



Color & Appearance Testing Program

Summary Report # 147 - 1st Q 2009

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

[Key to Tables and Graphs](#)

<u>Analysis</u>	<u>Analysis Name</u>
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408	Color & Color Difference (Paint Chips) - 45/0
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409	Color & Color Difference (Paint Chips) Sphere
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[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^*	
13Z977		A91	56.35	22.87	21.81	0.81	-0.35	-0.43	0.98	HW
		A92	57.16	22.52	21.38					
1Z98PC		A91	56.25	23.01	21.46	0.73	-0.34	-0.30	0.86	XU
		A92	56.98	22.68	21.17					
2DHJDJ		A91	56.28	23.02	21.55	0.99	-0.36	-0.32	1.10	XO
		A92	57.26	22.66	21.23					
3BQ9GM	X	A91	95.13	0.21	-1.85	0.19	-0.06	-0.03	0.20	XX
		A92	95.31	0.15	-1.88					
3LP7M4		A91	56.29	23.45	21.60	0.80	-0.33	-0.37	0.93	GE
		A92	57.09	23.12	21.24					
4A11MD		A91	56.49	22.94	21.38	0.74	-0.35	-0.30	0.87	XN
		A92	57.23	22.59	21.08					
6YLKAR		A91	56.24	23.16	21.55	0.75	-0.32	-0.30	0.86	XT
		A92	56.99	22.85	21.25					
7QWSJX		A91	56.32	22.95	21.62	0.83	-0.34	-0.30	0.94	HW
		A92	57.15	22.62	21.32					
7Y7WNA	X	A91	95.24	1.32	-8.34	0.09	0.28	-0.72	0.78	XX
		A92	95.33	1.60	-9.06					
8GCC8U		A91	56.28	23.01	21.50	0.79	-0.33	-0.34	0.92	XN
		A92	57.07	22.68	21.16					
A5DDDT	X	A91	56.51	23.44	21.08	0.47	-0.52	-0.53	0.87	GU
		A92	56.98	22.92	20.56					
BDF3MH		A91	56.37	22.91	21.93	0.77	-0.34	-0.35	0.91	HK
		A92	57.13	22.58	21.58					
BW5D2B		A91	56.60	23.17	22.05	0.82	-0.35	-0.34	0.95	HW
		A92	57.42	22.82	21.72					
C96XVH		A91	57.13	23.16	22.00	0.81	-0.21	-0.17	0.85	HW
		A92	57.94	22.95	21.83					

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^*	
DRDM6T		A91	56.30	23.37	21.58	0.78	-0.34	-0.30	0.90	GA
		A92	57.07	23.03	21.28					
E236KW		A91	56.07	22.96	21.35	0.81	-0.32	-0.32	0.93	XV
		A92	56.88	22.64	21.04					
F886S6		A91	56.24	23.07	21.58	0.83	-0.34	-0.32	0.95	XU
		A92	57.07	22.73	21.26					
FCZH79		A91	56.48	23.01	21.53	0.80	-0.33	-0.36	0.94	XO
		A92	57.28	22.69	21.17					
GDNVA7		A91	56.27	23.30	21.53	0.82	-0.36	-0.32	0.95	GE
		A92	57.09	22.94	21.22					
H2NPQ8		A91	56.35	23.00	21.53	0.87	-0.33	-0.27	0.97	XO
		A92	57.22	22.68	21.26					
JN77YA	X	A91	57.22	21.47	23.02	0.78	-0.33	-0.34	0.91	HW
		A92	57.99	21.15	22.68					
JVH7WD		A91	55.77	22.93	21.19	0.78	-0.30	-0.35	0.90	MQ
		A92	56.55	22.63	20.85					
K954Y2		A91	56.29	22.81	21.45	0.75	-0.33	-0.35	0.88	GH
		A92	57.03	22.49	21.10					
KXPQU9	X	A91	55.51	23.21	20.83	-0.72	-0.31	-0.29	0.84	GU
		A92	54.79	22.90	20.54					
L3FTGR		A91	56.53	22.89	21.98	0.75	-0.33	-0.30	0.87	HW
		A92	57.28	22.57	21.68					
L5A9E7		A91	56.30	22.88	21.80	0.80	-0.36	-0.33	0.93	HW
		A92	57.10	22.53	21.47					
LJ543T		A91	56.52	22.93	21.78	0.77	-0.33	-0.31	0.89	HW
		A92	57.29	22.61	21.48					
MMP6UZ		A91	56.47	23.03	22.12	0.85	-0.29	-0.38	0.97	MG
		A92	57.32	22.75	21.74					

**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^*	
NSV1LE		A91	56.61	22.82	21.72	0.78	-0.30	-0.31	0.89	GD
		A92	57.39	22.52	21.41					
Q4THQZ		A91	56.55	22.91	22.00	0.72	-0.36	-0.35	0.88	GH
		A92	57.27	22.55	21.66					
RKX4V7		A91	56.17	22.98	21.30	0.75	-0.34	-0.30	0.87	HK
		A92	56.92	22.65	21.01					
SG5VL4		A91	56.53	22.97	21.62	0.80	-0.36	-0.35	0.94	HW
		A92	57.33	22.62	21.27					
TV38N7		A91	56.23	23.17	21.71	0.69	-0.33	-0.33	0.83	XL
		A92	56.91	22.84	21.38					
U2RPVW		A91	56.42	22.97	21.76	0.78	-0.34	-0.34	0.91	HW
		A92	57.20	22.64	21.42					
V5BRM2		A91	56.30	23.00	21.57	0.87	-0.37	-0.37	1.01	XM
		A92	57.17	22.64	21.20					
X548TV		A91	55.75	23.10	21.70	0.95	-0.45	-0.40	1.12	TN
		A92	56.70	22.65	21.30					
X8MLCJ		A91	55.86	22.95	21.24	0.84	-0.32	-0.32	0.95	XR
		A92	56.70	22.63	20.92					
XFFCK6		A91	56.18	22.80	22.03	0.77	-0.35	-0.35	0.91	AE
		A92	56.94	22.46	21.68					
YPDL64		A91	56.29	22.85	21.76	0.77	-0.35	-0.34	0.91	GH
		A92	57.06	22.50	21.42					
ZVTPPQ		A91	56.33	23.15	21.68	0.75	-0.32	-0.32	0.87	XP
		A92	57.08	22.84	21.37					

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							
A91	56.35	23.01	21.62				
A92	57.14	22.68	21.29	0.80	-0.33	-0.33	0.92
Std Dev Btwn Labs							
A91	0.28	0.15	0.27				
A92	0.28	0.16	0.26	0.06	0.03	0.04	0.06

Statistics based on 35 of 40 reporting participants

Comments assigned on Data Flags for Test #408

3BQ9GM(X) - Apparently measured back of the samples.

7Y7WNA(X) - Apparently measured back of the samples.

A5DDDT(X) - High "a*" value for Sample A91 and low "b*" value for Sample A92. Large replication difference for "L*" values.

JN77YA(X) - High "L*" and "b*" values and low "a*" values.

KXPQU9(X) - Low "L*" and "b*" values. Large replication difference for "L" value on Sample A92.

Interlaboratory Testing Program for Color & Appearance

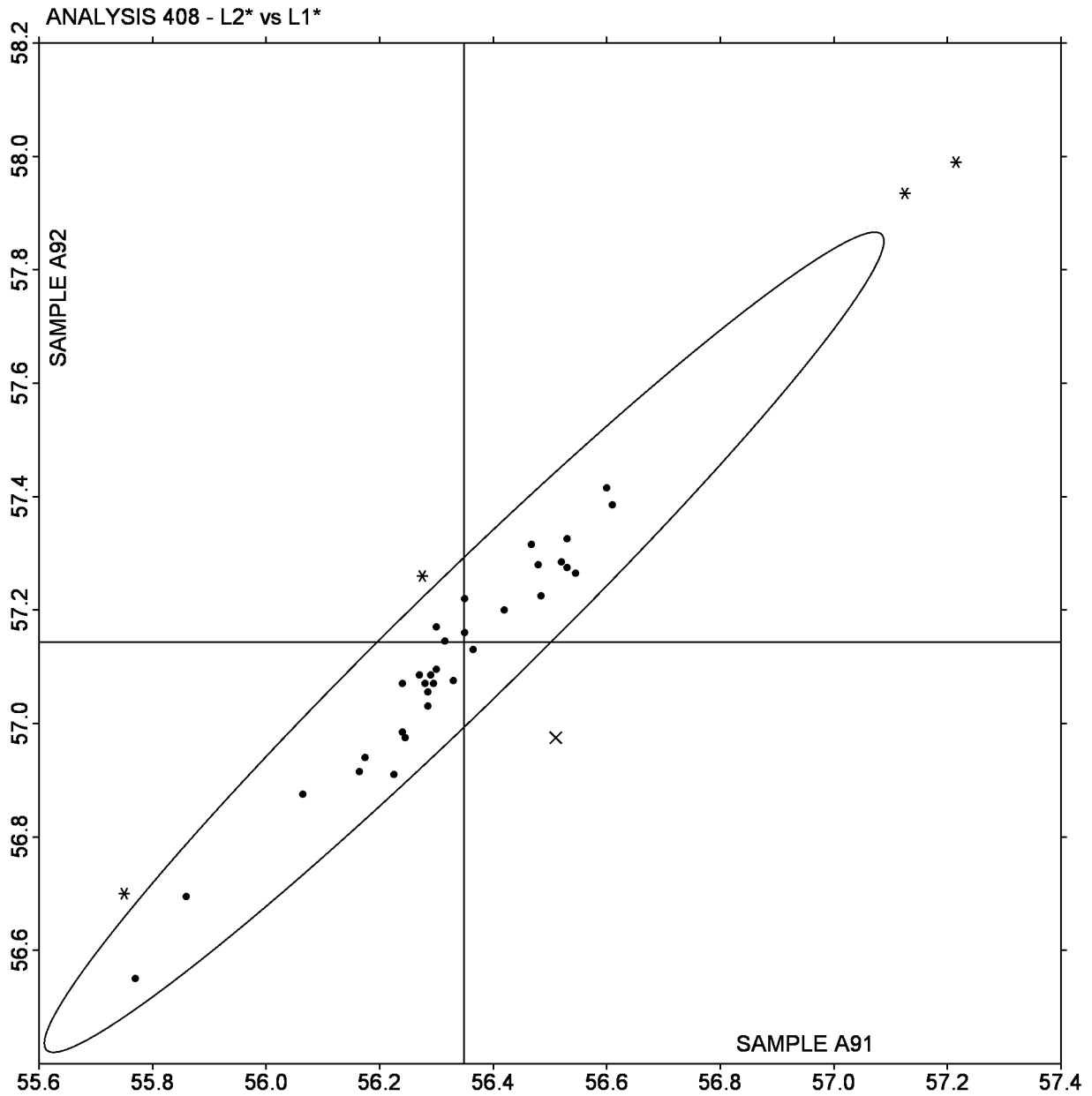
Analysis 408

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 A91 = 56.35

SAMPLE A92 = 57.14



Interlaboratory Testing Program for Color & Appearance

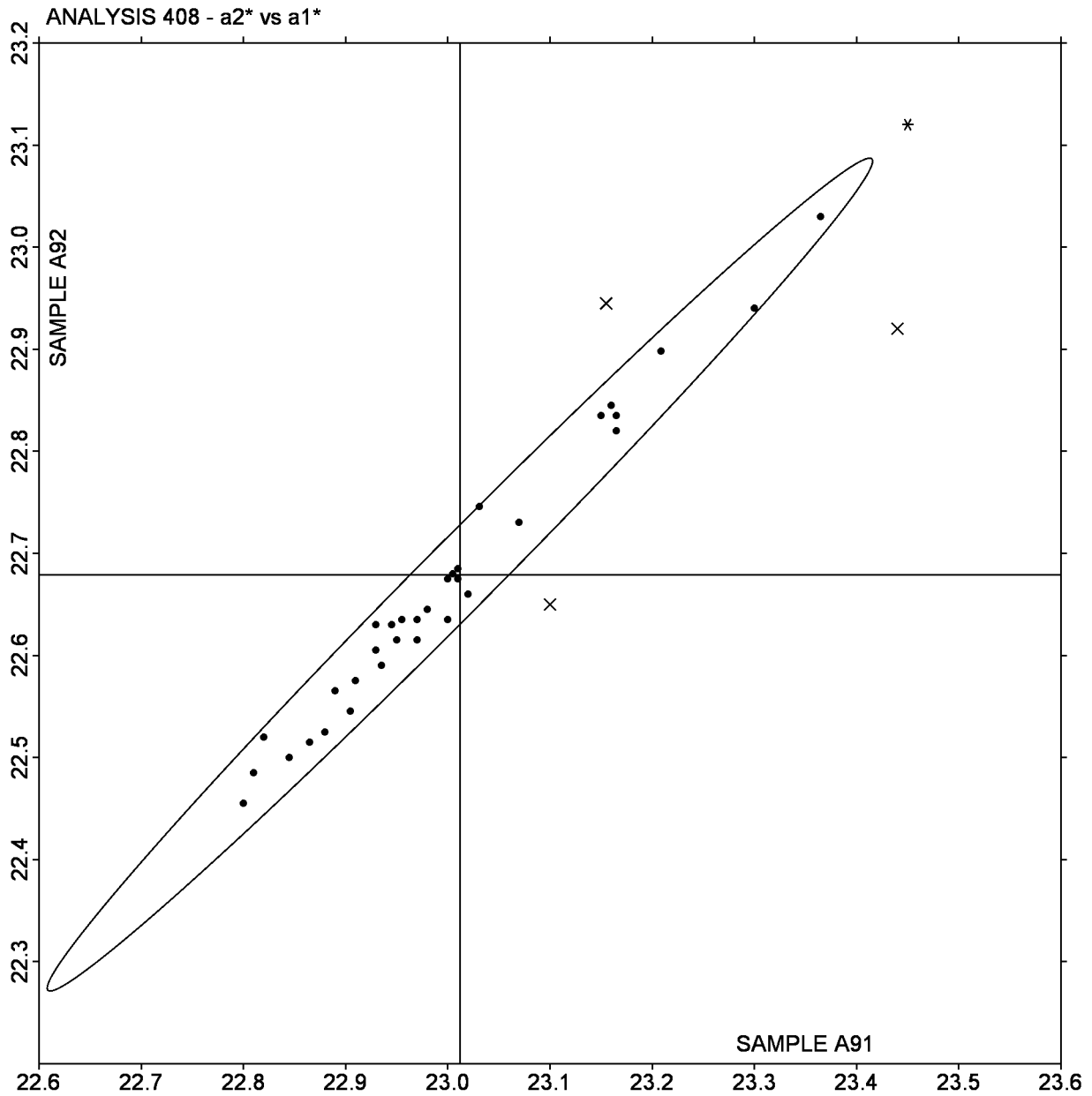
Analysis 408

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 A91 = 23.01

SAMPLE A92 = 22.68



Plot created using absolute values.

Interlaboratory Testing Program for Color & Appearance

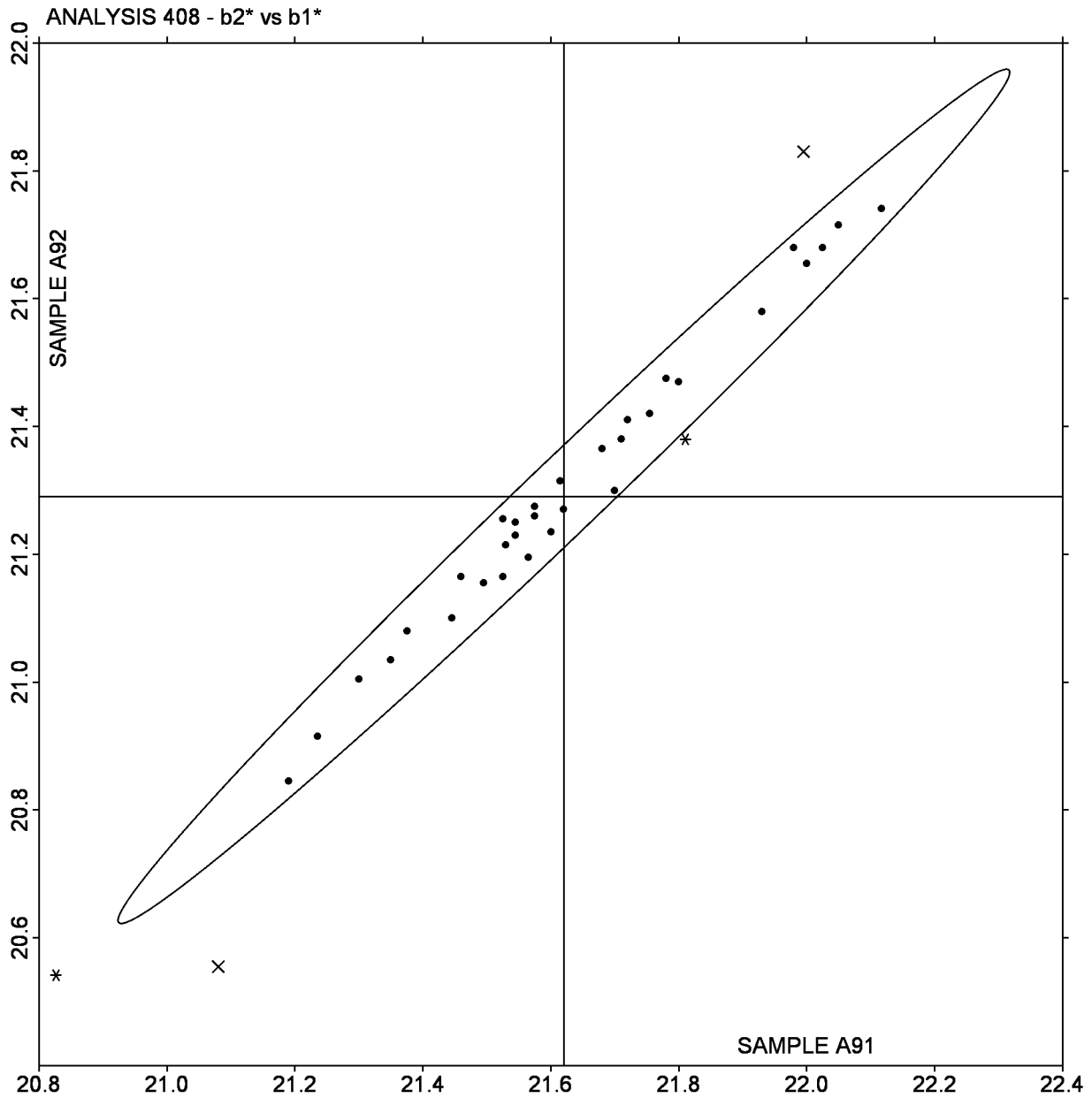
Analysis 408

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 A91 = 21.62

SAMPLE A92 = 21.29



**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^*	
19CQXU		A91	56.59	22.28	20.91	0.76	-0.35	-0.33	0.90	MK
		A92	57.35	21.93	20.58					
1CZ4NQ		A91	56.16	22.33	20.65	0.80	-0.36	-0.34	0.93	MJ
		A92	56.96	21.98	20.32					
1GWPUU	X	A91	96.12	2.31	-11.65	-0.07	-0.14	0.44	0.46	AJ
		A92	96.05	2.17	-11.22					
24KNPN		A91	56.49	22.75	20.23	0.78	-0.40	-0.41	0.96	AJ
		A92	57.26	22.35	19.83					
25WCYS	X	A91	96.01	2.65	-11.84	-0.04	-0.14	0.43	0.45	AG
		A92	95.97	2.51	-11.41					
276HD2		A91	56.03	22.78	20.80	0.81	-0.40	-0.36	0.97	MI
		A92	56.84	22.38	20.44					
2AUBNU	X	A91	59.97	24.69	26.64	0.71	-0.30	-0.37	0.86	MK
		A92	60.68	24.39	26.27					
2EUDYQ		A91	56.26	22.66	20.58	0.80	-0.35	-0.36	0.95	MK
		A92	57.06	22.31	20.23					
2HCZP6		A91	56.45	22.65	21.08	0.72	-0.31	-0.28	0.83	XO
		A92	57.17	22.34	20.81					
2HKP2P		A91	56.24	22.89	20.55	0.87	-0.30	-0.27	0.95	MV
		A92	57.10	22.60	20.28					
35KZ9N		A91	55.97	22.54	20.61	0.79	-0.35	-0.32	0.92	MG
		A92	56.75	22.19	20.30					
449PFV		A91	56.15	22.73	20.53	0.80	-0.36	-0.35	0.94	MK
		A92	56.95	22.37	20.18					
4AB3V5		A91	56.23	22.72	20.55	0.77	-0.31	-0.35	0.90	AM
		A92	57.00	22.41	20.20					
4CET46		A91	56.28	22.78	20.75	0.78	-0.31	-0.31	0.89	MM
		A92	57.06	22.48	20.44					

**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^*	
4CQ9UT		A91	56.73	22.67	21.21	0.78	-0.35	-0.32	0.90	HW
		A92	57.50	22.32	20.90					
4H71ME		A91	56.30	22.67	20.68	0.80	-0.34	-0.34	0.93	AM
		A92	57.10	22.33	20.34					
4JJ1MP		A91	56.15	22.75	20.73	0.85	-0.45	-0.47	1.06	MM
		A92	57.00	22.30	20.26					
4WRJH4		A91	56.19	22.75	20.82	0.80	-0.38	-0.38	0.96	AL
		A92	56.99	22.38	20.44					
5DZPNL	X	A91	56.78	22.57	20.86	0.72	-0.28	-0.22	0.80	HW
		A92	57.50	22.29	20.64					
5QQHXU		A91	56.33	22.75	20.57	0.76	-0.34	-0.32	0.89	AJ
		A92	57.09	22.42	20.25					
5ZZNAK		A91	56.44	22.66	21.12	0.75	-0.34	-0.33	0.89	XL
		A92	57.19	22.32	20.80					
686W9W		A91	56.36	22.82	20.70	0.80	-0.36	-0.36	0.94	AJ
		A92	57.15	22.46	20.34					
69Q4VC		A91	56.41	22.83	20.82	0.76	-0.36	-0.34	0.91	AM
		A92	57.17	22.48	20.48					
6J5T5X		A91	56.56	23.10	21.11	0.81	-0.49	-0.91	1.31	HF
		A92	57.37	22.61	20.20					
738QWD		A91	56.39	22.69	20.89	0.80	-0.33	-0.35	0.93	AJ
		A92	57.19	22.36	20.54					
79LE4F		A91	56.41	22.75	20.57	0.77	-0.31	-0.33	0.89	AO
		A92	57.18	22.44	20.25					
7BT8ZK		A91	56.40	23.00	21.05	0.60	-0.35	-0.45	0.83	CA
		A92	57.00	22.65	20.60					
7ES57L		A91	56.26	22.65	20.65	0.76	-0.34	-0.33	0.89	MM
		A92	57.02	22.31	20.32					

**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^*	
7YQVTL	X	A91	56.43	22.12	20.58	0.76	-0.33	-0.29	0.88	AD
		A92	57.19	21.79	20.29					
85JWJT		A91	56.06	22.20	20.32	0.80	-0.35	-0.33	0.93	MJ
		A92	56.85	21.86	19.99					
8JS4NB		A91	56.59	22.65	20.90	0.80	-0.37	-0.40	0.97	AJ
		A92	57.39	22.28	20.51					
8PUQ7T	X	A91	56.53	22.48	19.15	0.75	-0.33	-0.33	0.88	MV
		A92	57.28	22.15	18.82					
8Q6H2V		A91	56.40	22.89	20.66	0.77	-0.32	-0.32	0.89	AM
		A92	57.17	22.57	20.34					
8Y5JPL	X	A91	56.49	21.58	21.03	0.80	-0.36	-0.39	0.96	MK
		A92	57.30	21.22	20.64					
946JEW		A91	56.19	22.68	20.43	0.78	-0.33	-0.34	0.90	AM
		A92	56.97	22.36	20.09					
9J37TM		A91	56.23	22.88	20.65	0.82	-0.35	-0.32	0.95	XQ
		A92	57.05	22.53	20.33					
AWA88C		A91	56.36	22.77	20.77	0.81	-0.36	-0.35	0.95	MV
		A92	57.17	22.41	20.42					
AX12L2		A91	56.33	22.97	20.60	0.78	-0.37	-0.35	0.93	AM
		A92	57.10	22.60	20.25					
AYDE2P		A91	56.19	22.66	20.60	0.78	-0.32	-0.30	0.89	MM
		A92	56.97	22.34	20.31					
B66BJE		A91	56.39	22.79	20.84	0.76	-0.38	-0.27	0.90	MM
		A92	57.15	22.40	20.57					
B6FGKW		A91	56.32	22.63	20.54	0.83	-0.37	-0.38	0.98	AJ
		A92	57.14	22.26	20.16					
B8W4KU		A91	56.26	22.78	20.73	0.81	-0.36	-0.36	0.95	MM
		A92	57.07	22.42	20.37					

**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**

WebCode	Flag	Samples	CIE L* a* b* Color Values			Color Difference Values				InstrCode
			L*	a*	b*	ΔL^*	Δa^*	Δb^*	ΔE^*	
BMFRQ		A91	56.31	23.00	20.55	0.80	-0.34	-0.35	0.93	MV
		A92	57.10	22.66	20.20					
BURJXR		A91	56.24	22.45	20.97	0.79	-0.35	-0.34	0.92	XU
		A92	57.02	22.11	20.63					
BXY8HT		A91	56.28	22.80	20.86	0.80	-0.37	-0.39	0.96	MM
		A92	57.08	22.43	20.47					
C1EZ5E		A91	56.48	22.67	20.90	0.81	-0.39	-0.37	0.97	MK
		A92	57.29	22.28	20.53					
C2D29B		A91	56.05	22.45	20.61	0.85	-0.38	-0.38	1.00	MJ
		A92	56.90	22.07	20.23					
C3N7AT		A91	56.14	22.46	20.65	0.82	-0.38	-0.39	0.98	HG
		A92	56.96	22.08	20.27					
CVRARX		A91	56.49	22.83	20.59	0.78	-0.36	-0.36	0.93	AO
		A92	57.27	22.47	20.24					
CZNS6C		A91	56.08	22.51	20.62	0.77	-0.35	-0.33	0.91	HX
		A92	56.85	22.16	20.29					
DBRPJA	X	A91	57.37	21.37	22.12	0.80	-0.32	-0.32	0.92	HF
		A92	58.17	21.05	21.80					
DDVWM		A91	56.25	22.48	20.77	0.77	-0.28	-0.22	0.85	AJ
		A92	57.02	22.20	20.55					
DSEJS9		A91	56.17	23.04	21.11	0.81	-0.40	-0.39	0.98	GD
		A92	56.98	22.64	20.72					
DUK69K	X	A91	94.30	-0.11	-2.23	-0.01	-0.05	0.10	0.11	EE
		A92	94.29	-0.15	-2.13					
DX7LZF		A91	56.38	22.78	20.66	0.78	-0.34	-0.34	0.91	AG
		A92	57.15	22.45	20.32					
DZ6XH9		A91	56.31	22.78	20.84	0.78	-0.38	-0.37	0.94	AJ
		A92	57.09	22.40	20.48					

**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^*	
E3Q9UK		A91	56.36	22.79	20.54	0.74	-0.36	-0.31	0.87	AJ
		A92	57.09	22.43	20.23					
E4SJ3E	X	A91	57.92	23.47	21.08	0.85	-0.40	-0.42	1.02	AO
		A92	58.76	23.07	20.66					
E6B2ZK		A91	56.43	23.02	20.75	0.74	-0.32	-0.33	0.87	AO
		A92	57.17	22.70	20.43					
E8Q1GU		A91	56.25	22.72	20.63	0.86	-0.40	-0.41	1.03	AM
		A92	57.10	22.32	20.22					
EBDBT6		A91	56.77	22.73	21.13	0.77	-0.37	-0.36	0.93	HU
		A92	57.54	22.36	20.77					
EGXFLG	X	A91	56.11	22.59	20.18	0.34	-0.51	-0.49	0.78	HP
		A92	56.44	22.08	19.69					
ENT2WH		A91	56.50	22.94	20.65	0.88	-0.40	-0.44	1.06	AM
		A92	57.38	22.54	20.21					
EQ6B17		A91	56.13	22.74	20.61	0.80	-0.36	-0.32	0.93	MV
		A92	56.93	22.39	20.29					
ES2HSZ		A91	56.30	22.77	20.83	0.78	-0.34	-0.34	0.92	MK
		A92	57.08	22.44	20.49					
F52TR6		A91	55.83	22.20	20.32	0.80	-0.35	-0.34	0.94	MJ
		A92	56.63	21.85	19.97					
FFJDA2	X	A91	55.62	23.18	21.26	0.77	-0.33	-0.30	0.89	GH
		A92	56.39	22.85	20.96					
FVDB3K		A91	56.24	22.62	20.54	0.82	-0.37	-0.37	0.97	MM
		A92	57.06	22.25	20.17					
G1ZTSE		A91	56.57	22.55	21.01	0.73	-0.36	-0.40	0.90	XR
		A92	57.30	22.19	20.61					
GGHRRL		A91	56.32	22.75	20.55	0.77	-0.36	-0.33	0.91	AJ
		A92	57.09	22.39	20.22					

**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^*	
GJYDV1		A91	56.45	22.72	20.79	0.76	-0.30	-0.31	0.87	AJ
		A92	57.20	22.42	20.48					
GQDNLA		A91	56.00	22.51	20.16	0.76	-0.31	-0.27	0.86	HP
		A92	56.76	22.20	19.89					
HKPR56		A91	56.22	22.68	20.49	0.81	-0.34	-0.34	0.93	MX
		A92	57.03	22.34	20.16					
HL514Y	X	A91	56.19	21.97	20.79	0.82	-0.32	-0.32	0.94	MJ
		A92	57.02	21.65	20.48					
J3NBAX	X	A91	54.82	22.07	18.66	0.77	-0.30	-0.33	0.89	AJ
		A92	55.59	21.77	18.33					
JAULDB		A91	56.35	22.92	20.75	0.78	-0.35	-0.33	0.91	MV
		A92	57.13	22.57	20.43					
JLY5YX		A91	56.36	22.72	20.65	0.81	-0.39	-0.42	0.99	AJ
		A92	57.17	22.34	20.23					
JVM4MH		A91	56.30	22.81	20.69	0.76	-0.33	-0.30	0.88	MV
		A92	57.06	22.48	20.39					
KACWN4		A91	56.11	22.77	20.36	0.78	-0.35	-0.31	0.91	AM
		A92	56.89	22.42	20.05					
KDHUHB	X	A91	56.51	22.66	21.74	0.34	-0.42	-0.98	1.12	XO
		A92	56.85	22.24	20.76					
L5M9W9		A91	55.92	22.53	20.26	0.82	-0.36	-0.32	0.95	HG
		A92	56.74	22.17	19.94					
LKWL4P		A91	56.22	22.81	20.46	0.75	-0.33	-0.31	0.87	AM
		A92	56.97	22.48	20.16					
M4LTWH		A91	56.28	22.63	20.36	0.80	-0.32	-0.32	0.91	AJ
		A92	57.07	22.31	20.04					
M4W8M6		A91	56.41	22.79	20.93	0.77	-0.35	-0.33	0.91	MM
		A92	57.18	22.44	20.60					

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^*	
N8Y1V2		A91	56.51	22.57	20.71	0.83	-0.34	-0.34	0.95	AJ
		A92	57.34	22.24	20.37					
NFFDU1		A91	56.51	22.89	21.25	0.81	-0.34	-0.36	0.95	GD
		A92	57.32	22.55	20.89					
NWTGX8		A91	56.26	22.99	20.81	0.84	-0.36	-0.34	0.98	MV
		A92	57.10	22.63	20.47					
NYN7E8		A91	56.11	22.67	20.48	0.81	-0.34	-0.33	0.94	AM
		A92	56.92	22.33	20.15					
Q3GEZZ	X	A91	56.88	22.70	21.23	0.77	-0.36	-0.36	0.92	HW
		A92	57.65	22.35	20.87					
Q57G78	X	A91	48.97	19.37	13.66	0.85	-0.24	-0.09	0.89	MJ
		A92	49.82	19.13	13.57					
Q7DY64		A91	56.62	22.64	20.21	0.74	-0.32	-0.28	0.85	HH
		A92	57.36	22.33	19.93					
Q8S6RL		A91	56.29	22.68	20.56	0.77	-0.33	-0.32	0.89	AM
		A92	57.06	22.35	20.24					
QDWBW		A91	56.32	22.57	20.94	0.78	-0.34	-0.36	0.92	HW
		A92	57.10	22.24	20.59					
QK5N3Q		A91	56.36	22.88	20.70	0.79	-0.37	-0.38	0.95	AJ
		A92	57.15	22.51	20.32					
QMS74M		A91	56.24	22.91	20.75	0.82	-0.40	-0.40	0.99	MV
		A92	57.06	22.52	20.35					
QNLJL3		A91	56.57	23.10	20.68	0.83	-0.39	-0.38	0.99	MV
		A92	57.40	22.71	20.30					
QY8VBT		A91	56.18	22.74	20.90	0.73	-0.31	-0.30	0.84	MI
		A92	56.91	22.44	20.60					
R4NKUU		A91	56.30	22.62	20.85	0.79	-0.35	-0.35	0.93	MM
		A92	57.09	22.28	20.50					

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^*	
R6L75K		A91	56.40	22.83	20.59	0.78	-0.35	-0.33	0.91	AO
		A92	57.17	22.49	20.26					
RLB7KX		A91	56.35	22.75	20.50	0.80	-0.37	-0.35	0.94	AM
		A92	57.15	22.38	20.15					
RLT6WA		A91	56.37	22.80	20.58	0.76	-0.36	-0.36	0.91	AJ
		A92	57.13	22.44	20.23					
RU6GP2	X	A91	58.32	23.69	24.12	0.77	-0.39	-0.45	0.97	AJ
		A92	59.09	23.30	23.68					
RVSJFB		A91	56.44	22.62	20.48	0.73	-0.37	-0.34	0.88	AJ
		A92	57.17	22.25	20.14					
RWWNH		A91	56.29	22.76	20.39	0.80	-0.36	-0.37	0.95	AJ
		A92	57.09	22.40	20.02					
S9TGDU		A91	56.22	22.70	20.40	0.84	-0.40	-0.40	1.01	HP
		A92	57.06	22.31	20.01					
SCRZYP		A91	56.26	22.65	20.48	0.79	-0.33	-0.33	0.91	AJ
		A92	57.05	22.32	20.16					
STFALH		A91	56.75	22.58	21.13	0.79	-0.34	-0.31	0.91	HW
		A92	57.54	22.24	20.82					
TEEX15		A91	56.12	22.88	20.81	0.75	-0.30	-0.33	0.87	GD
		A92	56.87	22.58	20.48					
TEMDJH		A91	56.31	22.67	20.63	0.76	-0.33	-0.32	0.88	AM
		A92	57.07	22.35	20.31					
TJVBU5		A91	56.05	22.56	20.60	0.96	-0.36	-0.36	1.08	AM
		A92	57.01	22.20	20.24					
TMFJCJ		A91	56.25	22.64	20.66	0.77	-0.34	-0.33	0.90	MM
		A92	57.02	22.30	20.33					
TVBCUQ		A91	56.30	22.65	20.47	0.78	-0.35	-0.30	0.90	AJ
		A92	57.08	22.30	20.17					

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^*	
TW3Q4V		A91	56.42	22.87	20.78	0.76	-0.32	-0.30	0.88	PE
		A92	57.18	22.55	20.48					
U1FKQK		A91	56.20	22.74	20.46	0.81	-0.32	-0.30	0.92	AJ
		A92	57.00	22.42	20.17					
UD7B83		A91	56.46	22.59	20.59	0.80	-0.36	-0.36	0.95	MM
		A92	57.26	22.23	20.23					
VDGR2V		A91	56.32	22.63	20.50	0.77	-0.33	-0.30	0.89	MM
		A92	57.09	22.31	20.19					
VLXYF8		A91	56.28	22.65	20.64	0.77	-0.33	-0.32	0.90	AJ
		A92	57.05	22.32	20.32					
VPDACP X		A91	58.21	21.83	20.10	0.75	-0.24	-0.22	0.82	GG
		A92	58.96	21.59	19.88					
W5S347		A91	56.33	22.59	20.59	0.80	-0.33	-0.32	0.92	MM
		A92	57.13	22.26	20.27					
WJLZXQ		A91	56.50	22.49	20.46	0.77	-0.32	-0.33	0.89	GF
		A92	57.27	22.17	20.14					
WNNVQ		A91	56.29	22.74	20.68	0.81	-0.38	-0.38	0.97	XI
		A92	57.10	22.36	20.31					
WS2BFW		A91	56.16	22.73	20.42	0.83	-0.41	-0.47	1.03	HG
		A92	56.99	22.32	19.96					
WU4L1Y		A91	56.23	22.83	20.58	0.81	-0.37	-0.37	0.96	AJ
		A92	57.04	22.47	20.21					
WXSTSM X		A91	56.29	22.62	21.06	0.76	-0.34	4.56	4.63	XO
		A92	57.04	22.29	25.62					
X8GU39		A91	56.24	22.64	20.78	0.78	-0.33	-0.34	0.91	MK
		A92	57.02	22.32	20.44					
XTWFM3		A91	56.37	22.50	20.84	0.84	-0.39	-0.38	0.99	MG
		A92	57.21	22.11	20.46					

**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^*	
Y9MKQQ		A91	56.20	22.72	20.55	0.81	-0.39	-0.40	0.98	AJ
		A92	57.01	22.33	20.16					
YAMYSV		A91	56.31	22.52	20.81	0.77	-0.38	-0.36	0.93	XP
		A92	57.08	22.14	20.46					
YUY9GU		A91	56.21	22.68	20.48	0.76	-0.33	-0.31	0.88	MK
		A92	56.96	22.35	20.17					
YZE5JH		A91	56.23	22.37	20.85	0.77	-0.32	-0.28	0.88	XO
		A92	57.00	22.05	20.57					
Z4NP7P		A91	56.65	22.57	20.93	0.82	-0.36	-0.35	0.95	MZ
		A92	57.46	22.21	20.58					
ZL8CS5		A91	56.30	22.94	20.98	0.86	-0.41	-0.41	1.03	MT
		A92	57.15	22.54	20.57					

Summary Statistics

Samples	L*	a*	b*	ΔL^*	Δa^*	Δb^*	ΔE^*
Grand Means							
A91	56.31	22.70	20.69	0.79	-0.35	-0.35	0.93
A92	57.10	22.35	20.35				
Std Dev Btwn Labs							
A91	0.16	0.17	0.23	0.04	0.03	0.07	0.06
A92	0.16	0.17	0.23				
Statistics based on 112 of 132 reporting participants							

**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**

Comments assigned on Data Flags for Test #409

- 1GWPUU(X) - Apparently measured back of the samples.
- 25WCYS(X) - Apparently measured back of the samples.
- 2AUBNU(X) - All values are high.
- 5DZPNL(X) - High "L*" values for Sample A91.
- 7YQVTL(X) - Low "a*" values.
- 8PUQ7T(X) - Low "b*" values.
- 8Y5JPL(X) - Low "a*" values.
- DBRPJA(X) - High "L*" and "b*" values and low "a*" values.
- DUK69K(X) - Apparently measured back of the samples.
- E4SJ3E(X) - High "L*" and "a*" values.
- EGXFLG(X) - Low "L*" values for Sample A92. Large replication difference for all values on Sample A92.
- FFJDA2(X) - High "a*" values and low "L*" values.
- HL514Y(X) - Low "a*" values.
- J3NBAX(X) - All values are low.
- KDHUHB(X) - High "b*" values for Sample A91. Large replication difference for "b" value on Sample A91 and for "L*" values on Sample A92.
- Q3GEZZ(X) - High "L*" values.
- Q57G78(X) - Data appear to be reported as Hunter L a b instead of CIE L* a* b*.
- RU6GP2(X) - All values are high.
- VPDACP(X) - High "L*" values and low "a*" values.
- WXSTSM(X) - Very large replication difference for "b*" value on Sample A92.

Interlaboratory Testing Program for Color & Appearance

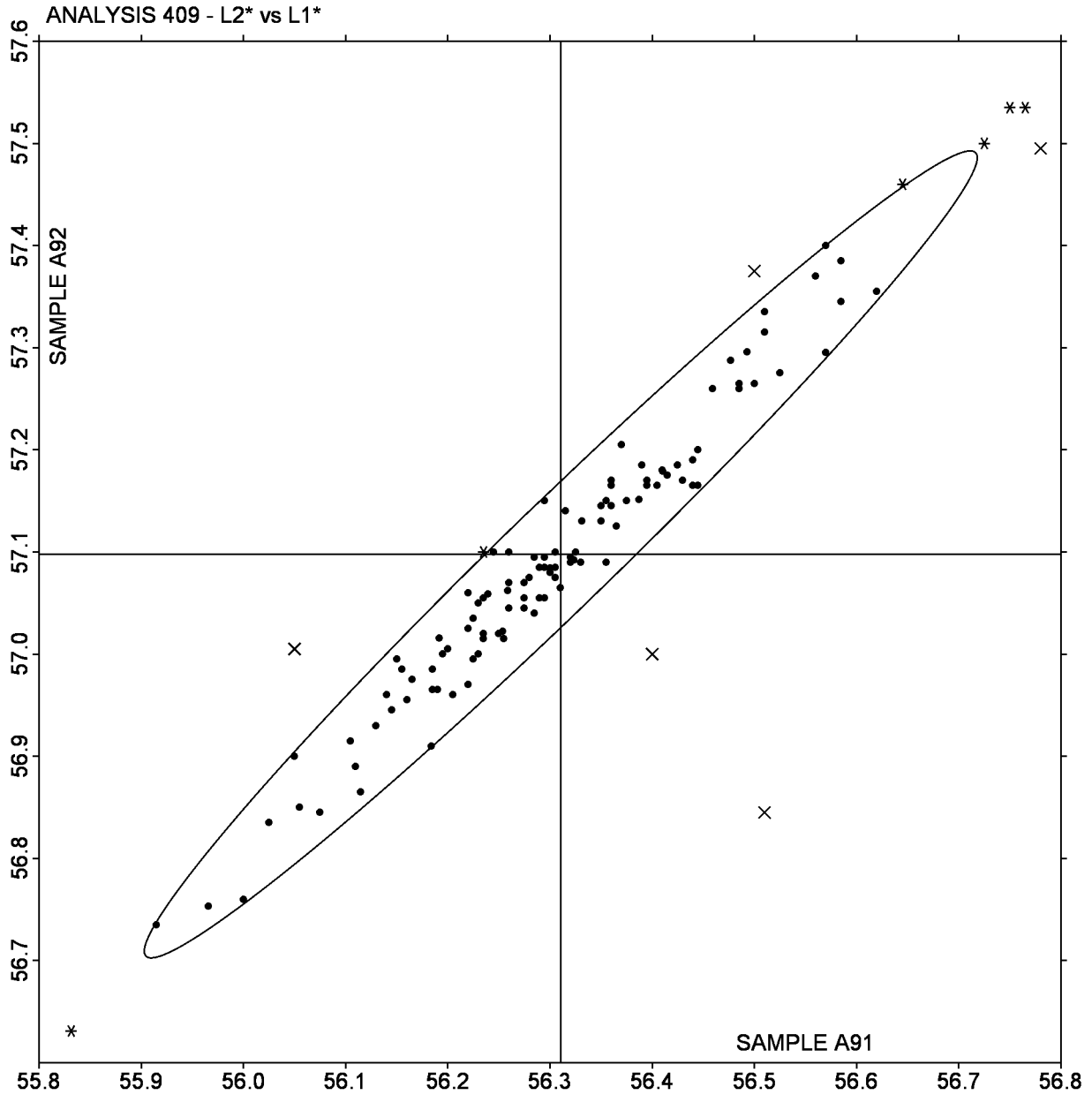
Analysis 409

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 A91 = 56.31

SAMPLE A92 = 57.10



Interlaboratory Testing Program for Color & Appearance

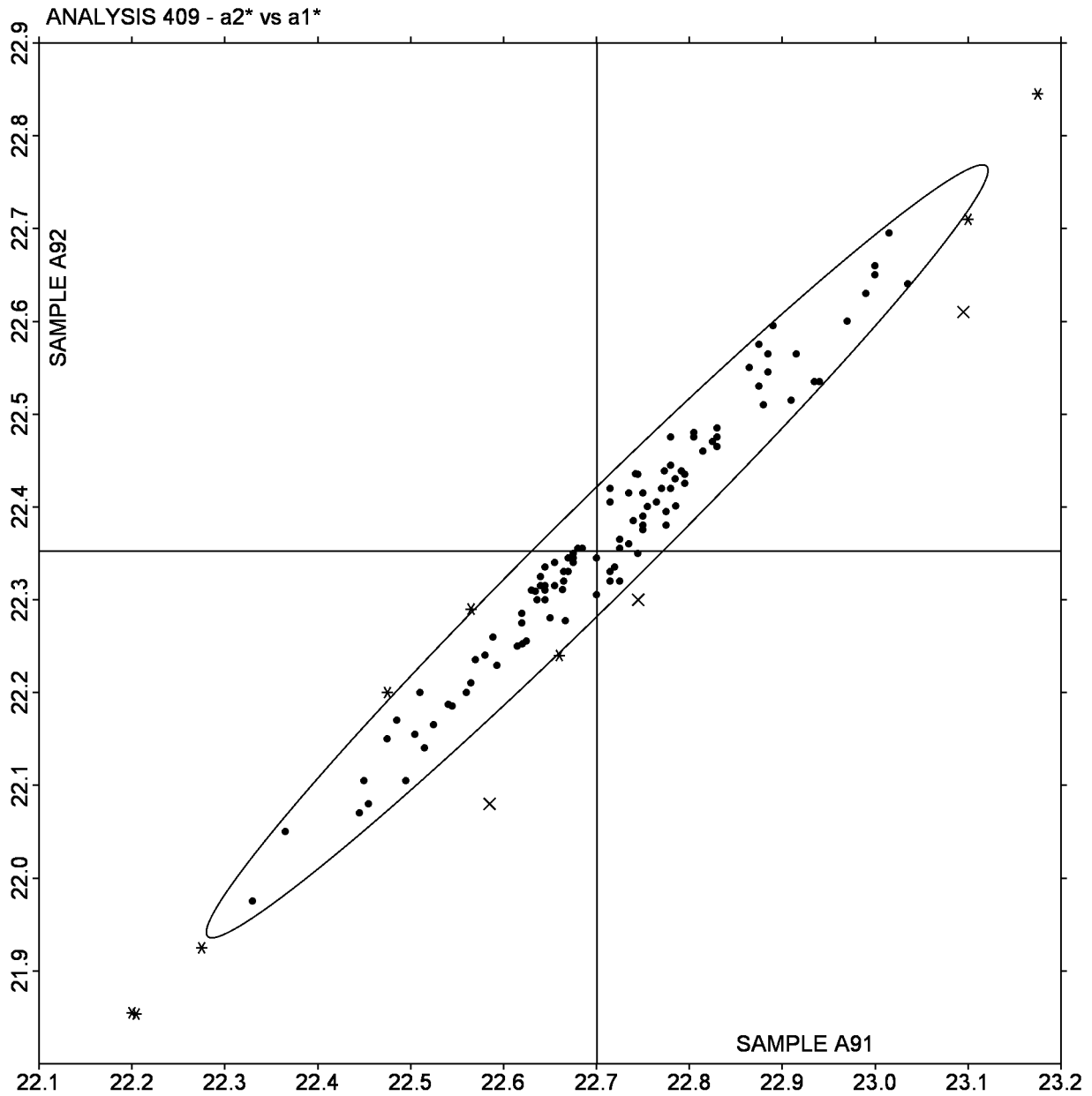
Analysis 409

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 A91 = 22.70

SAMPLE A92 = 22.35



Plot created using absolute values.

Interlaboratory Testing Program for Color & Appearance

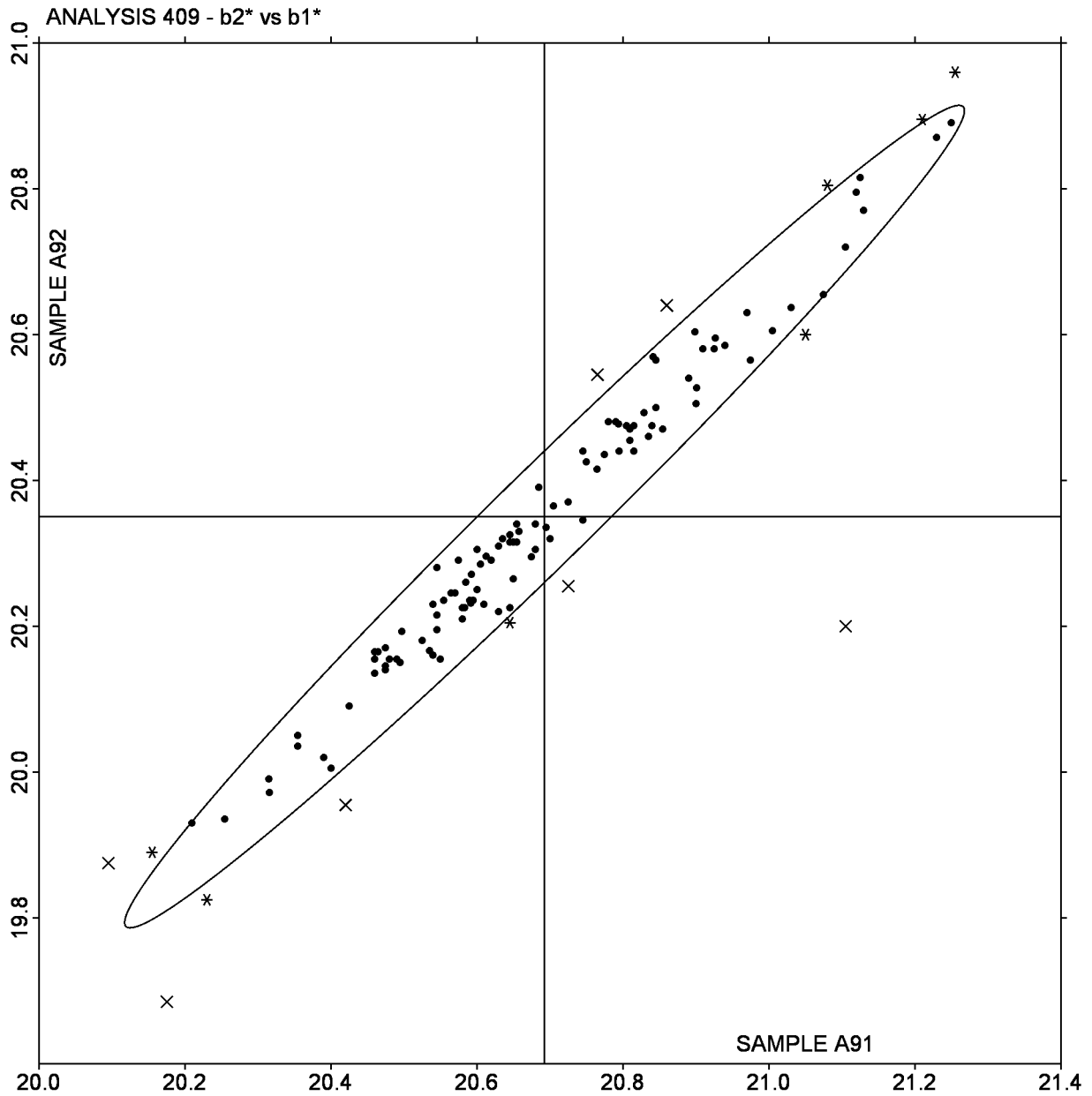
Analysis 409

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 A91 = 20.69

SAMPLE A92 = 20.35



Instrument Code List - Report# 147

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