

WebCode	Flag	Samples	CIE L* a* b* Color Values			Color Difference Values				InstrCode
			L*	a*	b*	ΔL^*	Δa^*	Δb^*	ΔE^*	
AJQUC3		C91	52.59	-25.66	-17.01	0.86	-0.12	-0.18	0.89	XP
		C92	53.45	-25.78	-17.19					
AK58MY		C91	52.70	-25.63	-16.98	0.81	-0.23	-0.21	0.87	XV
		C92	53.51	-25.86	-17.19					
BGAHQC		C91	52.78	-25.31	-16.68	0.84	-0.22	-0.21	0.89	GE
		C92	53.61	-25.53	-16.89					
CD4EE2		C91	52.06	-25.76	-17.22	0.89	-0.16	-0.18	0.92	GH
		C92	52.95	-25.92	-17.39					
CX34TQ		C91	52.17	-24.26	-17.78	0.73	-0.31	-0.24	0.82	HW
		C92	52.90	-24.57	-18.02					
DLFZTY		C91	52.66	-25.94	-16.77	0.95	-0.06	-0.22	0.97	AE
		C92	53.61	-26.00	-16.99					
F45X8V	X	C91	52.01	-26.99	-20.99	0.81	-0.27	-0.19	0.87	GU
		C92	52.82	-27.25	-21.18					
FGXJFB		C91	52.32	-25.29	-16.85	0.84	-0.17	-0.17	0.87	XL
		C92	53.16	-25.45	-17.02					
G23RTU		C91	52.17	-25.32	-17.11	0.72	-0.27	-0.26	0.81	GH
		C92	52.89	-25.59	-17.37					
G5R3S1		C91	52.81	-25.21	-16.84	0.77	-0.27	-0.23	0.84	XM
		C92	53.58	-25.48	-17.07					
HR7QEJ		C91	52.78	-25.26	-16.54	0.86	-0.21	-0.21	0.91	GA
		C92	53.64	-25.47	-16.75					
K3HNRQ		C91	52.18	-25.87	-16.97	0.88	-0.12	-0.14	0.89	MQ
		C92	53.06	-25.99	-17.11					
L76W4V		C91	52.82	-25.70	-16.82	0.81	-0.17	-0.23	0.86	XN
		C92	53.63	-25.87	-17.05					
LVUJ19		C91	52.55	-24.49	-17.57	0.82	-0.24	-0.23	0.88	HW
		C92	53.36	-24.73	-17.79					

Interlaboratory Testing Program for Color & Appearance

Analysis 408

Color and Color Difference - Paint Chips - 45-0 Geometry Instruments
 CIE L*a*b* Color Space - Illuminant D65 - CIE 1964 (10 Degree) Observer

WebCode	Flag	Samples	CIE L* a* b* Color Values			Color Difference Values				InstrCode
			L*	a*	b*	ΔL^*	Δa^*	Δb^*	ΔE^*	
N24P9J		C91	52.28	-24.64	-17.77	0.85	-0.19	-0.17	0.88	XX
		C92	53.13	-24.83	-17.94					
N2UGRP		C91	52.27	-24.61	-17.59	0.87	-0.10	-0.14	0.88	HW
		C92	53.14	-24.71	-17.73					
NUKYVY		C91	52.25	-24.85	-16.90	0.85	0.10	-0.30	0.91	TN
		C92	53.10	-24.75	-17.20					
NVT2DP		C91	53.27	-26.08	-16.00	0.87	0.29	-0.24	0.94	GU
		C92	54.13	-25.79	-16.24					
P396TU		C91	52.79	-24.41	-17.40	0.94	-0.07	-0.11	0.94	HW
		C92	53.72	-24.48	-17.51					
PANZRJ		C91	52.84	-25.44	-16.62	0.78	-0.23	-0.23	0.84	GE
		C92	53.62	-25.66	-16.84					
PXZFFT		C91	52.73	-24.24	-17.63	0.83	-0.19	-0.20	0.88	MG
		C92	53.57	-24.43	-17.83					
Q9VRME		C91	52.89	-23.92	-17.45	0.82	-0.20	-0.19	0.87	HW
		C92	53.71	-24.12	-17.64					
R6NR6E		C91	52.74	-24.43	-17.58	1.00	-0.21	-0.23	1.04	HW
		C92	53.73	-24.64	-17.81					
TKJSVK	X	C91	51.64	-19.85	-20.03	0.86	-0.18	-0.20	0.90	XX
		C92	52.50	-20.03	-20.23					
TPZ4S2		C91	53.00	-25.36	-16.29	0.86	-0.17	-0.19	0.89	XR
		C92	53.85	-25.53	-16.48					
WZZNHC		C91	52.77	-25.93	-16.15	0.81	-0.17	-0.21	0.85	GU
		C92	53.58	-26.11	-16.35					
XVGWG		C91	52.66	-24.31	-17.47	0.91	-0.12	-0.13	0.92	HW
		C92	53.56	-24.43	-17.60					
ZRCQE9	X	C91	51.50	-26.30	-19.45	0.85	-0.30	-0.25	0.94	GQ
		C92	52.35	-26.60	-19.70					

Interlaboratory Testing Program for Color & Appearance

Analysis 408

Color and Color Difference - Paint Chips - 45-0 Geometry Instruments
 CIE L*a*b* Color Space - Illuminant D65 - CIE 1964 (10 Degree) Observer

Summary Statistics							
Samples	L*	a*	b*	ΔL^*	Δa^*	Δb^*	ΔE^*
Grand Means							
C91	52.58	-25.20	-17.04				
C92	53.43	-25.38	-17.23	0.85	-0.15	-0.19	0.89
Std Dev Btwn Labs							
C91	0.40	0.67	0.45				
C92	0.41	0.68	0.45	0.07	0.10	0.05	0.05

Statistics based on 39 of 42 reporting participants

Comments assigned on Data Flags for Test #408

F45X8V(X) - Low "a*" and "b*" values.

TKJSVK(X) - High "a*" values and low "b*" values.

ZRCQE9(X) - Low "L*" and "b*" values.

Interlaboratory Testing Program for Color & Appearance

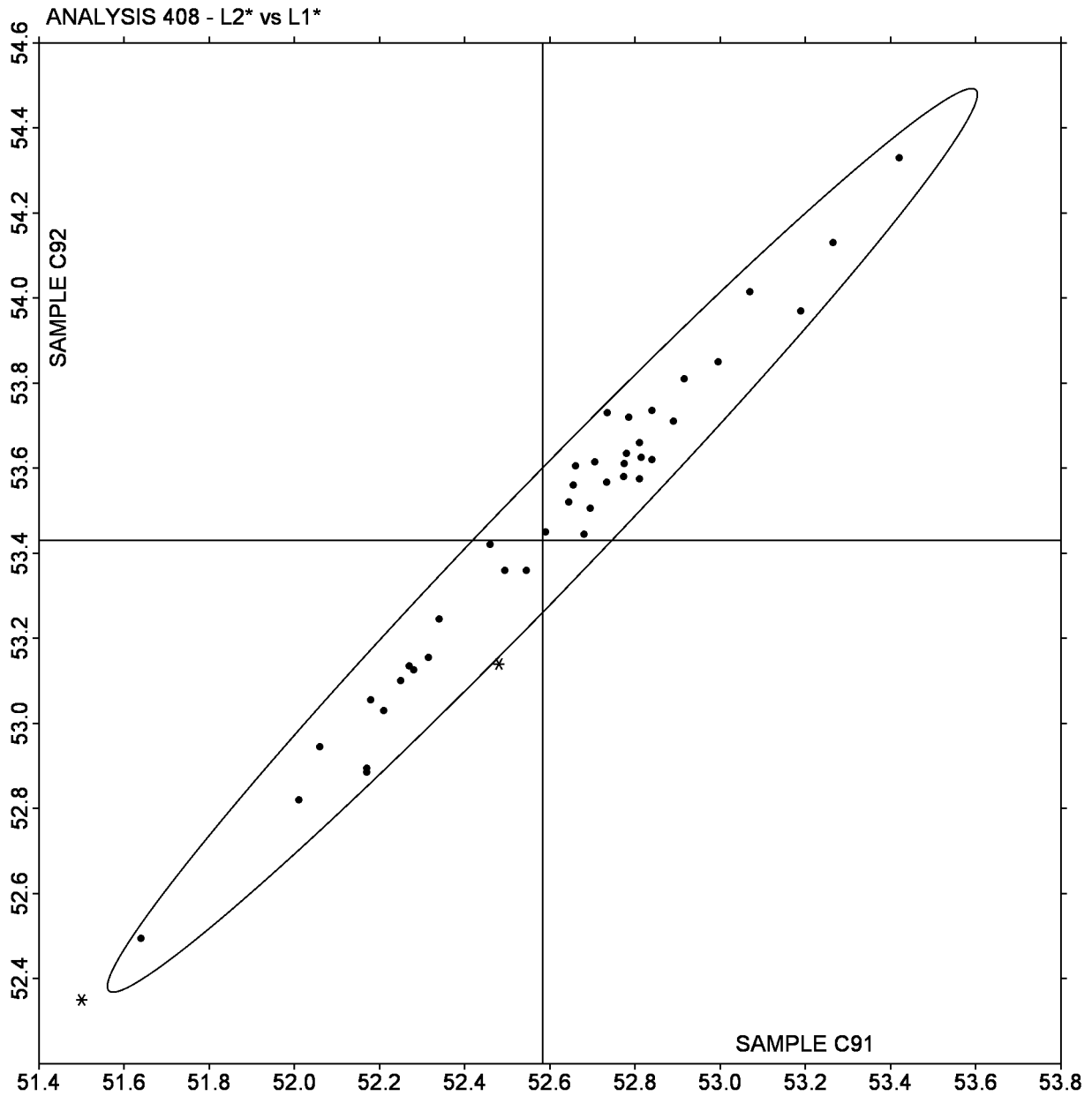
Analysis 408

Color and Color Difference - Paint Chips - 45-0 Geometry Instruments
CIE L*a*b* Color Space - Illuminant D65 - CIE 1964 (10 Degree) Observer

L2* vs L1*

SAMPLE C91 = 52.58

SAMPLE C92 = 53.43



Interlaboratory Testing Program for Color & Appearance

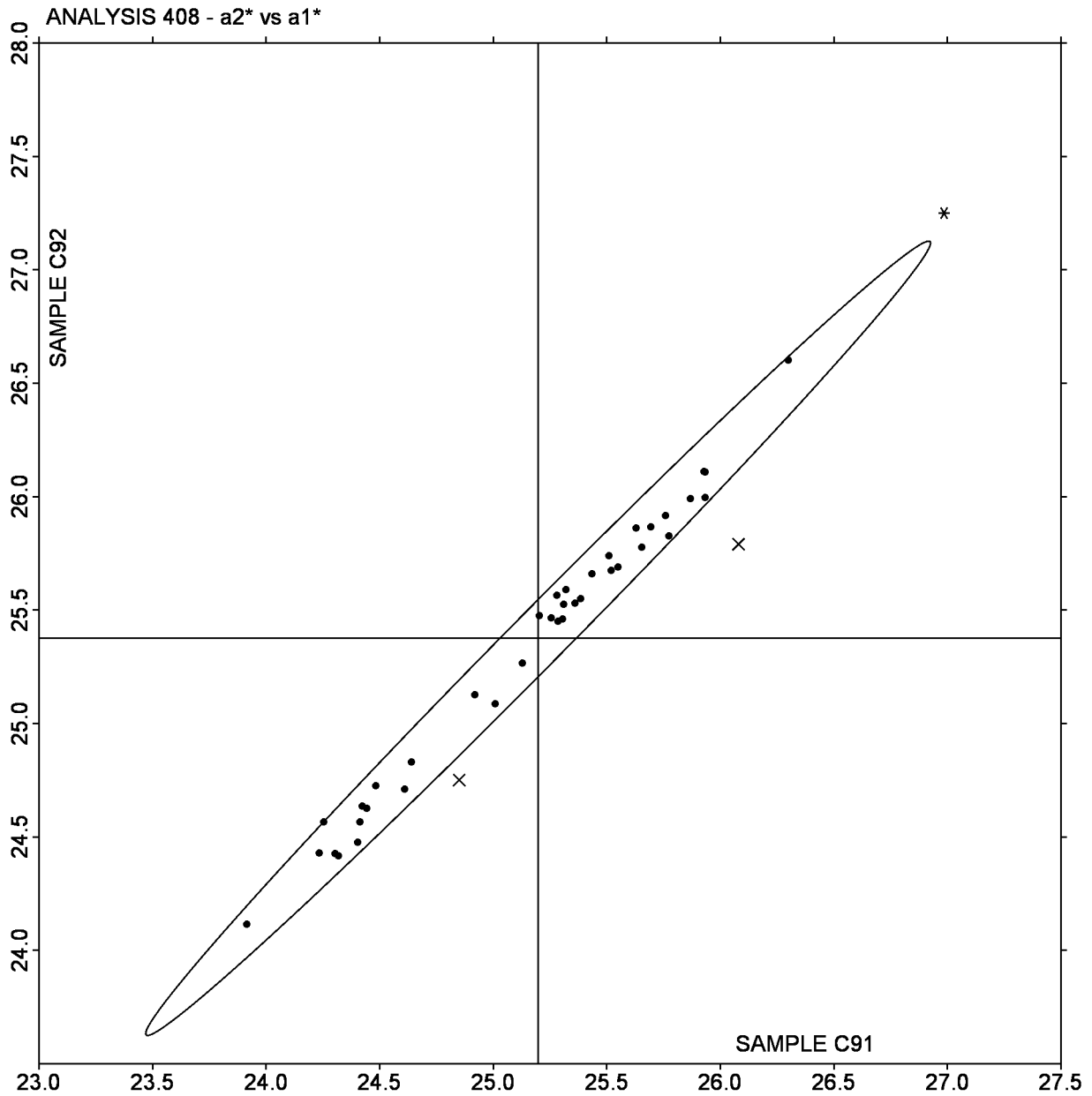
Analysis 408

Color and Color Difference - Paint Chips - 45-0 Geometry Instruments
CIE L*a*b* Color Space - Illuminant D65 - CIE 1964 (10 Degree) Observer

a2* vs a1*

SAMPLE C91 = -25.20

SAMPLE C92 = -25.38



Plot created using absolute values.

Interlaboratory Testing Program for Color & Appearance

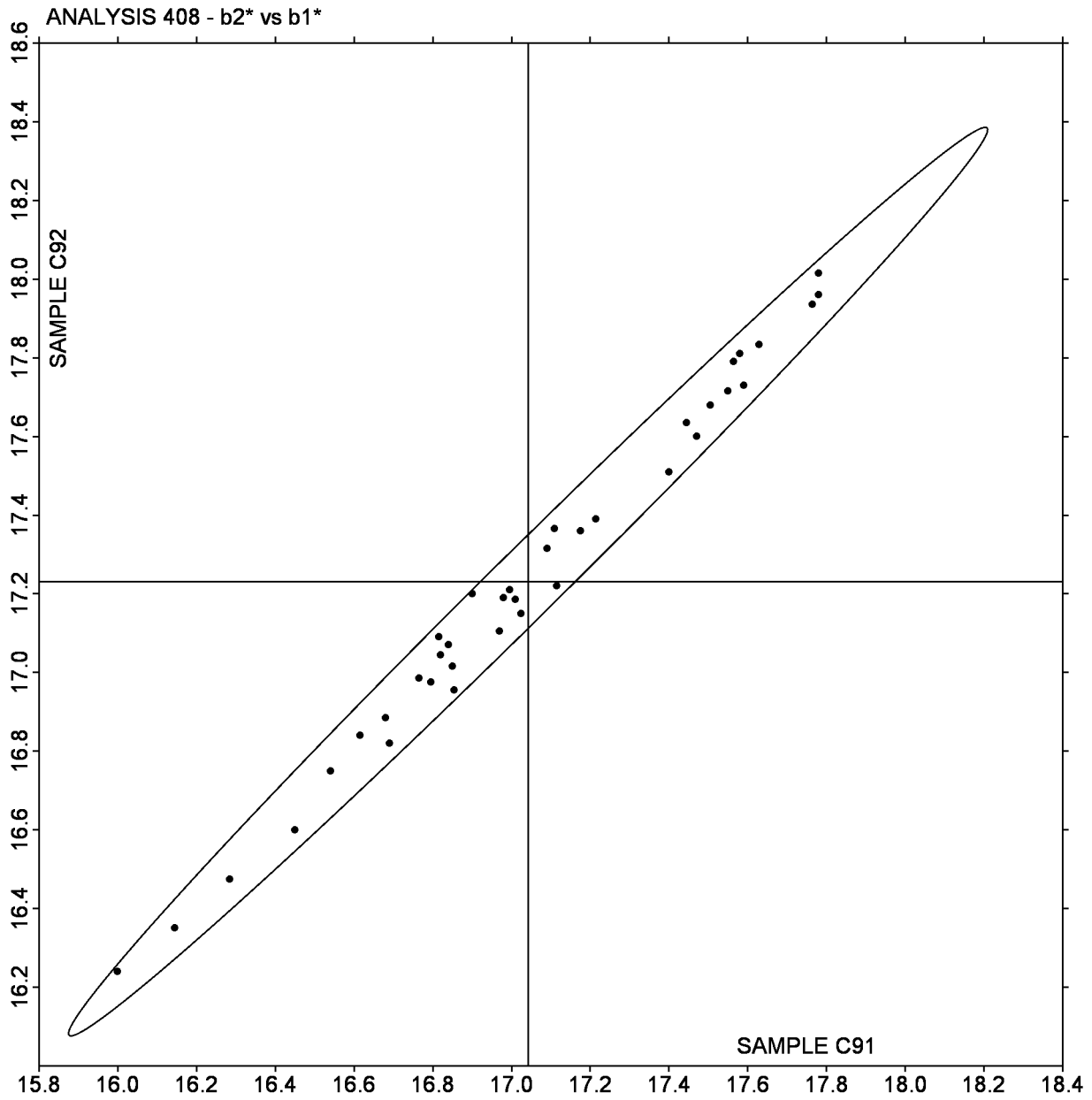
Analysis 408

Color and Color Difference - Paint Chips - 45-0 Geometry Instruments
CIE L*a*b* Color Space - Illuminant D65 - CIE 1964 (10 Degree) Observer

b2* vs b1*

SAMPLE C91 = -17.04

SAMPLE C92 = -17.23



Plot created using absolute values.

Interlaboratory Testing Program for Color & Appearance

Analysis 409

Color and Color Difference - Paint Chips - Sphere Geometry Instruments
 CIE L*a*b* Color Space - Illuminant D65 - CIE 1964 (10 Degree) Observer

WebCode	Flag	Samples	CIE L* a* b* Color Values			Color Difference Values				InstrCode
			L*	a*	b*	ΔL^*	Δa^*	Δb^*	ΔE^*	
13MMXJ		C91	53.57	-24.63	-16.79	0.92	-0.07	-0.17	0.94	AM
		C92	54.49	-24.70	-16.96					
17RXYJ		C91	53.40	-24.36	-16.90	0.91	-0.07	-0.14	0.92	MV
		C92	54.30	-24.43	-17.04					
1GZ54Z		C91	53.55	-24.56	-16.36	0.90	-0.11	-0.12	0.91	MM
		C92	54.45	-24.67	-16.47					
1MZW2V		C91	53.41	-24.26	-16.57	0.91	-0.07	-0.11	0.92	XO
		C92	54.32	-24.33	-16.68					
1ZDPXG		C91	53.62	-24.60	-16.76	0.92	-0.10	-0.15	0.93	AJ
		C92	54.54	-24.70	-16.91					
21F67X		C91	53.41	-24.06	-16.85	0.90	-0.09	-0.14	0.91	HH
		C92	54.31	-24.15	-16.99					
23PR6D		C91	53.38	-24.61	-16.73	0.90	-0.11	-0.16	0.92	AJ
		C92	54.27	-24.71	-16.89					
2QVA46		C91	53.42	-24.73	-16.50	0.90	-0.08	-0.16	0.92	AM
		C92	54.32	-24.81	-16.65					
2VDWF		C91	53.38	-23.93	-16.64	0.90	-0.06	-0.14	0.91	MG
		C92	54.27	-23.99	-16.78					
2WFLZL		C91	53.42	-23.83	-16.43	0.92	-0.08	-0.14	0.93	GD
		C92	54.34	-23.91	-16.56					
2Y28E2	X	C91	96.04	2.21	-10.95	0.00	-0.04	0.12	0.12	AG
		C92	96.04	2.17	-10.83					
362SQY		C91	53.44	-25.06	-16.30	0.92	-0.10	-0.13	0.93	AM
		C92	54.36	-25.15	-16.42					
3G4GUZ		C91	53.53	-24.53	-16.85	0.92	-0.09	-0.14	0.93	HP
		C92	54.44	-24.62	-16.99					
3MULDA		C91	53.41	-24.31	-16.67	0.88	-0.08	-0.15	0.90	XP
		C92	54.29	-24.39	-16.82					

Interlaboratory Testing Program for Color & Appearance

Analysis 409

Color and Color Difference - Paint Chips - Sphere Geometry Instruments
 CIE L*a*b* Color Space - Illuminant D65 - CIE 1964 (10 Degree) Observer

WebCode	Flag	Samples	CIE L* a* b* Color Values			Color Difference Values				InstrCode
			L*	a*	b*	ΔL^*	Δa^*	Δb^*	ΔE^*	
3US91F		C91	53.15	-24.52	-16.70	1.14	-0.07	-0.13	1.14	MM
		C92	54.28	-24.59	-16.83					
3VN4ZR		C91	53.58	-24.16	-16.73	0.90	-0.15	-0.14	0.92	XO
		C92	54.48	-24.30	-16.86					
3VQNFL		C91	53.22	-24.93	-16.41	0.90	-0.07	-0.15	0.91	MV
		C92	54.11	-24.99	-16.56					
4BC2UD		C91	53.40	-24.85	-16.26	0.91	-0.09	-0.15	0.92	PE
		C92	54.31	-24.94	-16.41					
4ENGGH	X	C91	52.76	-23.64	-16.13	0.91	-0.07	-0.13	0.92	GH
		C92	53.67	-23.71	-16.26					
4LBVRJ	X	C91	54.70	-25.25	-16.09	0.92	-0.11	-0.12	0.93	AQ
		C92	55.61	-25.36	-16.21					
4RHPL		C91	53.46	-24.63	-16.62	0.90	-0.11	-0.14	0.92	AM
		C92	54.36	-24.73	-16.76					
4VFA8B		C91	53.50	-24.15	-16.62	0.86	-0.13	-0.13	0.88	XO
		C92	54.36	-24.28	-16.75					
5AXQH7		C91	53.53	-24.50	-16.70	0.86	-0.10	-0.20	0.89	HF
		C92	54.39	-24.59	-16.90					
5WQCW		C91	53.37	-23.80	-16.54	0.91	-0.08	-0.15	0.92	GD
		C92	54.28	-23.88	-16.69					
67ZLNS		C91	53.18	-24.41	-16.76	0.93	-0.11	-0.16	0.94	MI
		C92	54.11	-24.52	-16.92					
6QQP3E	X	C91	52.86	-23.70	-15.82	0.91	-0.11	-0.15	0.93	GH
		C92	53.77	-23.81	-15.97					
71RLMM		C91	53.45	-24.73	-16.15	0.91	-0.05	-0.15	0.92	HP
		C92	54.36	-24.78	-16.30					
7B93FT		C91	53.37	-24.03	-16.78	0.97	-0.08	-0.19	0.99	XL
		C92	54.33	-24.11	-16.96					

Interlaboratory Testing Program for Color & Appearance

Analysis 409

Color and Color Difference - Paint Chips - Sphere Geometry Instruments
 CIE L*a*b* Color Space - Illuminant D65 - CIE 1964 (10 Degree) Observer

WebCode	Flag	Samples	CIE L* a* b* Color Values			Color Difference Values				InstrCode
			L*	a*	b*	ΔL^*	Δa^*	Δb^*	ΔE^*	
7BR3L4		C91	53.52	-24.65	-16.59	0.94	-0.11	-0.17	0.96	AM
		C92	54.46	-24.75	-16.76					
7LK6XD		C91	53.72	-24.80	-16.91	0.91	-0.07	-0.15	0.92	AJ
		C92	54.63	-24.87	-17.06					
7S3G5M		C91	53.64	-24.73	-16.57	0.89	-0.10	-0.15	0.90	AJ
		C92	54.52	-24.83	-16.72					
7XFEH2		C91	53.47	-24.38	-16.59	0.90	-0.07	-0.16	0.91	HP
		C92	54.36	-24.45	-16.75					
96XKMJ		C91	53.54	-24.64	-16.79	0.90	-0.10	-0.15	0.92	AM
		C92	54.44	-24.74	-16.93					
9THGG1	X	C91	54.31	-25.27	-17.09	0.95	-0.10	-0.16	0.96	AP
		C92	55.26	-25.37	-17.25					
A4GXZW		C91	53.36	-24.72	-16.16	0.88	-0.13	-0.18	0.90	HX
		C92	54.24	-24.85	-16.34					
A6J1LR		C91	53.32	-24.35	-16.38	0.92	-0.12	-0.15	0.94	MM
		C92	54.24	-24.47	-16.53					
AA4NMR		C91	53.33	-24.47	-16.45	0.90	-0.09	-0.15	0.91	MK
		C92	54.23	-24.56	-16.60					
AFK1SY		C91	53.42	-24.57	-16.71	0.90	-0.12	-0.16	0.92	AJ
		C92	54.31	-24.68	-16.86					
AP7VVU	X	C91	96.13	1.89	-10.69	-0.02	-0.14	0.25	0.28	AJ
		C92	96.11	1.76	-10.44					
APXGNJ		C91	53.51	-24.83	-16.04	0.90	-0.06	-0.14	0.91	MK
		C92	54.41	-24.88	-16.18					
AQKHEU		C91	53.53	-24.71	-16.64	0.90	-0.04	-0.13	0.91	AJ
		C92	54.43	-24.75	-16.77					
ARYZFE		C91	53.77	-24.07	-16.30	0.93	-0.09	-0.14	0.94	MJ
		C92	54.70	-24.15	-16.44					

Interlaboratory Testing Program for Color & Appearance

Analysis 409

Color and Color Difference - Paint Chips - Sphere Geometry Instruments
 CIE L*a*b* Color Space - Illuminant D65 - CIE 1964 (10 Degree) Observer

WebCode	Flag	Samples	CIE L* a* b* Color Values			Color Difference Values				InstrCode
			L*	a*	b*	ΔL^*	Δa^*	Δb^*	ΔE^*	
B42LH4		C91	53.31	-24.33	-16.55	0.88	-0.08	-0.14	0.89	MK
		C92	54.19	-24.41	-16.69					
B8VW2G		C91	53.66	-24.13	-16.34	0.89	-0.13	-0.16	0.91	MJ
		C92	54.55	-24.26	-16.50					
BAPPBS		C91	53.38	-24.25	-16.67	0.90	-0.07	-0.11	0.91	MK
		C92	54.27	-24.32	-16.78					
BCL5GG		C91	53.38	-24.47	-16.50	0.89	-0.07	-0.15	0.90	MM
		C92	54.27	-24.55	-16.65					
BR8JNQ		C91	53.53	-24.59	-16.51	0.90	-0.10	-0.16	0.92	AJ
		C92	54.43	-24.69	-16.67					
BRNYLY		C91	53.51	-24.62	-16.49	0.90	-0.11	-0.16	0.92	MV
		C92	54.40	-24.73	-16.65					
BU4AHE		C91	53.57	-24.61	-16.65	0.91	-0.08	-0.16	0.93	AJ
		C92	54.48	-24.68	-16.81					
BU9P2V		C91	53.69	-24.65	-16.87	0.90	-0.13	-0.17	0.92	AM
		C92	54.59	-24.77	-17.04					
BVFX2E		C91	53.25	-24.59	-16.56	0.91	-0.13	-0.15	0.93	XI
		C92	54.16	-24.72	-16.71					
C57K2B		C91	53.45	-24.32	-16.17	0.91	-0.08	-0.13	0.92	MM
		C92	54.36	-24.40	-16.30					
CHB2GS		C91	53.76	-24.73	-16.73	0.90	-0.10	-0.15	0.92	AJ
		C92	54.66	-24.82	-16.88					
CLWVPD		C91	53.46	-24.33	-16.62	0.82	-0.01	-0.11	0.83	HW
		C92	54.28	-24.34	-16.73					
CZA1LL		C91	53.44	-24.09	-16.54	0.91	-0.13	-0.11	0.93	AD
		C92	54.35	-24.22	-16.65					
D2UFM1	X	C91	53.72	-24.42	-15.91	0.91	-0.07	-0.14	0.92	MJ
		C92	54.62	-24.50	-16.05					

Interlaboratory Testing Program for Color & Appearance

Analysis 409

Color and Color Difference - Paint Chips - Sphere Geometry Instruments
 CIE L*a*b* Color Space - Illuminant D65 - CIE 1964 (10 Degree) Observer

WebCode	Flag	Samples	CIE L* a* b* Color Values			Color Difference Values				InstrCode
			L*	a*	b*	ΔL^*	Δa^*	Δb^*	ΔE^*	
D465XQ	X	C91	53.61	-23.87	-15.94	0.92	-0.11	-0.13	0.93	MJ
		C92	54.52	-23.97	-16.08					
DCDRWS		C91	53.44	-24.06	-16.73	0.92	-0.14	-0.15	0.94	MZ
	C92	54.35	-24.20	-16.88						
DCLUZX		C91	53.46	-24.85	-16.60	0.90	-0.07	-0.11	0.90	AJ
	C92	54.35	-24.92	-16.71						
DVESUJ		C91	53.38	-24.47	-16.71	0.89	-0.13	-0.16	0.91	HP
	C92	54.26	-24.60	-16.86						
E6REHA		C91	53.60	-24.72	-16.59	0.91	-0.13	-0.16	0.93	AJ
	C92	54.51	-24.85	-16.74						
ELHFV8		C91	53.32	-24.63	-16.51	0.91	-0.08	-0.22	0.94	AJ
	C92	54.23	-24.70	-16.72						
EV9UYE		C91	53.38	-24.68	-16.44	0.90	-0.11	-0.16	0.92	AL
	C92	54.27	-24.79	-16.60						
F27NNZ		C91	53.19	-24.41	-16.78	0.96	-0.16	-0.19	0.99	XQ
	C92	54.14	-24.57	-16.96						
F2SWPA		C91	53.51	-24.81	-16.51	0.89	-0.09	-0.15	0.91	MX
	C92	54.40	-24.89	-16.66						
F7EER6		C91	53.47	-24.76	-16.46	0.90	-0.09	-0.14	0.91	MV
	C92	54.37	-24.85	-16.60						
FRQ444		C91	53.15	-24.36	-16.41	0.90	-0.09	-0.15	0.91	HW
	C92	54.04	-24.45	-16.56						
FY4KP5		C91	53.05	-24.90	-16.75	0.90	-0.05	-0.15	0.91	CA
	C92	53.95	-24.95	-16.90						
FZJBPU	X	C91	49.08	-29.00	-18.21	1.04	0.11	-0.10	1.05	MV
		C92	50.12	-28.90	-18.31					
GJASRK		C91	53.43	-24.50	-16.48	0.90	-0.10	-0.13	0.92	HP
	C92	54.33	-24.60	-16.61						

Interlaboratory Testing Program for Color & Appearance

Analysis 409

Color and Color Difference - Paint Chips - Sphere Geometry Instruments
 CIE L*a*b* Color Space - Illuminant D65 - CIE 1964 (10 Degree) Observer

WebCode	Flag	Samples	CIE L* a* b* Color Values			Color Difference Values				InstrCode
			L*	a*	b*	ΔL^*	Δa^*	Δb^*	ΔE^*	
GJQ46M		C91	53.31	-24.53	-16.68	0.91	-0.07	-0.15	0.92	MM
		C92	54.22	-24.60	-16.83					
GTACPP		C91	53.49	-24.73	-16.77	0.89	-0.11	-0.17	0.91	AM
		C92	54.38	-24.84	-16.94					
HQM1QJ		C91	53.54	-24.77	-16.60	0.86	-0.04	-0.18	0.88	HG
		C92	54.40	-24.81	-16.78					
HTHHHY		C91	53.26	-24.37	-16.69	0.89	-0.05	-0.15	0.91	MM
		C92	54.15	-24.43	-16.84					
HY4MXE		C91	53.44	-24.76	-16.42	0.92	-0.09	-0.22	0.95	AJ
		C92	54.36	-24.84	-16.64					
J3K9BK		C91	53.52	-24.63	-16.64	0.90	-0.03	-0.14	0.91	AJ
		C92	54.42	-24.66	-16.78					
JD3R4R		C91	53.33	-24.81	-16.58	0.92	-0.05	-0.16	0.93	XI
		C92	54.25	-24.85	-16.74					
JL1EY3		C91	53.19	-24.16	-16.91	0.90	-0.06	-0.13	0.91	MM
		C92	54.09	-24.22	-17.04					
K3AV59		C91	53.45	-24.52	-16.76	0.89	-0.09	-0.17	0.90	GG
		C92	54.33	-24.61	-16.93					
K81MHS		C91	53.61	-24.90	-16.50	0.90	-0.10	-0.15	0.92	AJ
		C92	54.51	-25.00	-16.64					
K8Q36F	X	C91	52.89	-24.19	-16.41	0.97	-0.06	-0.13	0.98	MI
		C92	53.85	-24.25	-16.54					
KRU8TN		C91	53.60	-24.89	-16.50	0.91	-0.12	-0.16	0.93	AM
		C92	54.51	-25.00	-16.65					
KUREXM		C91	53.30	-24.75	-16.45	0.85	-0.10	-0.15	0.87	SH
		C92	54.15	-24.85	-16.60					
M81SEA		C91	53.61	-24.42	-16.37	0.88	-0.09	-0.13	0.89	HP
		C92	54.49	-24.51	-16.49					

Interlaboratory Testing Program for Color & Appearance

Analysis 409

Color and Color Difference - Paint Chips - Sphere Geometry Instruments
 CIE L*a*b* Color Space - Illuminant D65 - CIE 1964 (10 Degree) Observer

WebCode	Flag	Samples	CIE L* a* b* Color Values			Color Difference Values				InstrCode
			L*	a*	b*	ΔL^*	Δa^*	Δb^*	ΔE^*	
M8LD5F		C91	53.52	-24.82	-16.16	0.92	-0.08	-0.16	0.94	MV
		C92	54.44	-24.90	-16.31					
MGYU12		C91	53.59	-24.68	-16.64	0.91	-0.09	-0.16	0.92	AJ
		C92	54.50	-24.77	-16.80					
MNCFGD		C91	53.55	-25.05	-16.80	0.95	0.00	-0.15	0.96	CA
		C92	54.50	-25.05	-16.95					
MPW5VS		C91	53.52	-24.53	-16.91	0.91	-0.07	-0.17	0.93	AJ
		C92	54.43	-24.60	-17.08					
MRKGU		C91	53.49	-24.32	-16.56	0.89	-0.08	-0.15	0.91	MM
		C92	54.38	-24.40	-16.71					
MRR5CH		C91	53.54	-24.90	-16.36	0.89	-0.16	-0.16	0.92	AJ
		C92	54.43	-25.06	-16.52					
MSCGS8		C91	53.30	-24.45	-16.80	0.84	-0.01	-0.09	0.84	AJ
		C92	54.14	-24.46	-16.89					
MWAVE		C91	53.31	-24.40	-16.67	0.91	-0.10	-0.14	0.92	MM
		C92	54.22	-24.50	-16.81					
N1CPC8		C91	53.61	-24.72	-16.47	0.91	-0.08	-0.15	0.92	AM
		C92	54.51	-24.80	-16.61					
N9YU3K		C91	53.61	-24.75	-16.44	0.91	-0.07	-0.18	0.93	AM
		C92	54.52	-24.82	-16.62					
NHR5F1		C91	53.59	-24.72	-16.68	0.91	-0.13	-0.14	0.93	AJ
		C92	54.50	-24.85	-16.82					
NKH5CB X		C91	53.60	-25.15	-15.93	0.88	-0.10	-0.12	0.89	HG
		C92	54.48	-25.25	-16.05					
NT9M88		C91	53.62	-24.75	-16.59	0.91	-0.05	-0.13	0.92	AO
		C92	54.52	-24.80	-16.72					
P5E489		C91	53.39	-24.50	-16.54	0.92	-0.07	-0.10	0.93	MK
		C92	54.32	-24.57	-16.65					

Interlaboratory Testing Program for Color & Appearance

Analysis 409

Color and Color Difference - Paint Chips - Sphere Geometry Instruments
 CIE L*a*b* Color Space - Illuminant D65 - CIE 1964 (10 Degree) Observer

WebCode	Flag	Samples	CIE L* a* b* Color Values			Color Difference Values				InstrCode
			L*	a*	b*	ΔL^*	Δa^*	Δb^*	ΔE^*	
P6T2HF		C91	53.52	-24.85	-16.32	0.90	-0.11	-0.17	0.92	MV
		C92	54.42	-24.96	-16.49					
PK6MNR		C91	53.11	-24.08	-16.42	0.88	-0.10	-0.19	0.91	MG
		C92	54.00	-24.17	-16.61					
PQ4F67		C91	53.35	-24.53	-16.44	0.89	-0.07	-0.16	0.91	MM
		C92	54.24	-24.60	-16.59					
PQPY77		C91	53.52	-24.67	-16.77	0.91	-0.08	-0.16	0.92	AJ
		C92	54.43	-24.75	-16.92					
PWMVNJ		C91	53.35	-24.10	-17.01	0.92	-0.01	-0.09	0.92	HW
		C92	54.27	-24.11	-17.09					
PXARWD		C91	53.62	-24.08	-16.45	0.91	-0.09	-0.15	0.93	MJ
		C92	54.53	-24.16	-16.60					
Q43HLT		C91	53.65	-24.72	-16.63	0.90	-0.11	-0.16	0.92	AJ
		C92	54.55	-24.82	-16.79					
Q8BFKU		C91	53.33	-24.50	-16.45	0.89	-0.07	-0.14	0.90	MM
		C92	54.22	-24.56	-16.59					
QRVRK7		C91	53.56	-24.55	-16.83	0.90	-0.10	-0.14	0.91	AM
		C92	54.45	-24.64	-16.97					
R19PVX		C91	53.35	-24.37	-16.67	0.94	-0.16	-0.13	0.96	HF
		C92	54.28	-24.53	-16.80					
RD58EF		C91	53.57	-24.47	-16.73	0.89	-0.07	-0.15	0.90	AJ
		C92	54.46	-24.54	-16.88					
RQR73R		C91	53.60	-24.55	-16.73	0.93	-0.09	-0.13	0.94	AO
		C92	54.52	-24.64	-16.86					
S7BRD9		C91	53.42	-24.41	-16.64	0.94	-0.07	-0.09	0.95	MK
		C92	54.36	-24.48	-16.72					
T3Z3FY	X	C91	53.25	-23.93	-16.67	0.72	0.04	-0.46	0.86	GD
		C92	53.97	-23.90	-17.13					

Interlaboratory Testing Program for Color & Appearance

Analysis 409

Color and Color Difference - Paint Chips - Sphere Geometry Instruments
 CIE L*a*b* Color Space - Illuminant D65 - CIE 1964 (10 Degree) Observer

WebCode	Flag	Samples	CIE L* a* b* Color Values			Color Difference Values				InstrCode
			L*	a*	b*	ΔL^*	Δa^*	Δb^*	ΔE^*	
TBSDSE		C91	53.77	-25.02	-16.08	0.92	-0.06	-0.17	0.94	MV
		C92	54.69	-25.07	-16.25					
TFEWJQ		C91	53.31	-24.42	-16.73	0.93	-0.07	-0.04	0.93	MK
		C92	54.24	-24.49	-16.77					
U1X9MD		C91	53.43	-24.44	-16.61	0.92	-0.10	-0.13	0.93	MI
		C92	54.35	-24.54	-16.74					
UJHR3T		C91	53.53	-24.58	-16.79	0.90	-0.14	-0.15	0.92	AO
		C92	54.43	-24.72	-16.94					
V3QAUE		C91	53.35	-24.51	-16.73	0.86	-0.09	-0.14	0.87	AP
		C92	54.21	-24.60	-16.87					
VVLLP2		C91	53.52	-24.46	-16.83	0.92	-0.07	-0.12	0.92	AJ
		C92	54.43	-24.53	-16.95					
VXUKA		C91	53.53	-24.58	-16.58	0.91	-0.09	-0.14	0.92	AO
		C92	54.43	-24.67	-16.72					
W8NETJ		C91	53.33	-24.00	-16.88	0.93	-0.06	-0.13	0.94	XO
		C92	54.26	-24.06	-17.01					
WL2FKB		C91	53.27	-24.52	-16.69	0.89	-0.17	-0.17	0.92	MM
		C92	54.15	-24.68	-16.85					
WLLRM		C91	53.38	-24.46	-16.63	0.90	-0.08	-0.14	0.91	MM
		C92	54.28	-24.53	-16.76					
WPCMP		C91	53.54	-24.11	-16.75	0.87	-0.11	-0.17	0.89	HW
		C92	54.41	-24.21	-16.92					
WPH3XG		C91	53.47	-24.28	-16.61	0.93	-0.10	-0.15	0.94	XR
		C92	54.40	-24.38	-16.76					
X339UM		C91	53.53	-24.66	-16.65	0.85	-0.04	-0.19	0.87	MT
		C92	54.38	-24.70	-16.84					
XR1GZW X		C91	52.95	-25.12	-16.72	0.94	-0.01	-0.10	0.95	EE
		C92	53.89	-25.13	-16.82					

Interlaboratory Testing Program for Color & Appearance

Analysis 409

Color and Color Difference - Paint Chips - Sphere Geometry Instruments
 CIE L*a*b* Color Space - Illuminant D65 - CIE 1964 (10 Degree) Observer

WebCode	Flag	Samples	CIE L* a* b* Color Values			Color Difference Values				InstrCode
			L*	a*	b*	ΔL^*	Δa^*	Δb^*	ΔE^*	
XYS11X		C91	53.31	-24.50	-16.59	0.92	-0.05	-0.15	0.93	MM
		C92	54.23	-24.55	-16.73					
Y232Z3		C91	53.54	-24.46	-16.53	0.91	-0.06	-0.15	0.92	AM
		C92	54.45	-24.52	-16.67					
YQS6YR		C91	53.49	-24.52	-16.25	0.94	-0.12	-0.13	0.96	GF
		C92	54.43	-24.64	-16.38					
YTCTZR		C91	53.48	-24.47	-16.61	0.88	-0.12	-0.16	0.90	AJ
		C92	54.36	-24.59	-16.77					
YYEQ1X		C91	53.42	-23.67	-16.67	0.89	-0.06	-0.12	0.89	AO
		C92	54.30	-23.73	-16.78					
Z3XCYH		C91	53.61	-24.78	-16.42	0.91	-0.06	-0.14	0.92	MV
		C92	54.52	-24.84	-16.56					
Z4QCWT		C91	53.53	-24.51	-16.84	0.92	-0.09	-0.13	0.93	HP
		C92	54.45	-24.60	-16.97					
ZFSSZ4		C91	53.63	-24.76	-16.71	0.92	-0.08	-0.16	0.94	AO
		C92	54.55	-24.83	-16.87					
ZLBT2A		C91	53.54	-24.64	-16.56	0.90	-0.14	-0.16	0.92	AM
		C92	54.44	-24.77	-16.72					
ZV9B4S		C91	53.32	-24.02	-16.52	0.92	-0.08	-0.15	0.93	XU
		C92	54.23	-24.10	-16.67					
ZZQQXS		C91	53.58	-24.82	-16.65	0.91	-0.12	-0.15	0.93	AJ
		C92	54.49	-24.94	-16.80					

Interlaboratory Testing Program for Color & Appearance

Analysis 409

Color and Color Difference - Paint Chips - Sphere Geometry Instruments
 CIE L*a*b* Color Space - Illuminant D65 - CIE 1964 (10 Degree) Observer

Summary Statistics

Samples	L*	a*	b*	ΔL^*	Δa^*	Δb^*	ΔE^*
Grand Means							
C91	53.47	-24.50	-16.58				
C92	54.37	-24.59	-16.73	0.90	-0.09	-0.15	0.92
Std Dev Btwn Labs							
C91	0.14	0.31	0.20				
C92	0.14	0.31	0.20	0.03	0.03	0.02	0.03
Statistics based on 124 of 137 reporting participants							

Comments assigned on Data Flags for Test #409

2Y28E2(X) - Apparently measured back of the samples.

4ENGGH(X) - High "a*" values and low "L*" values.

4LBVRJ(X) - High "L*" values.

6QQP3E(X) - High "b*" values and low "L*" values.

9THGG1(X) - High "L*" values.

AP7VVU(X) - Apparently measured back of the samples.

D2UFM1(X) - High "b*" values.

D465XQ(X) - High "b*" values.

FZJBPU(X) - All values are low.

K8Q36F(X) - Low "L*" values.

NKH5CB(X) - High "b*" values.

T3Z3FY(X) - Low "L*" values for Sample C92. Large replication difference for all value on Sample C92.

XR1GZW(X) - Low "L*" values.

Interlaboratory Testing Program for Color & Appearance

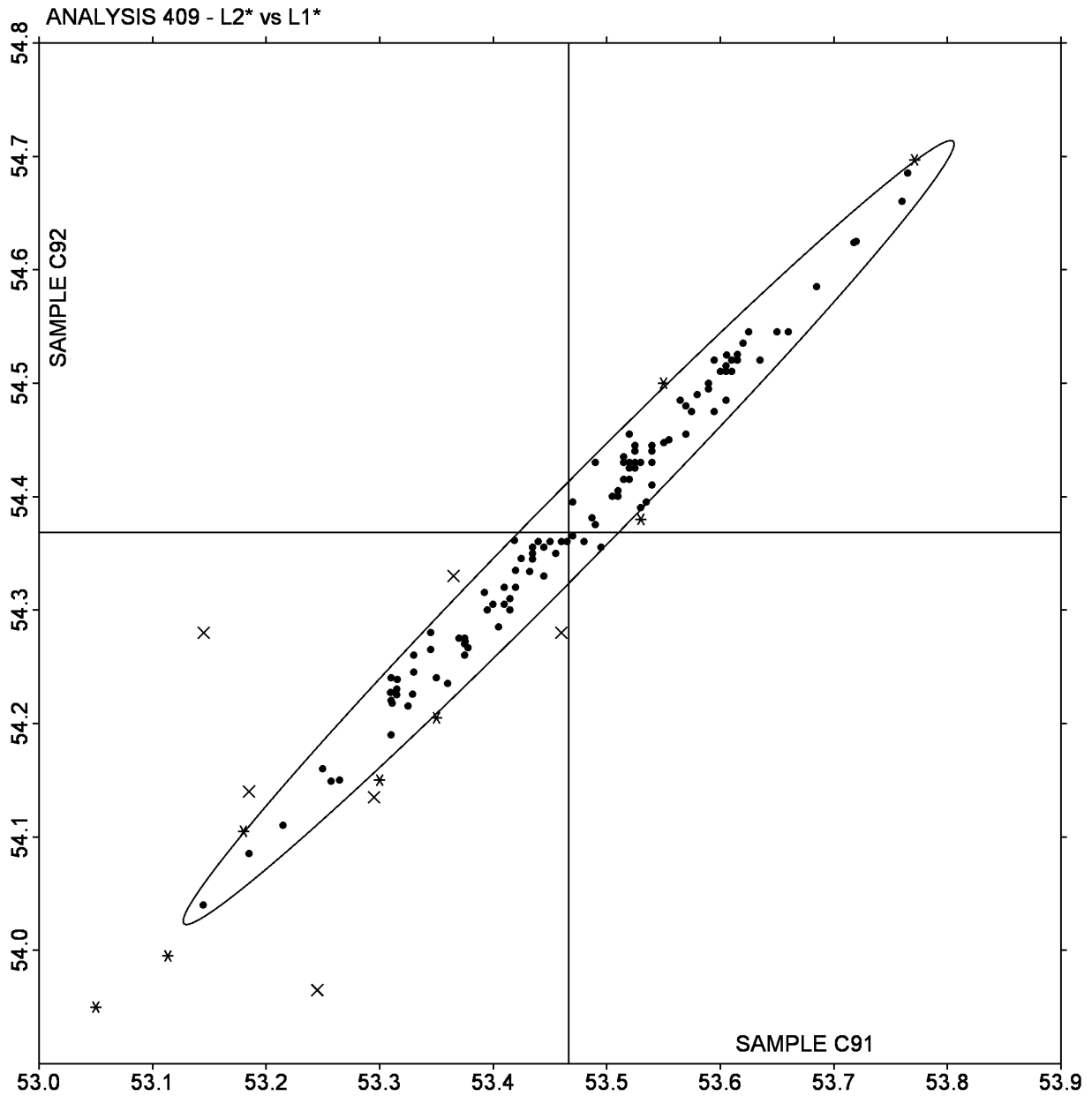
Analysis 409

Color and Color Difference - Paint Chips - Sphere Geometry Instruments
CIE L*a*b* Color Space - Illuminant D65 - CIE 1964 (10 Degree) Observer

L2* vs L1*

SAMPLE C91 = 53.47

SAMPLE C92 = 54.37



Interlaboratory Testing Program for Color & Appearance

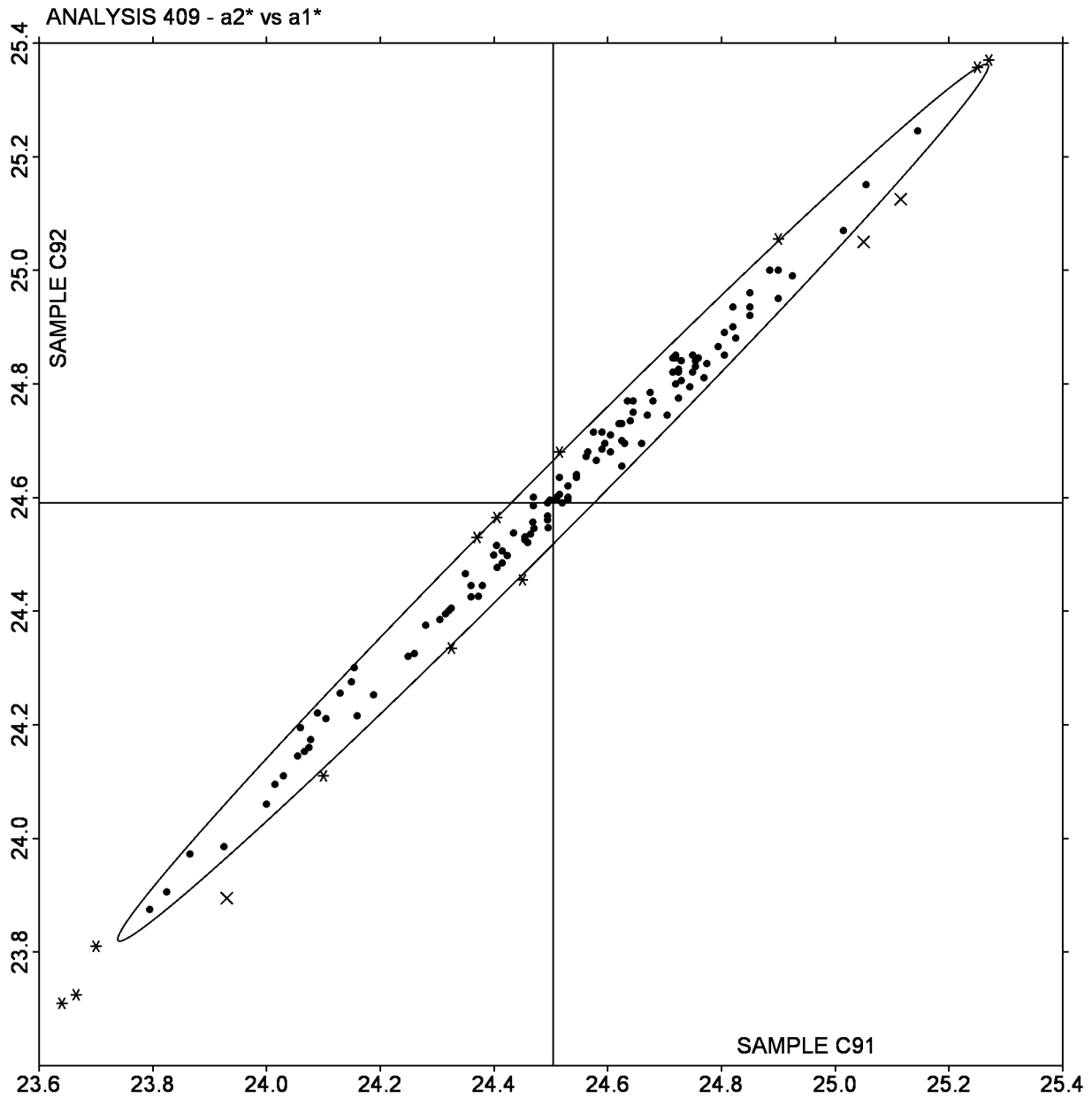
Analysis 409

Color and Color Difference - Paint Chips - Sphere Geometry Instruments
CIE L*a*b* Color Space - Illuminant D65 - CIE 1964 (10 Degree) Observer

a2* vs a1*

SAMPLE C91 = -24.50

SAMPLE C92 = -24.59



Plot created using absolute values.

Interlaboratory Testing Program for Color & Appearance

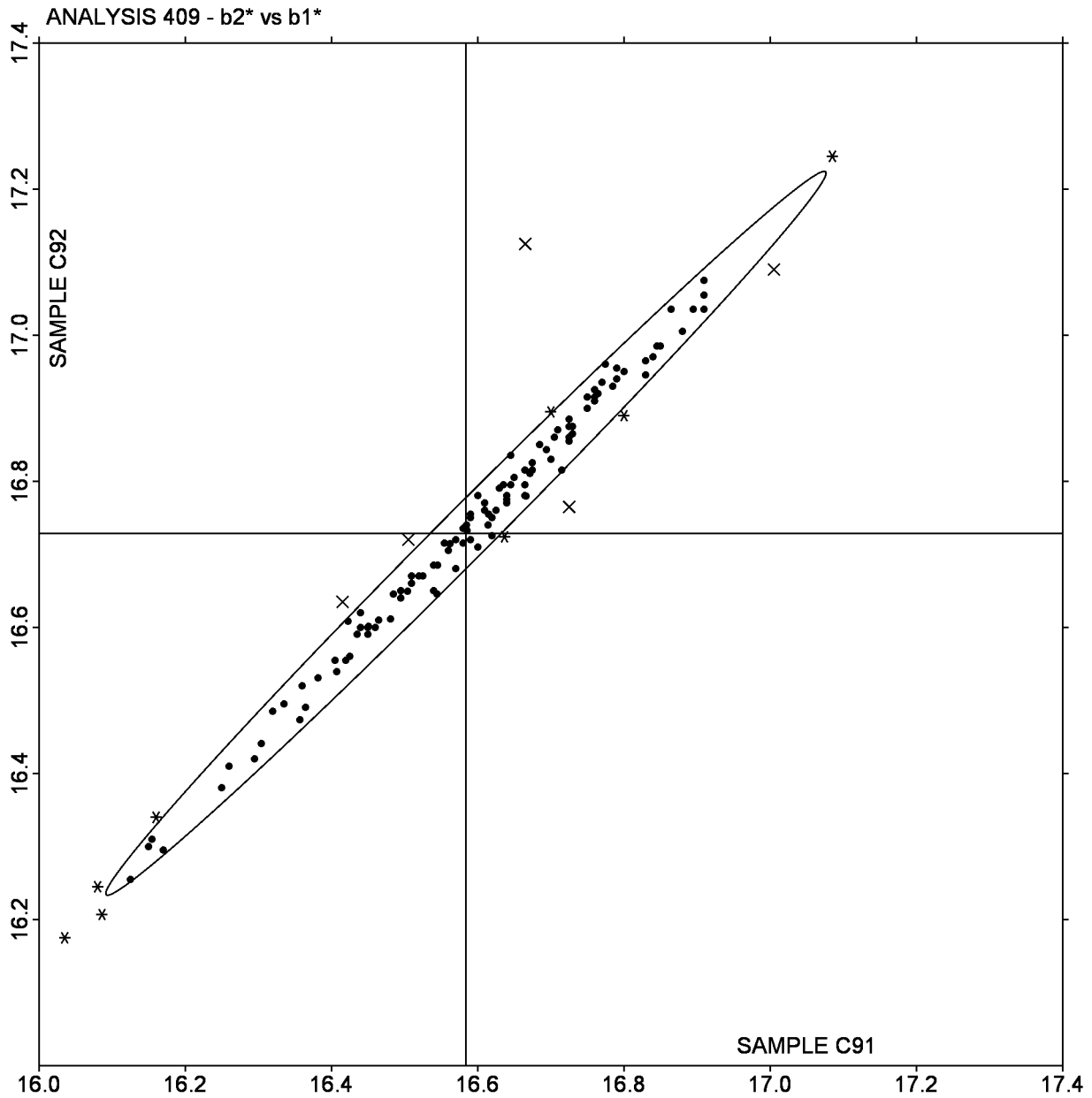
Analysis 409

Color and Color Difference - Paint Chips - Sphere Geometry Instruments
CIE L*a*b* Color Space - Illuminant D65 - CIE 1964 (10 Degree) Observer

b2* vs b1*

SAMPLE C91 = -16.58

SAMPLE C92 = -16.73



Plot created using absolute values.

Instrument Code List - Report# 149

Instrument information as provided by laboratories

<u>Analysis</u>	<u>Analysis Name</u>
408	<u>Color & Color Difference (Paint Chips) - 45-0</u>

Instrument code and description

AE	ACS Chroma-Sensor CS-3
GA	BYK-Gardner Color Guide (45/0)
GD	BYK-Gardner The Color Machine
GE	BYK-Gardner spectro-guide (45/0)
GH	BYK-Gardner Color-View
GQ	Gretag SpectroMat
GU	Gretag Spectrolino Spectrophotometer
HK	Hunter MiniScan XE (45/0)
HW	Hunter LabScan XE
MG	Macbeth 1500/PLUS or 2025+ Color Eye
MQ	Minolta CM-503c Spectrophotometer
TN	Topcon SR-1 Spectroradiometer
XL	X-Rite MA90
XM	X-Rite MA58 Multi-Angle SpectroPhotometer
XN	X-Rite MA68 Multi-Angle SpectroPhotometer
XO	X-Rite MA68 II Multi-Angle SpectroPhotometer
XP	X-Rite 962 SpectroPhotometer
XR	X-Rite 968 Portable SpectroPhotometer
XT	X-Rite 948 SpectroColorimeter
XU	X-Rite 964 Portable SpectroPhotometer
XV	X-Rite 939 SpectroDensitometer
XX	Instrument make/model not specified by lab

409	<u>Color & Color Difference (Paint Chips) Sphere</u>
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Instrument code and description

AD	ACS Chroma-Sensor CS-5	MJ	Macbeth Color-Eye 3000
AG	ACS-DataColor Intl. Spectraflash 450	MK	Macbeth Color-Eye 7000
AJ	ACS-Datacolor Intl. Spectraflash 600	MM	Macbeth Color-Eye 7000a
AL	ACS-Datacolor Intl. Dataflash 100	MT	Minolta CM-2600d
AM	ACS-Datacolor Intl. Spectraflash 600 Plus	MV	Minolta CM-3000d Series Spectrophotometer
AO	ACS-Datacolor Intl. Spectraflash 650X	MX	Minolta CM-508d Spectrophotometer
AP	DataColor Check Plus	MZ	Minolta CM-2002 Spectrophotometer
AQ	ACS-Datacolor Intl. Spectraflash 600X	PE	Perkin Elmer Spectrophotometer
CA	Cary 5000	SH	SIMADZU UV 3101PC
EE	Datacolor Elrepho 2000	XI	X-Rite Color i7
GD	BYK-Gardner spectro-guide sphere	XL	X-Rite SP60 Portable Sphere Spectrophotometer
GF	BYK-Gardner The Color Sphere (TCS)	XO	X-Rite SP64 Portable Sphere Spectrophotometer
GG	BYK-Gardner TCS II	XP	X-Rite SP88 Portable Sphere Spectrophotometer
GH	BYK Gardner Color-Guide Sphere	XQ	X-Rite SP68 Portable Sphere Spectrophotometer
HF	Hunter ColorFlex Diffuse	XR	X-Rite SP78 Portable Sphere Spectrophotometer
HG	Hunter ColorQUEST	XU	X-Rite Color Premier 8200 Spectrophotometer
HH	Hunter ColorQUEST XE		
HP	Hunter UltraScan PRO		
HW	Hunter UltraScan XE		
HX	Hitachi C-2000S Spectrophotometer		
MG	Macbeth 2180 Color Eye		
MI	Macbeth Color i 5		