Collaborative Testing Services, Inc.

Color & Appearance Testing Program

Summary Report #201 - 3rd Qtr 2022

About the Color Program, About CTS

Key to Tables and Graphs (Color Tests)

Key to Tables and Graphs (Spectro Test)

Key to Tables and Graphs (Gloss Tests)

Analysis	Analysis Name
408	Color & Color Difference-45-0, D65/10° Observer
409	Color & Color Difference Sphere, D65/10°Observer
411	Spectrophotometric - Sphere
440	Gloss 60 Degree

About The Color & Appearance 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, Collaborative Testing Services, Inc. (CTS) is a privately - owned company that specializes in interlaboratory tests for a variety of sectors: including color, rubber, plastics, fasteners and metals, containerboard, paper, agriculture, hemp, and wine, as well as proficiency tests for forensic laboratories. All of the tests are designed to assist organizations in achieving and maintaining quality assurance objectives. Labs from the U.S., as well as more than 100 countries, currently participate in the CTS programs.

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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 emailed 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:

DATA FLAG	STATISTICALLY INCLUDED/EXCLUDED	ACTION REQUIRED
*	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.

Key for Spectrophotometric 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 emailed to each participant.

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).

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:

DATA FLAG	STATISTICALLY INCLUDED/EXCLUDED	ACTION REQUIRED
X	EXCLUDED	**STOP** - immediate review of data and/or testing procedure is required. See specific notes following each table for more information on why the data is excluded.

In addition to the DATA FLAG column, it is also possible to have a flag on individual wavelength values as follows:

*	The laboratory's mean for that wavelength deviates from the GRAND MEAN by more than two BETWEEN-LAB STANDARD DEVIATIONS.
X	The laboratory's mean for that wavelength deviates from the GRAND MEAN by more than the critical limit determined by a 99.5% confidence interval.

Key for Gloss 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 emailed to each participant.

Lab Mean — The average of the test results obtained by the participant.

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.

Difference from Grand Mean — The difference of the LAB MEAN 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.

Inst Code — A code indicating the manufacturer of the instrument used to perform the test (see separate INSTRUMENT CODE LIST for each test section).

Graphs — For each laboratory, the LAB MEAN for the first sample (x-axis) is plotted against the LAB MEAN for the second sample (y-axis) with each point representing a laboratory. The horizontal and vertical cross-hairs are the GRAND MEANS for each sample. When 20 or more laboratories are in the statistics, an ellipse is also drawn so that 95% of the time a randomly selected laboratory will be included inside the ellipse. Plotted data flags are explained above.

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:

DATA FLAG	STATISTICALLY INCLUDED/EXCLUDED	ACTION REQUIRED
*	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. See specific notes following each table for more information on why the data is excluded.
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.

			CIE L* a* b* Color Values			Color Difference Values				
WebCode	Flag	Samples	L*	a*	b*	ΔL*	Δa*	Δb*	ΔE*	InstrCode
2XEG6U		C221	40.00	-7.25	-6.88	0.51	-0.35	-0.76	0.98	DB
		C222	40.51	-7.60	-7.64					
3HEW2B		C221	39.38	-7.18	-7.69	0.38	-0.34	-0.80	0.96	XF
		C222	39.77	-7.52	-8.49					
3Y6WWG		C221	40.40	-7.08	-7.74	0.40	-0.35	-0.81	0.97	XX
		C222	40.80	-7.43	-8.55					
44FC2Y	X	C221	39.15	-7.80	-7.57	0.40	-0.36	-0.82	0.99	BG
		C222	39.56	-8.16	-8.40					
48DQPN		C221	39.58	-7.25	-7.47	0.42	-0.34	-0.78	0.96	MT
		C222	40.00	-7.59	-8.26					
4NFQE4		C221	40.00	-6.99	-7.85	0.55	-0.32	-0.72	0.97	XH
		C222	40.55	-7.32	-8.58					
4XQW9L		C221	39.70	-7.10	-7.70	0.40	-0.40	-0.80	0.98	HW
		C222	40.10	-7.50	-8.50					
6J464B		C221	39.53	-7.03	-7.67	0.36	-0.35	-0.81	0.96	HW
		C222	39.89	-7.38	-8.49					
6L9RGF	X	C221	59.96	-38.75	-6.57	0.40	-0.50	0.77	1.00	GG
		C222	60.37	-39.25	-5.81					
6U6MJK		C221	39.56	-7.11	-7.69	0.54	-0.34	-0.76	0.99	HW
		C222	40.10	-7.45	-8.45					
6ZRK2F		C221	39.95	-7.11	-7.40	0.50	-0.36	-0.78	0.99	XD
		C222	40.45	-7.47	-8.18					
7BKZQG		C221	39.76	-7.23	-7.19	0.41	-0.27	-0.86	0.99	GA
		C222	40.17	-7.49	-8.05					
93M8BM		C221	39.33	-7.17	-7.35	0.32	-0.36	-0.83	0.96	GG
		C222	39.65	-7.53	-8.18					
99PC6R		C221	39.56	-7.08	-7.72	0.42	-0.33	-0.78	0.95	HW
		C222	39.98	-7.41	-8.51					
A8YDN8		C221	39.86	-7.16	-7.17	0.38	-0.32	-0.86	1.00	GE
		C222	40.24	-7.48	-8.03					
BVY4FP		C221	39.99	-6.98	-7.78	0.52	-0.35	-0.77	0.99	XH
		C222	40.50	-7.34	-8.55					

			CIE L* a* b* Color Values			Color Difference Values				
WebCode	Flag	Samples	L*	a*	b*	ΔL*	Δa*	Δb*	ΔE*	InstrCode
D6E2VJ		C221	39.62	-7.11	-7.91	0.63	-0.34	-0.70	1.01	HW
		C222	40.25	-7.46	-8.62					
EA4YY2		C221	39.84	-7.17	-7.30	0.30	-0.35	-0.85	0.96	GE
		C222	40.14	-7.52	-8.14					
FX9X4C		C221	40.10	-7.30	-7.19	0.36	-0.38	-0.80	0.96	GH
		C222	40.46	-7.68	-7.99					
GF4V2X		C221	39.63	-7.15	-7.44	0.39	-0.34	-0.83	0.98	XU
		C222	40.02	-7.49	-8.27					
GXJ7LB		C221	39.59	-7.08	-7.33	0.55	-0.36	-0.73	0.98	GE
		C222	40.14	-7.44	-8.06					
HE3E37		C221	39.71	-7.14	-7.43	0.40	-0.33	-0.80	0.96	XU
		C222	40.10	-7.47	-8.24					
HJF3WB		C221	39.70	-7.26	-7.35	0.53	-0.33	-0.72	0.95	XS
		C222	40.23	-7.59	-8.07					
K8CQED		C221	39.60	-7.00	-7.70	0.60	-0.30	-0.80	1.04	HW
		C222	40.20	-7.30	-8.50					
KANJE8		C221	39.85	-7.21	-7.46	0.45	-0.33	-0.80	0.98	XE
		C222	40.30	-7.54	-8.26					
KFAEC6		C221	39.81	-7.24	-7.48	0.48	-0.31	-0.74	0.94	XU
		C222	40.29	-7.55	-8.22					
KHDE9V		C221	39.80	-7.37	-7.04	0.50	-0.36	-0.75	0.97	GE
		C222	40.30	-7.73	-7.79					
KKKC2C		C221	39.90	-7.10	-7.80	0.40	-0.30	-0.80	0.94	HW
		C222	40.30	-7.40	-8.60					
KTXJJ2		C221	39.90	-7.46	-7.59	0.62	-0.31	-0.76	1.02	XW
		C222	40.52	-7.77	-8.34					
LVKFP8		C221	39.47	-6.96	-7.77	0.39	-0.31	-0.77	0.92	MG
		C222	39.86	-7.26	-8.54					
MHDQBH		C221	39.60	-7.26	-7.61	0.48	-0.35	-0.80	1.00	PR
		C222	40.08	-7.61	-8.41					
MU4PT8	X	C221	39.23	-7.72	-7.66	0.43	-0.36	-0.82	0.99	BG
		C222	39.65	-8.08	-8.48					

			CIE L* a* b* Color Values			Color Difference Values				
WebCode	Flag	Samples	L*	a*	b*	ΔL*	Δa*	Δb*	ΔE*	InstrCode
MVB63Y		C221	39.63	-7.30	-7.45	0.52	-0.36	-0.77	1.00	XU
		C222	40.15	-7.66	-8.22					
NJZP48		C221	39.65	-7.20	-7.40	0.36	-0.37	-0.82	0.97	XU
		C222	40.01	-7.56	-8.22					
PXG86A		C221	39.83	-7.05	-7.59	0.34	-0.38	-0.84	0.99	XO
		C222	40.17	-7.43	-8.43					
QGM2C7		C221	39.74	-7.18	-7.27	0.47	-0.31	-0.77	0.96	GE
		C222	40.21	-7.49	-8.04					
RCLEU2		C221	39.51	-7.05	-7.35	0.36	-0.42	-0.76	0.93	HK
		C222	39.86	-7.47	-8.11					
TYTDTL		C221	39.35	-7.17	-7.36	0.49	-0.35	-0.76	0.97	GG
		C222	39.85	-7.52	-8.12					
U3A2P4		C221	39.65	-7.10	-7.70	0.45	-0.40	-0.80	1.00	HW
		C222	40.10	-7.50	-8.50					
U78J6H		C221	39.65	-7.12	-7.71	0.40	-0.34	-0.80	0.95	XX
		C222	40.05	-7.46	-8.50					
VT4EG4		C221	39.50	-7.14	-7.64	0.43	-0.34	-0.78	0.96	HW
		C222	39.93	-7.48	-8.42					
VYP67J	X	C221	45.23	-6.06	-5.61	0.33	-0.33	-0.68	0.82	XP
		C222	45.57	-6.39	-6.29					
XWCD72		C221	39.83	-7.15	-7.58	0.59	-0.32	-0.70	0.97	XM
		C222	40.42	-7.48	-8.28					
YDDJU3		C221	39.86	-7.22	-7.46	0.35	-0.33	-0.79	0.92	MD
		C222	40.21	-7.55	-8.25					
YFPCQP		C221	39.58	-6.92	-7.72	0.38	-0.34	-0.80	0.94	HW
		C222	39.96	-7.26	-8.51					
ZM2W9R		C221	39.65	-7.22	-7.35	0.43	-0.34	-0.78	0.95	XU
		C222	40.08	-7.56	-8.13					

Summary Statistics

Samples	L*	a*	b*	ΔL*	Δa*	Δb*	ΔE*
Grand Means							
C221	39.69	-7.15	-7.51	0.45	-0.34	-0.78	0.97
C222	40.14	-7.49	-8.30				
Stnd Dev Btwn Labs							
C221	0.24	0.11	0.23	0.08	0.03	0.04	0.03
C222	0.26	0.11	0.22				

Statistics based on 42 of 46 reporting participants

Comments Assigned on Data Flags for Test #408

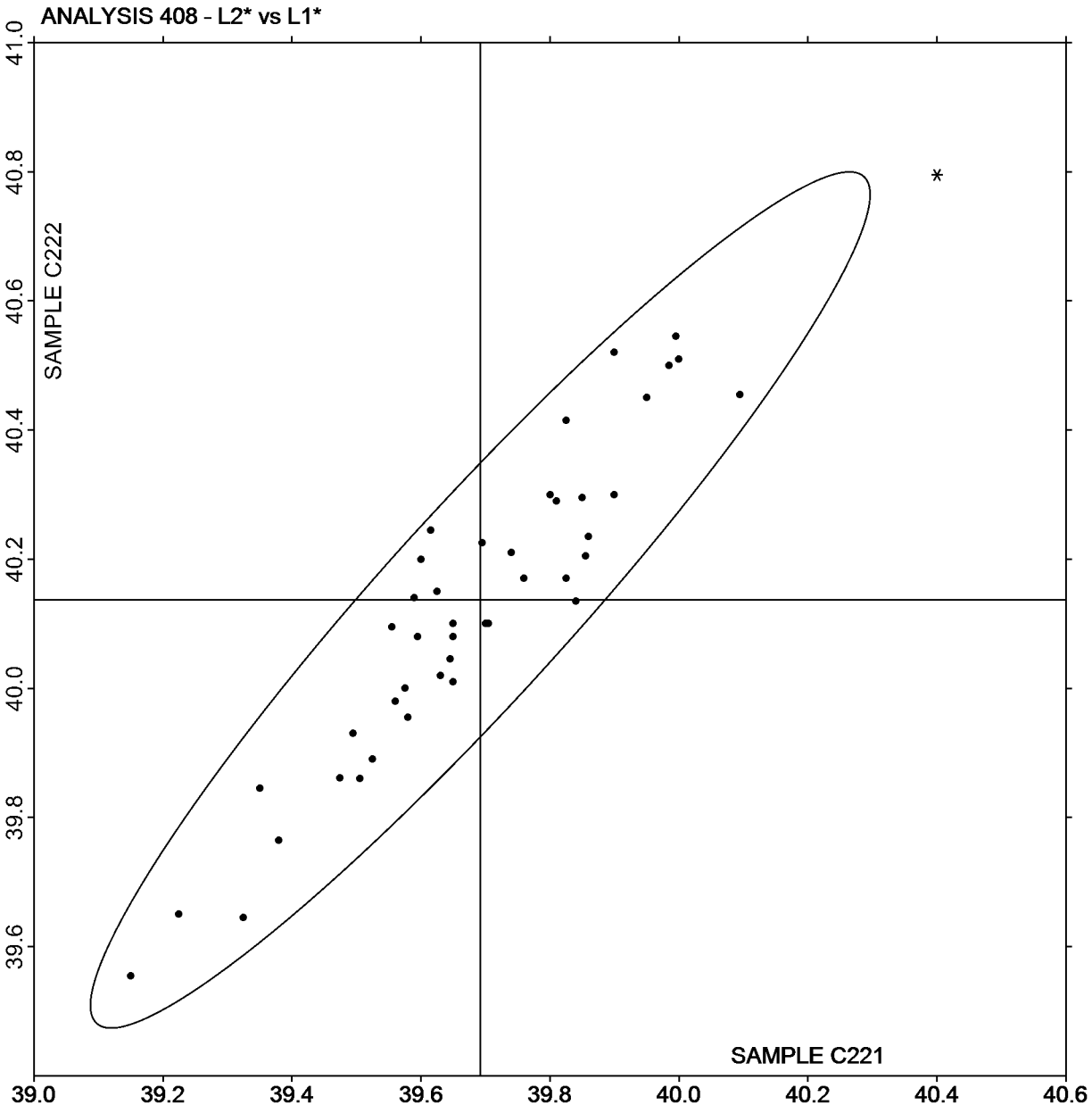
44FC2Y(X) - Low a* values for both samples.
6L9RGF(X) - Extreme Data. Small Delta a & large Delta b.
MU4PT8(X) - Low a* values for both samples.
VYP67J(X) - Extreme Data. Large Delta b & small Delta E.

Key to Instrument Codes Reported by Participants

BG	BYK Mac i	DB	Datacolor 110
GA	BYK-Gardner	GE	BYK-Gardner spectro-guide (45/0)
GG	BYK-Gardner spectro2-guide (45/0) gloss	GH	BYK-Gardner Color-View
HK	Hunter MiniScan XE (45/0)	HW	Hunter LabScan XE
MD	Minolta FD 7	MG	Macbeth 1500/PLUS or 2025+ Color Eye
MT	Minolta CM-25cG Spectrophotometer	PR	PhotoResearch PR730
XD	X-Rite 500 Series SpectroDensitometer	XE	X-Rite eXact Portable Spectrophotometer
XF	X-Rite i1 iSis	XH	X-Rite Color i5
XM	X-Rite MA58 Multi-Angle Spectrophotometer	XO	X-Rite MA68 II Multi-Angle Spectrophotometer
XP	X-Rite MA9 Multi-Angle Spectrophotometer	XS	X-Rite 962 Portable Spectrophotometer
XU	X-Rite 964 Portable Spectrophotometer	XW	X-Rite
XX	Instrument make/model not specified by lab		

L2* vs L1*

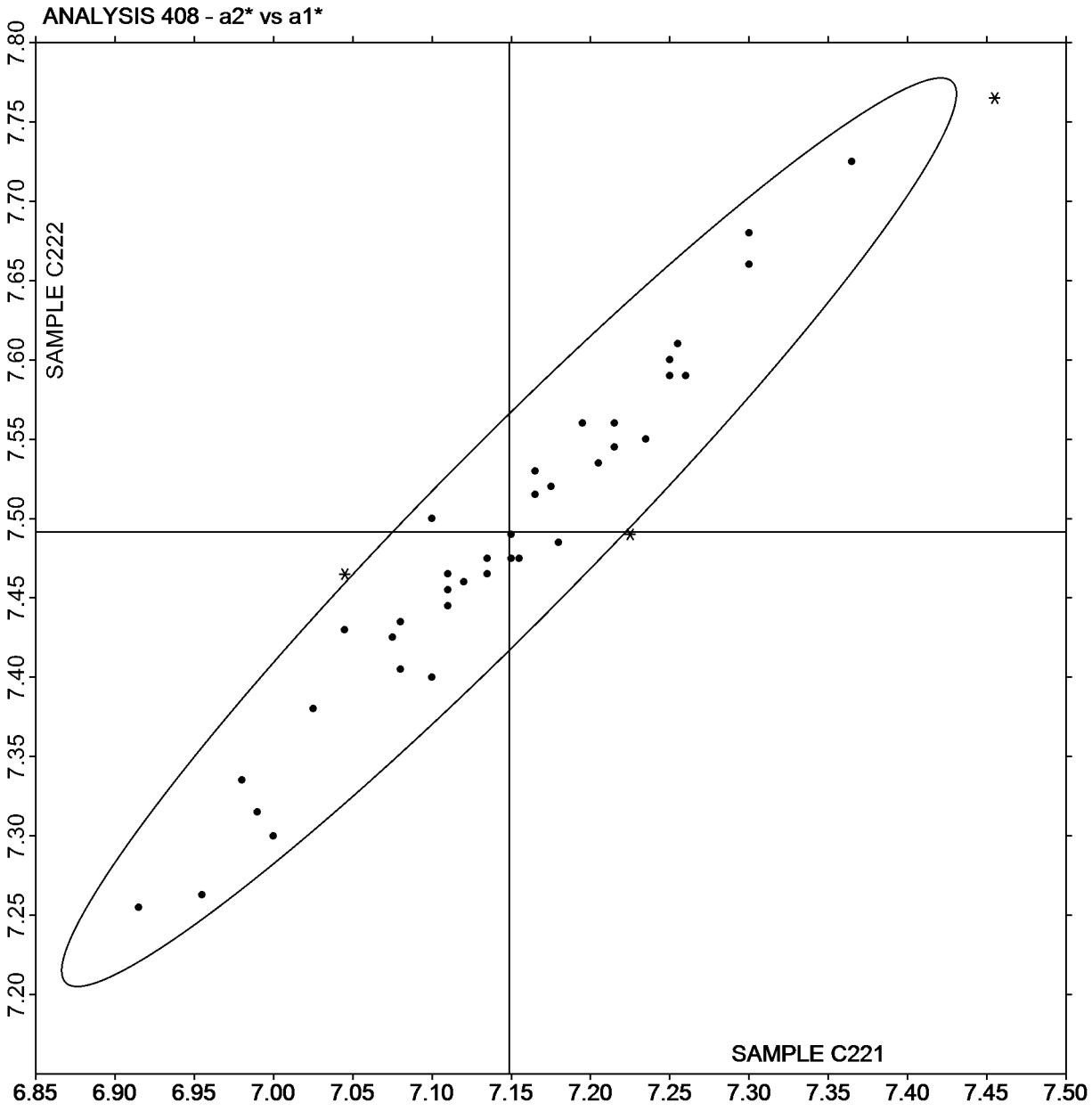
SAMPLE C221 = 39.69 SAMPLE C222 = 40.14



a2* vs a1*

SAMPLE C221 = -7.15

SAMPLE C222 = -7.49

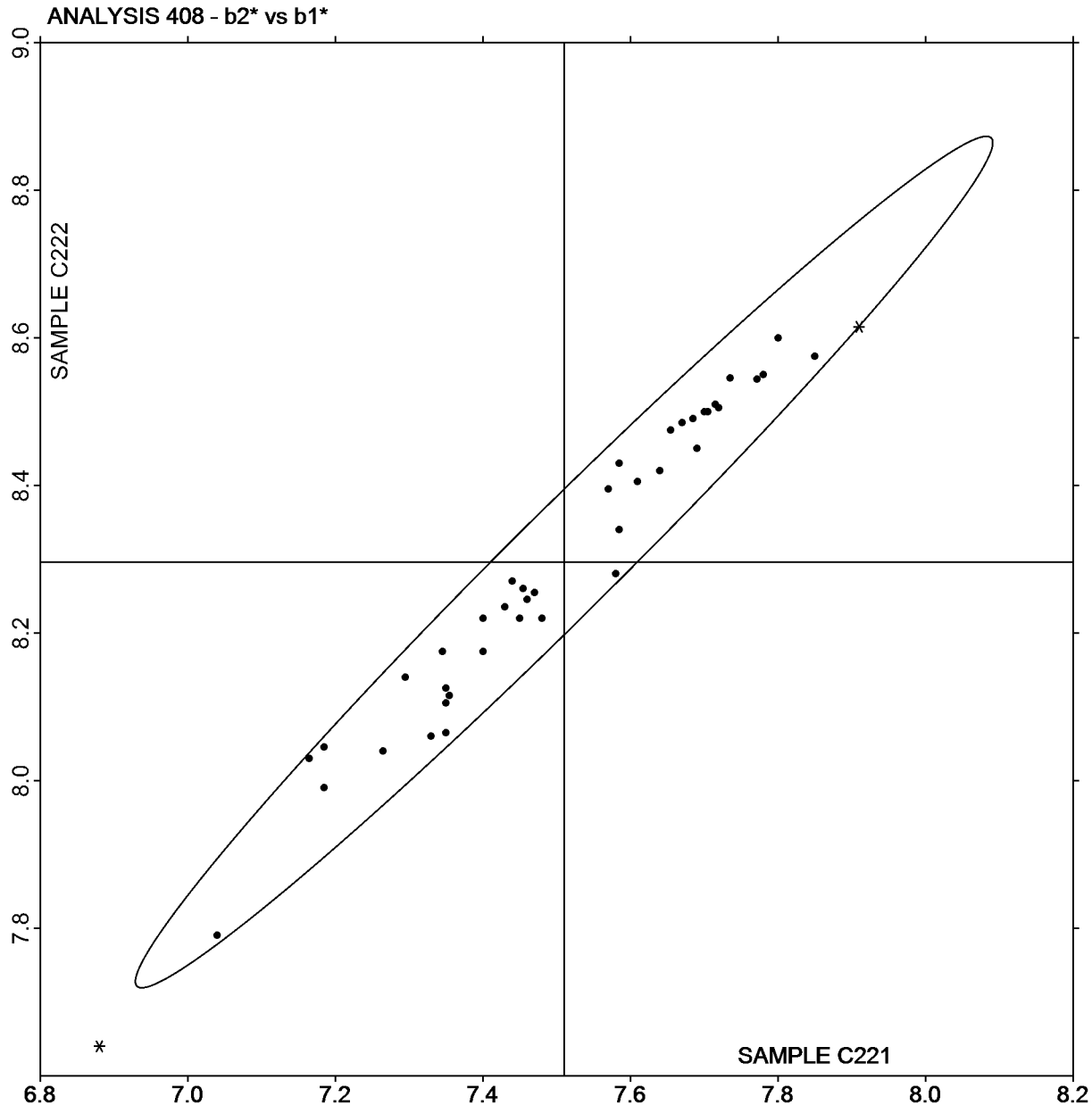


Plot created using absolute values.

b2* vs b1*

SAMPLE C221 = -7.51

SAMPLE C222 = -8.30



Plot created using absolute values.

			CIE L* a* b* Color Values			Color Difference Values				
WebCode	Flag	Samples	L*	a*	b*	ΔL*	Δa*	Δb*	ΔE*	InstrCode
24FVMN		C221	40.27	-7.07	-7.75	0.45	-0.32	-0.79	0.96	XD
		C222	40.72	-7.39	-8.54					
2A73BP	X	C221	43.46	-6.86	-8.21	0.22	-2.51	-0.02	2.52	CA
		C222	43.68	-9.36	-8.23					
2CCHNM		C221	40.06	-7.02	-7.76	0.49	-0.38	-0.81	1.02	XI
		C222	40.56	-7.40	-8.56					
2MFL8Y		C221	40.18	-7.08	-7.76	0.42	-0.34	-0.79	0.96	XD
		C222	40.60	-7.43	-8.55					
3KPW4W		C221	40.25	-7.09	-7.77	0.39	-0.32	-0.79	0.94	XX
		C222	40.65	-7.41	-8.55					
3T2VWM		C221	40.42	-7.13	-7.66	0.45	-0.35	-0.79	0.98	AO
		C222	40.88	-7.49	-8.45					
3Y38RJ	X	C221	39.15	-7.51	-8.01	0.39	-0.39	-0.83	1.00	AJ
		C222	39.54	-7.89	-8.85					
3Y6WWG		C221	40.40	-7.08	-7.74	0.40	-0.35	-0.81	0.97	AJ
		C222	40.80	-7.43	-8.55					
48DQPN		C221	40.33	-7.22	-7.81	0.39	-0.37	-0.76	0.93	XB
		C222	40.72	-7.59	-8.58					
4C7X4Q		C221	40.40	-7.15	-7.62	0.42	-0.38	-0.79	0.97	AP
		C222	40.82	-7.52	-8.41					
4FLPUJ		C221	40.01	-7.09	-7.65	0.39	-0.32	-0.63	0.81	XO
		C222	40.40	-7.40	-8.28					
4HTX6P		C221	40.14	-7.10	-7.75	0.38	-0.36	-0.83	0.98	XB
		C222	40.52	-7.46	-8.58					
4NFQE4		C221	40.03	-6.99	-7.85	0.53	-0.35	-0.74	0.98	XH
		C222	40.56	-7.34	-8.59					
7B8PUX	X	C221	40.72	-7.11	-7.80	0.20	-0.32	-0.80	0.88	XI
		C222	40.93	-7.43	-8.60					
7BKZQG		C221	40.34	-7.06	-7.65	0.41	-0.36	-0.80	0.97	AJ
		C222	40.75	-7.42	-8.45					
7CYM4P		C221	40.27	-7.14	-7.60	0.43	-0.36	-0.77	0.95	AS
		C222	40.70	-7.49	-8.37					

			CIE L* a* b* Color Values			Color Difference Values				
WebCode	Flag	Samples	L*	a*	b*	ΔL*	Δa*	Δb*	ΔE*	InstrCode
8K8GWW		C221	40.39	-7.11	-7.87	0.44	-0.34	-0.81	0.98	AQ
		C222	40.83	-7.45	-8.68					
8UVDXX		C221	40.51	-7.20	-7.87	0.38	-0.38	-0.80	0.96	AN
		C222	40.88	-7.58	-8.67					
93M8BM	X	C221	39.69	-7.22	-7.47	0.43	-0.33	-0.79	0.95	GE
		C222	40.12	-7.54	-8.25					
9EC4CK		C221	40.30	-7.02	-7.84	0.45	-0.34	-0.78	0.96	XI
		C222	40.75	-7.36	-8.62					
9KL6TH		C221	40.24	-7.16	-7.82	0.57	-0.37	-0.73	1.00	HP
		C222	40.82	-7.53	-8.56					
9YK8BP	X	C221	40.17	-7.39	-7.88	0.39	-0.35	-0.81	0.97	CA
		C222	40.57	-7.75	-8.69					
AAFXBM		C221	40.29	-7.20	-7.80	0.34	-0.37	-0.80	0.95	HP
		C222	40.62	-7.57	-8.60					
AC3LN9		C221	40.31	-7.11	-7.75	0.39	-0.34	-0.80	0.96	XD
		C222	40.70	-7.45	-8.56					
B8BR9M		C221	40.04	-7.27	-7.73	0.40	-0.12	-0.80	0.90	XD
		C222	40.43	-7.39	-8.53					
BPP3YR		C221	40.20	-7.22	-7.87	0.35	-0.38	-0.81	0.95	HP
		C222	40.55	-7.60	-8.68					
BRCRDD		C221	40.27	-7.13	-7.62	0.46	-0.38	-0.74	0.96	AT
		C222	40.73	-7.51	-8.36					
CADQ3R		C221	40.25	-7.17	-7.59	0.55	-0.36	-0.77	1.02	AS
		C222	40.80	-7.53	-8.36					
CRQBYV		C221	40.36	-7.12	-7.57	0.43	-0.31	-0.80	0.96	AS
		C222	40.79	-7.43	-8.37					
DD8C6E		C221	40.54	-7.00	-7.81	0.41	-0.39	-0.75	0.94	XH
		C222	40.94	-7.38	-8.56					
DDV92N		C221	40.32	-7.11	-7.65	0.34	-0.38	-0.81	0.96	AU
		C222	40.66	-7.49	-8.46					
DZ4PGR		C221	40.34	-7.12	-7.70	0.40	-0.38	-0.82	0.99	AR
		C222	40.74	-7.50	-8.52					

			CIE L* a* b* Color Values			Color Difference Values				
WebCode	Flag	Samples	L*	a*	b*	ΔL*	Δa*	Δb*	ΔE*	InstrCode
E29RK2		C221	40.40	-7.11	-7.62	0.31	-0.36	-0.80	0.93	AT
		C222	40.70	-7.47	-8.42					
EEH8Q7		C221	40.41	-7.15	-7.66	0.37	-0.35	-0.82	0.97	AT
		C222	40.78	-7.50	-8.48					
EY446C		C221	40.32	-7.24	-7.84	0.39	-0.32	-0.83	0.97	HP
		C222	40.71	-7.55	-8.67					
EZV3E4		C221	40.25	-7.18	-7.77	0.29	-0.34	-0.82	0.94	MV
		C222	40.54	-7.52	-8.60					
FX9X4C		C221	40.56	-7.08	-7.74	0.29	-0.43	-0.75	0.91	MV
		C222	40.85	-7.52	-8.48					
GF4V2X		C221	40.20	-7.14	-7.86	0.35	-0.38	-0.81	0.96	XE
		C222	40.55	-7.51	-8.67					
GGVTA4		C221	40.31	-7.12	-7.67	0.33	-0.36	-0.81	0.94	AJ
		C222	40.64	-7.47	-8.48					
GLUZY9		C221	40.13	-7.15	-7.61	0.48	-0.34	-0.79	0.98	XM
		C222	40.61	-7.48	-8.40					
H2F9AB		C221	40.16	-7.14	-7.85	0.37	-0.34	-0.81	0.95	XI
		C222	40.53	-7.48	-8.66					
H3BVG9		C221	40.17	-7.18	-7.89	0.56	-0.32	-0.74	0.98	XB
		C222	40.73	-7.50	-8.63					
HE3E37		C221	40.10	-7.14	-7.83	0.34	-0.34	-0.80	0.93	XI
		C222	40.44	-7.48	-8.63					
HH4KJW		C221	40.20	-7.10	-7.79	0.38	-0.34	-0.82	0.96	XG
		C222	40.58	-7.43	-8.61					
HJF3WB		C221	40.11	-7.07	-7.66	0.54	-0.36	-0.75	0.99	AJ
		C222	40.65	-7.43	-8.41					
HJWJR4		C221	40.27	-7.14	-7.74	0.44	-0.33	-0.78	0.95	XD
		C222	40.70	-7.46	-8.52					
HP6HPN		C221	40.18	-7.17	-7.61	0.52	-0.37	-0.75	0.98	MW
		C222	40.69	-7.53	-8.36					
HWAG3Y		C221	40.42	-7.14	-7.53	0.41	-0.35	-0.80	0.96	AS
		C222	40.83	-7.49	-8.32					

			CIE L* a* b* Color Values			Color Difference Values				
WebCode	Flag	Samples	L*	a*	b*	ΔL*	Δa*	Δb*	ΔE*	InstrCode
HYE6HN		C221	39.92	-7.14	-7.80	0.51	-0.27	-0.75	0.95	XF
		C222	40.43	-7.41	-8.55					
JVUGJA		C221	40.21	-7.21	-7.78	0.50	-0.32	-0.72	0.93	AB
		C222	40.71	-7.53	-8.50					
JXX8M4		C221	40.12	-6.95	-7.65	0.44	-0.35	-0.80	0.98	XH
		C222	40.56	-7.30	-8.46					
KFAEC6		C221	40.35	-7.11	-7.76	0.44	-0.37	-0.78	0.97	XI
		C222	40.79	-7.47	-8.54					
KHDE9V		C221	39.81	-7.00	-7.75	0.47	-0.39	-0.73	0.95	GD
		C222	40.28	-7.39	-8.48					
KLX28B		C221	40.34	-7.16	-7.74	0.41	-0.34	-0.81	0.97	MT
		C222	40.75	-7.50	-8.56					
KPXEN9		C221	40.31	-7.13	-7.61	0.36	-0.37	-0.84	0.98	AS
		C222	40.67	-7.49	-8.45					
KXB7D7		C221	40.20	-7.16	-7.82	0.56	-0.34	-0.74	0.99	AS
		C222	40.76	-7.50	-8.56					
LFN6ZF		C221	40.38	-7.15	-7.58	0.41	-0.32	-0.80	0.95	AJ
		C222	40.78	-7.48	-8.38					
LRK4U8		C221	40.32	-7.17	-7.61	0.42	-0.37	-0.79	0.96	AT
		C222	40.74	-7.54	-8.40					
LV46TZ		C221	40.18	-7.16	-7.80	0.48	-0.36	-0.78	0.98	AQ
		C222	40.65	-7.52	-8.58					
M93PPG		C221	40.59	-7.25	-7.80	0.43	-0.33	-0.80	0.96	CA
		C222	41.02	-7.58	-8.59					
MHDQBH		C221	40.24	-7.21	-7.79	0.43	-0.34	-0.80	0.97	CA
		C222	40.68	-7.55	-8.59					
MKGNFJ		C221	40.20	-7.15	-7.72	0.32	-0.38	-0.80	0.94	MQ
		C222	40.51	-7.53	-8.52					
MQ8W4J		C221	40.34	-7.05	-7.61	0.43	-0.34	-0.79	0.96	AJ
		C222	40.76	-7.40	-8.39					
NP99ZE		C221	40.17	-7.07	-7.83	0.41	-0.34	-0.79	0.96	XD
		C222	40.58	-7.42	-8.62					

			CIE L* a* b* Color Values			Color Difference Values				
WebCode	Flag	Samples	L*	a*	b*	ΔL*	Δa*	Δb*	ΔE*	InstrCode
P2TAVB		C221	40.29	-7.16	-7.62	0.45	-0.34	-0.79	0.97	AS
		C222	40.74	-7.50	-8.41					
P3BYHC		C221	40.61	-7.17	-7.72	0.46	-0.36	-0.75	0.95	HW
		C222	41.07	-7.53	-8.47					
PTZWWC		C221	40.20	-7.09	-7.80	0.42	-0.34	-0.78	0.95	XI
		C222	40.63	-7.43	-8.58					
Q7N9Z9		C221	40.22	-7.17	-7.65	0.44	-0.37	-0.75	0.95	MW
		C222	40.66	-7.54	-8.40					
QF9CAT		C221	40.30	-7.16	-7.69	0.33	-0.35	-0.83	0.96	MU
		C222	40.62	-7.51	-8.52					
QTFH28		C221	40.25	-7.12	-7.62	0.43	-0.37	-0.80	0.98	AS
		C222	40.68	-7.49	-8.42					
R7H9J6		C221	40.12	-7.12	-7.90	0.47	-0.33	-0.77	0.96	XD
		C222	40.59	-7.45	-8.66					
RA3FMY		C221	40.23	-7.22	-7.84	0.44	-0.34	-0.78	0.96	XR
		C222	40.67	-7.57	-8.62					
RCADGF		C221	40.09	-7.20	-7.81	0.42	-0.32	-0.79	0.95	XC
		C222	40.52	-7.52	-8.59					
RYZVK7		C221	40.15	-7.18	-7.69	0.48	-0.34	-0.79	0.98	MY
		C222	40.63	-7.52	-8.48					
T4RL4M		C221	39.89	-6.93	-7.64	0.39	-0.35	-0.81	0.96	XH
		C222	40.28	-7.28	-8.45					
TLT883		C221	40.11	-7.06	-7.92	0.36	-0.35	-0.81	0.95	XO
		C222	40.47	-7.41	-8.73					
TYTDTL		C221	39.95	-7.22	-7.43	0.43	-0.38	-0.80	0.98	GE
		C222	40.37	-7.60	-8.24					
U7A7LW		C221	40.44	-7.23	-7.53	0.45	-0.34	-0.78	0.96	AO
		C222	40.89	-7.58	-8.31					
ULKPH3		C221	40.12	-7.14	-7.74	0.48	-0.35	-0.76	0.97	MM
		C222	40.60	-7.49	-8.50					
UMZ7G3		C221	40.42	-6.95	-7.85	0.34	-0.36	-0.85	0.98	MI
		C222	40.75	-7.32	-8.70					

			CIE L* a* b* Color Values			Color Difference Values				
WebCode	Flag	Samples	L*	a*	b*	ΔL*	Δa*	Δb*	ΔE*	InstrCode
UVADFQ		C221	40.26	-7.17	-7.98	0.43	-0.34	-0.79	0.96	XB
		C222	40.68	-7.51	-8.77					
VJGCEA		C221	39.94	-7.13	-7.64	0.45	-0.32	-0.77	0.95	XM
		C222	40.39	-7.45	-8.42					
VY9B3N		C221	40.46	-7.15	-7.55	0.40	-0.35	-0.78	0.95	AJ
		C222	40.87	-7.51	-8.33					
VYP67J		C221	40.05	-7.13	-7.77	0.46	-0.32	-0.76	0.94	XF
		C222	40.51	-7.45	-8.53					
X292KN		C221	40.28	-7.11	-7.78	0.39	-0.38	-0.80	0.97	MK
		C222	40.67	-7.49	-8.58					
X7XKKW		C221	40.24	-7.15	-7.72	0.43	-0.38	-0.80	0.98	MS
		C222	40.67	-7.52	-8.52					
XVHQ94		C221	40.14	-7.14	-7.75	0.41	-0.35	-0.78	0.95	MS
		C222	40.55	-7.48	-8.53					
Y3WRAY		C221	40.25	-7.15	-7.67	0.41	-0.36	-0.80	0.97	XI
		C222	40.66	-7.51	-8.46					
Y4AJZV		C221	40.21	-7.10	-7.86	0.34	-0.34	-0.82	0.95	XD
		C222	40.56	-7.44	-8.68					
Y6JGNK		C221	40.41	-7.05	-7.76	0.39	-0.37	-0.79	0.96	MM
		C222	40.80	-7.42	-8.56					
Y7CKZR		C221	40.15	-7.18	-7.72	0.55	-0.35	-0.71	0.96	AS
		C222	40.71	-7.53	-8.42					
Y8QQKN		C221	40.19	-7.14	-7.71	0.39	-0.36	-0.80	0.96	XD
		C222	40.58	-7.50	-8.51					
YAHTNQ		C221	40.14	-7.13	-7.67	0.37	-0.34	-0.76	0.91	XI
		C222	40.51	-7.46	-8.42					
YBUJF8		C221	40.06	-7.19	-7.75	0.50	-0.30	-0.80	0.99	MV
		C222	40.56	-7.49	-8.55					
YKFVNE		C221	40.26	-7.08	-7.78	0.39	-0.36	-0.76	0.93	HP
		C222	40.64	-7.44	-8.55					
ZQHE8N	X	C221	40.42	-6.99	-8.61	0.55	-0.34	-0.77	1.00	XE
		C222	40.97	-7.33	-9.38					

Summary Statistics

Samples	L*	a*	b*	ΔL*	Δa*	Δb*	ΔE*
Grand Means							
C221	40.24	-7.12	-7.73	0.42	-0.35	-0.78	0.96
C222	40.66	-7.47	-8.52				
Stnd Dev Btwn Labs							
C221	0.15	0.07	0.11	0.06	0.03	0.03	0.03
C222	0.15	0.07	0.11				

Statistics based on 90 of 96 reporting participants

Comments Assigned on Data Flags for Test #409

2A73BP(X) - Extreme Data. Small Delta L & a. Large Delta b & E.

3Y38RJ(X) - Extreme data for both L* & a* values.

7B8PUX(X) - High L* values for Sample C221. Large replication difference for L* Sample C221. Small Delta L & Delta E.

93M8BM(X) - Low L* values for both samples.

9YK8BP(X) - Low a* values for both samples.

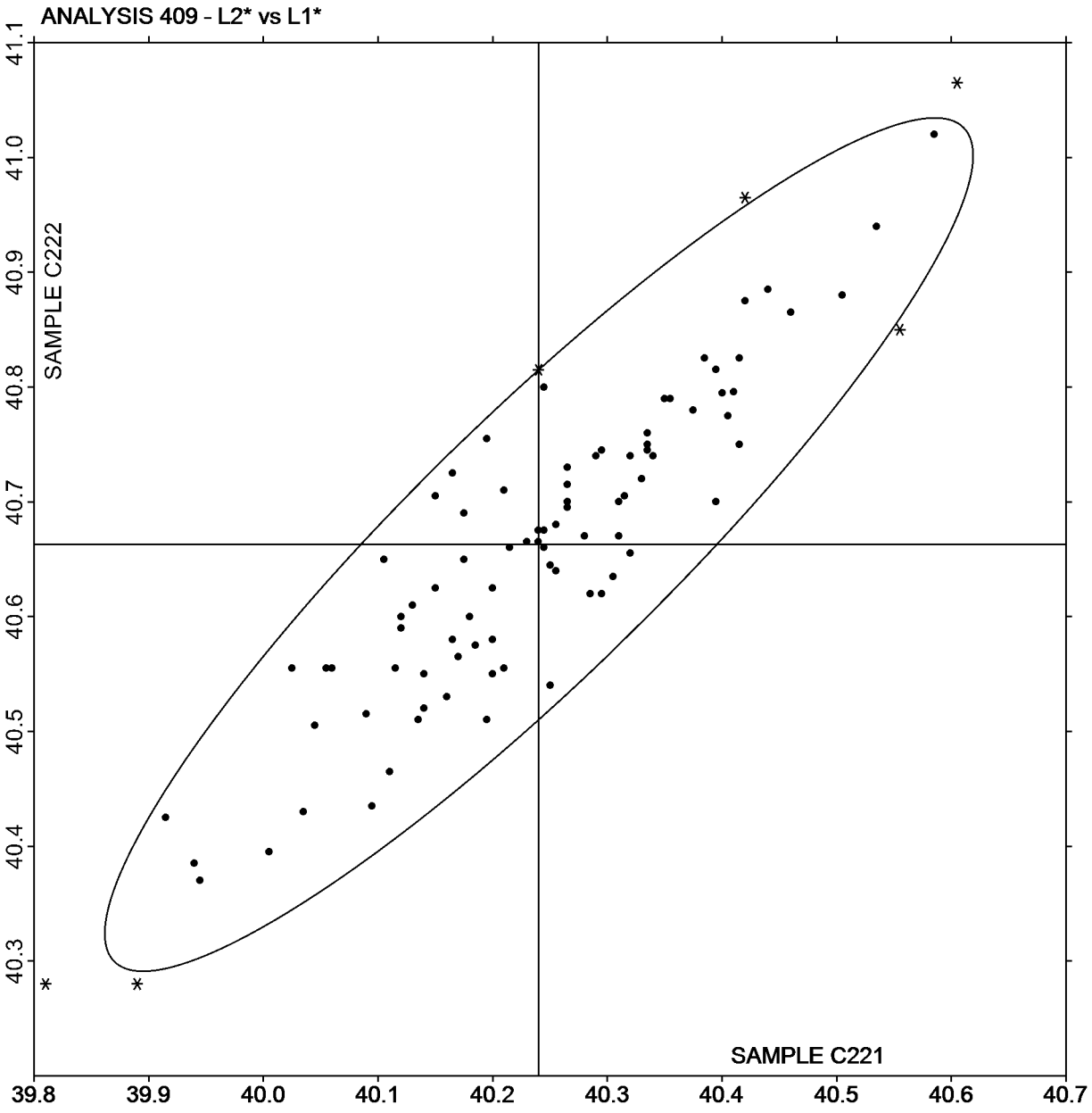
ZQHE8N(X) - Extreme data for both b* values.

Key to Instrument Codes Reported by Participants

AB	Datacolor 100	AJ	Datacolor 600
AN	Datacolor 650	AO	Datacolor 650x
AP	Datacolor 750	AQ	Datacolor 600x
AR	Datacolor 400	AS	Datacolor 800
AT	Datacolor 850	AU	Datacolor 1000
CA	Cary 5000	GD	BYK-Gardner Spectro-Guide Sphere
GE	BYK-Gardner Spectro2-Guide Sphere Gloss	HP	Hunter UltraScan PRO
HW	Hunter UltraScan XE	MI	Macbeth Color i5
MK	Macbeth Color-Eye 7000	MM	Macbeth Color-Eye 7000a
MQ	Minolta CM-700d	MS	Minolta CM-600d
MT	Minolta CM-2600d	MU	Minolta
MV	Minolta CM-3000d Spectrophotometer	MW	Minolta CM 3700a Spectrophotometer
MY	Minolta Benchtop Spectrophotometer CM-3600a	XB	X-Rite Ci7000 Series Benchtop Spectrophotometer
XC	X-Rite Ci4200 Benchtop Spectrophotometer	XD	X-Rite Ci7800 Benchtop Spectrophotometer
XE	X-Rite Ci7600 Benchtop Spectrophotometer	XF	X-Rite Ci6x Portable Spectrophotometer
XG	X-Rite Ci7860 Benchtop Spectrophotometer	XH	X-Rite Color i5 Benchtop Spectrophotometer
XI	X-Rite Color i7 Benchtop Spectrophotometer	XM	X-Rite SP62 Portable Sphere Spectrophotometer
XO	X-Rite SP64 Portable Sphere Spectrophotometer	XR	X-Rite
XX	Instrument make/model not specified by lab		

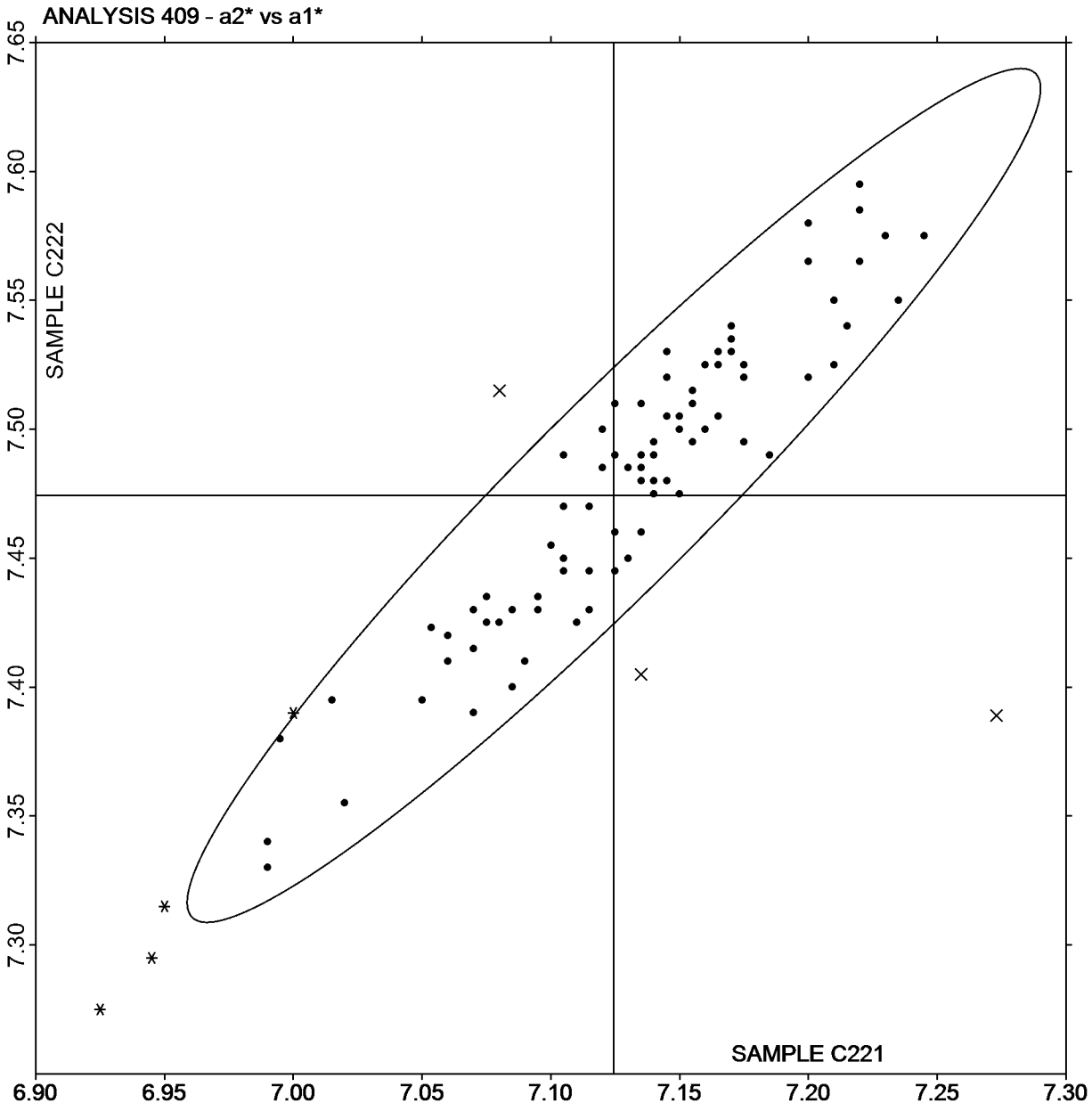
L2* vs L1*

SAMPLE C221 = 40.24 SAMPLE C222 = 40.66



a2* vs a1*

SAMPLE C221 = -7.12 SAMPLE C222 = -7.47

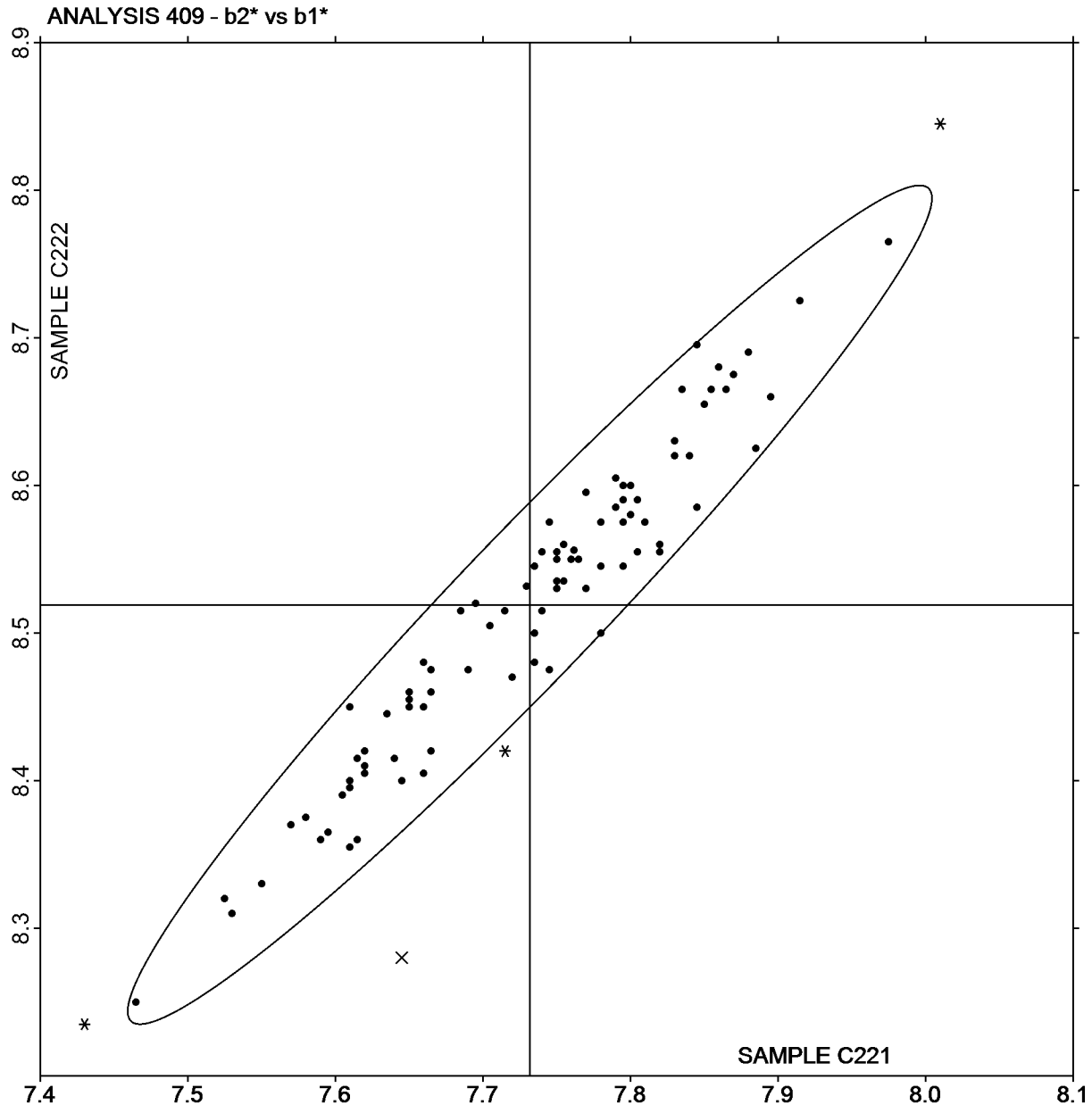


Plot created using absolute values.

b2* vs b1*

SAMPLE C221 = -7.73

SAMPLE C222 = -8.52



Plot created using absolute values.

Spectrophotometric Reflectance values (as %) at selected wavelengths

WebCode	Data Flag	400	420	440	460	480	500	520	540	560	580	600	620	640	660	680	700	Instr Code
Sample C221																		
24FVMN		13.06	14.24	14.57	14.47	14.12	13.85	13.41	12.55	11.00	9.53	8.66	8.12	7.90	7.95	7.79	7.41	XD
2A73BP	X	17.15X	17.39X	17.28X	16.88X	16.35X	16.04X	15.66X	14.83X	13.11X	11.40X	10.35X	9.69X	9.25X	9.19X	9.08X	8.63X	CA
2CCHNM		12.97	14.09	14.40	14.34	13.98	13.71	13.28	12.39	10.83	9.46	8.57	8.04	7.85	7.86	7.68	7.25	XI
2MFL8Y		13.80*	14.19	14.51	14.41	14.08	13.78	13.37	12.50	10.95	9.47	8.59	8.07	7.86	7.91	7.72	7.27	XD
3KPW4W		13.02	14.23	14.56	14.45	14.12	13.83	13.40	12.54	11.00	9.51	8.62	8.10	7.89	7.94	7.79	7.40	XX
3T2VWM		13.20	14.30	14.60	14.60	14.20	13.90	13.50	12.70	11.10	9.60	8.70	8.20	7.95	8.00	7.80	7.50	AN
3Y38RJ	X	12.21X	13.59X	13.87X	13.80X	13.50X	13.19X	12.77X	11.89X	10.37X	8.84X	7.97X	7.42X	7.21X	7.17X	6.44X	4.02X	AJ
3Y6WWG		13.18	14.35	14.64	14.56	14.26	13.95	13.47	12.63	11.12	9.57	8.71	8.18	7.99	7.98	7.80	7.44	AJ
48DQPN		13.05	14.28	14.64	14.52	14.20	13.92	13.48	12.61	11.04	9.54	8.65	8.10	7.85	7.88	7.73	7.32	XB
4C7X4Q		13.03	14.28	14.58	14.49	14.21	13.93	13.45	12.62	11.10	9.58	8.75	8.18	7.95	7.94	7.79	7.47	AP
4HTX6P		13.23	14.16	14.48	14.36	14.05	13.75	13.33	12.47	10.94	9.46	8.59	8.04	7.82	7.87	7.71	7.31	XB
4NFQE4		12.95	14.15	14.43	14.34	13.96	13.68	13.24	12.40	10.81	9.40	8.53	8.03	7.83	7.86	7.70	7.29	XH
7B8PUX		13.35	14.50	14.80	14.70	14.30	14.05	13.65*	12.80	11.10	9.60	8.80	8.20	8.00	8.05	7.85	7.50	XI
7CYM4P		12.94	14.17	14.47	14.41	14.11	13.82	13.38	12.56	11.04	9.53	8.66	8.12	7.91	7.95	7.77	7.44	AS
8K8GWW		14.06X	14.36	14.68	14.59	14.26	13.97	13.53	12.60	11.09	9.56	8.69	8.15	7.96	7.98	7.77	7.45	AQ
8UVDXX		14.53X	14.50	14.73	14.71*	14.35	14.02	13.59	12.73	11.13	9.61	8.74	8.16	7.96	7.97	7.87	7.50	AN
93M8BM		12.34*	13.62X	14.04X	13.98X	13.73X	13.43X	13.01X	12.21*	10.69X	9.22X	8.34X	7.82X	7.65X	7.71X	7.59*	7.21*	GE
9EC4CK		13.08	14.36	14.65	14.51	14.14	13.88	13.44	12.57	11.00	9.50	8.67	8.16	7.94	7.96	7.77	7.32	XI
9KL6TH		13.33	14.31	14.58	14.49	14.16	13.87	13.46	12.53	10.98	9.49	8.59	8.07	7.86	7.90	7.80	7.37	HP
9YK8BP		13.15	14.34	14.70	14.63	14.29	13.99	13.58	12.72	11.14	9.59	8.71	8.16	7.93	7.99	7.86	7.45	CA
AC3LN9		13.07	14.26	14.60	14.49	14.15	13.86	13.46	12.59	11.02	9.54	8.65	8.14	7.91	7.97	7.79	7.37	XD
B8BR9M		12.93	14.06	14.39	14.30	13.98	13.68	13.25	12.40	10.87	9.40	8.54	8.01	7.80	7.85	7.69	7.30	XD

Spectrophotometric - Sphere Geometry Instruments
Reflectance at 16 Selected Wavelengths

Spectrophotometric Reflectance values (as %) at selected wavelengths

WebCode	Data Flag	400	420	440	460	480	500	520	540	560	580	600	620	640	660	680	700	Instr Code
Sample C221																		
BPP3YR		12.98	14.21	14.58	14.50	14.15	13.86	13.43	12.49	11.00	9.46	8.56	8.07	7.79	7.94	7.79	7.30	HP
BRCRDD		13.09	14.19	14.48	14.41	14.11	13.85	13.41	12.58	11.00	9.52	8.67	8.09	7.90	7.90	7.68	7.44	AT
CADQ3R		12.97	14.16	14.45	14.39	14.12	13.81	13.41	12.54	11.02	9.49	8.66	8.09	7.91	7.91	7.77	7.39	AS
CRQBYV		13.31	14.25	14.50	14.47	14.17	13.87	13.44	12.63	11.12	9.58	8.71	8.15	7.95	7.95	7.81	7.47	AS
DD8C6E		13.10	14.48	14.81	14.69	14.31	14.03	13.63*	12.69	11.16	9.69*	8.81*	8.31*	8.07*	8.14X	7.98*	7.51	XH
DDV92N		13.30	14.22	14.53	14.48	14.15	13.87	13.45	12.59	11.07	9.55	8.69	8.16	7.93	7.93	7.93	7.45	AU
E29RK2		13.11	14.27	14.59	14.50	14.20	13.93	13.50	12.64	11.14	9.59	8.74	8.19	7.97	8.01	7.85	7.54	AT
EEH8Q7		13.13	14.30	14.59	14.53	14.22	13.95	13.49	12.67	11.12	9.58	8.72	8.16	7.96	8.00	7.95*	7.48	AT
EZV3E4		12.84	14.24	14.55	14.47	14.12	13.89	13.41	12.55	11.02	9.46	8.61	8.09	7.87	7.92	7.82	7.42	MV
FX9X4C		13.21	14.42	14.77	14.68	14.37*	14.05	13.63*	12.75	11.13	9.65	8.80	8.28*	8.11X	8.15X	8.02X	7.62*	MV
GF4V2X		13.13	14.24	14.58	14.45	14.12	13.82	13.38	12.51	10.96	9.49	8.59	8.06	7.80	7.84	7.65	7.24	XB
GGVTA4		13.01	14.22	14.53	14.47	14.17	13.89	13.45	12.59	11.07	9.55	8.70	8.13	7.93	7.92	7.74	7.44	AJ
GLUZY9		12.75	14.10	14.44	14.27	14.01	13.76	13.36	12.48	10.93	9.45	8.58	8.04	7.87	7.89	7.76	7.39	XM
H2F9AB		13.05	14.24	14.57	14.40	14.07	13.79	13.39	12.47	10.93	9.46	8.55	8.03	7.81	7.86	7.71	7.27	XI
H3BVG9		13.10	14.23	14.57	14.45	14.11	13.81	13.39	12.50	10.93	9.46	8.56	8.01	7.78	7.87	7.69	7.25	XB
HE3E37		12.98	14.17	14.48	14.37	14.03	13.74	13.31	12.42	10.91	9.45	8.55	8.06	7.85	7.90	7.71	7.33	XI
HH4KJW		13.02	14.20	14.54	14.43	14.11	13.80	13.37	12.51	10.95	9.48	8.60	8.09	7.87	7.92	7.75	7.35	XG
HJWJR4		13.08	14.22	14.55	14.45	14.14	13.85	13.41	12.56	10.99	9.52	8.64	8.10	7.88	7.94	7.77	7.34	XD
HP6HPN		12.69	14.14	14.41	14.37	14.05	13.76	13.37	12.51	10.98	9.46	8.59	8.06	7.85	7.92	7.81	7.42	MW
HWAG3Y		13.05	14.23	14.48	14.52	14.18	13.91	13.43	12.65	11.15	9.63	8.76	8.20	7.97	7.97	7.91	7.46	AS
JVUGJA		12.91	14.19	14.52	14.46	14.14	13.81	13.41	12.52	10.99	9.46	8.57	8.07	7.83	7.92	7.76	7.25	AB
JXX8M4		12.94	14.11	14.41	14.32	13.95	13.68	13.28	13.47X	10.90	9.47	8.60	8.12	7.89	7.94	7.77	7.39	XH

Spectrophotometric - Sphere Geometry Instruments
Reflectance at 16 Selected Wavelengths

Spectrophotometric Reflectance values (as %) at selected wavelengths

WebCode	Data Flag	400	420	440	460	480	500	520	540	560	580	600	620	640	660	680	700	Instr Code
Sample C221																		
KFAEC6		12.93	14.30	14.58	14.55	14.21	13.93	13.47	12.59	11.03	9.57	8.67	8.16	7.97	8.01	7.80	7.45	XI
KHDE9V		13.28	13.91*	14.26*	14.24	13.78X	13.39X	13.17*	12.35	10.61X	9.35	8.39X	7.89*	7.73*	7.75*	7.60*	7.19*	GD
KLX28B		12.90	14.22	14.60	14.56	14.19	13.90	13.49	12.61	11.05	9.54	8.66	8.12	7.90	7.96	7.83	7.43	MT
KPXEN9		12.97	14.16	14.53	14.43	14.17	13.88	13.40	12.57	11.07	9.54	8.71	8.12	7.93	7.94	7.82	7.43	AS
KXB7D7		13.06	14.19	14.54	14.46	14.14	13.81	13.34	12.52	10.96	9.45	8.61	8.05	7.85	7.87	7.74	7.41	AS
LFN6ZF		13.05	14.22	14.53	14.48	14.19	13.91	13.49	12.65	11.10	9.58	8.74	8.15	7.96	7.99	7.94*	7.49	AJ
LRK4U8		12.98	14.19	14.51	14.47	14.16	13.87	13.44	12.62	11.08	9.54	8.68	8.13	7.92	7.94	7.82	7.46	AT
LV46TZ		12.79	14.16	14.49	14.45	14.13	13.83	13.34	12.48	10.96	9.47	8.60	8.05	7.85	7.84	7.69	7.36	AQ
M93PPG		13.30	14.40	14.83*	14.72*	14.38*	14.09*	13.68*	12.79	11.20	9.65	8.75	8.21	7.99	8.05	7.91	7.51	CA
MHDQBH		12.98	14.11	14.50	14.47	14.11	13.85	13.44	12.57	10.99	9.47	8.61	8.06	7.84	7.91	7.78	7.36	CA
MKGNFJ		12.87	14.16	14.50	14.42	14.06	13.79	13.39	12.53	10.97	9.48	8.59	8.07	7.83	7.90	7.75	7.36	MQ
MQ8W4J		13.04	14.23	14.54	14.46	14.15	13.84	13.40	12.58	11.12	9.57	8.75	8.17	7.95	7.97	7.78	7.45	AJ
NP99ZE		13.05	14.21	14.52	14.41	14.08	13.78	13.35	12.47	11.36X	9.46	8.58	8.07	7.85	7.91	7.73	7.32	XD
P2TAVB		13.32	14.17	14.48	14.45	14.17	13.86	13.40	12.56	11.05	9.52	8.71	8.12	7.90	7.90	7.74	7.39	AS
PTZWWC		12.99	14.20	14.53	14.42	14.09	13.79	13.36	12.50	10.95	9.47	8.59	8.08	7.86	7.91	7.75	7.38	XI
QF9CAT		12.89	14.24	14.53	14.48	14.17	13.84	13.47	12.60	11.02	9.52	8.66	8.10	7.91	7.98	7.86	7.46	MV
QTFH28		12.97	14.17	14.47	14.39	14.09	13.81	13.38	12.55	11.04	9.50	8.67	8.10	7.91	7.90	7.72	7.44	AS
R7H9J6		13.01	14.21	14.52	14.42	14.07	13.77	13.34	12.46	10.89	9.42	8.54	8.02	7.83	7.87	7.70	7.32	MM
RA3FMY		13.04	14.23	14.71	14.48	14.15	13.85	13.43	12.54	10.96	9.49	8.59	8.04	7.80	7.84	7.64	7.22	XR
RCADGF		12.79	14.07	14.46	14.35	14.03	13.78	13.32	12.43	10.85	9.37	8.52	7.99	7.81	7.86	7.72	7.34	XC
RYZVK7		12.81	14.14	14.45	14.39	14.01	13.77	13.35	12.51	10.94	9.43	8.58	8.03	7.82	7.89	7.74	7.39	MY
TLT883		12.81	14.23	14.54	14.42	14.09	13.76	13.32	12.46	10.89	9.38	8.57	8.03	7.85	7.88	7.73	7.33	XO

Spectrophotometric Reflectance values (as %) at selected wavelengths

WebCode	Data Flag	400	420	440	460	480	500	520	540	560	580	600	620	640	660	680	700	Instr Code
Sample C221																		
TYTDTL		12.51	13.73X	14.19*	14.17*	13.88*	13.61	13.17*	12.35	10.86	9.38	8.47	7.96	7.77	7.81	7.66	7.31	GE
U7A7LW		13.10	14.30	14.50	14.50	14.30	14.00	13.50	12.70	11.20	9.60	8.70	8.20	7.95	8.00	7.80	7.50	AN
ULKPH3		12.87	14.11	14.45	14.38	14.03	13.75	13.33	12.46	10.92	9.43	8.54	8.02	7.83	7.88	7.74	7.36	MM
UMZ7G3		13.09	14.35	14.63	14.59	14.20	13.91	13.46	12.62	11.00	9.54	8.71	8.23	7.96	8.00	7.87	7.53	MI
UVADFQ		13.16	14.34	14.68	14.52	14.18	13.88	13.45	12.55	10.97	9.49	8.59	8.05	7.83	7.86	7.70	7.27	XB
VJGCEA		13.35	14.30	14.70	14.55	14.20	13.95	13.50	12.60	11.00	9.50	8.60	8.20	8.00	8.20X	7.70	7.50	HW
VY9B3N		13.06	14.27	14.51	14.57	14.26	13.96	13.47	12.68	11.17	9.65	8.76	8.23	7.99	8.00	7.86	7.47	AJ
VYP67J		12.87	14.15	14.50	14.37	14.06	13.81	13.37	12.47	10.91	9.44	8.57	8.06	7.86	7.91	7.78	7.39	XR
X292KN		12.93	14.21	14.60	14.51	14.16	13.86	13.42	12.56	11.01	9.55	8.63	8.11	7.90	7.95	7.81	7.42	MK
X7XKKW		12.90	14.23	14.55	14.49	14.14	13.85	13.45	12.58	11.03	9.54	8.65	8.10	7.88	7.93	7.79	7.41	MS
XVHQ94		12.85	14.14	14.47	14.40	14.05	13.76	13.35	12.49	10.93	9.45	8.56	8.04	7.82	7.87	7.74	7.34	MS
Y4AJZV		13.08	14.23	14.58	14.47	14.12	13.82	13.38	12.50	10.94	9.48	8.59	8.08	7.84	7.87	7.72	7.34	XD
Y6JGNK		13.07	14.34	14.68	14.57	14.27	13.95	13.50	12.64	11.09	9.61	8.72	8.18	7.97	8.00	7.89	7.51	MM
Y7CKZR		13.04	14.15	14.44	14.36	14.10	13.82	13.37	12.48	10.94	9.43	8.60	8.04	7.84	7.88	7.70	7.38	AS
Y8QQKN		12.96	14.17	14.49	14.39	14.07	13.80	13.38	12.51	10.94	9.49	8.60	8.08	7.85	7.88	7.72	7.28	XD
YAHTNQ		12.75	14.12	14.40	14.34	14.01	13.78	13.33	12.45	10.91	9.45	8.58	8.07	7.85	7.93	7.70	7.34	XI
YBUJF8		12.84	14.08	14.39	14.34	13.95	13.71	13.31	12.44	10.85	9.38	8.51	7.99	7.79	7.86	7.72	7.33	MV
YKFVNE	X	46.89X	47.72X	48.14X	47.95X	47.69X	47.24X	46.74X	46.01X	45.00X	44.08X	43.26X	42.58X	42.20X	42.24X	42.19X	41.86X	HP
ZQHE8N		13.95X	14.89X	15.10X	14.87X	14.46X	14.09*	13.61	12.64	11.01	9.50	8.64	8.12	7.91	7.98	7.77	7.31	XI

Summary Statistics

	400	420	440	460	480	500	520	540	560	580	600	620	640	660	680	700
Grand Means	13.06	14.22	14.54	14.46	14.13	13.84	13.41	12.56	11.00	9.50	8.63	8.10	7.88	7.93	7.77	7.39
SD Btwn Labs	0.30	0.15	0.14	0.12	0.12	0.12	0.11	0.14	0.11	0.08	0.09	0.08	0.07	0.08	0.08	0.09

2A73BP (X) - High % reflectance data at all wavelengths. Large replication difference for almost all wavelengths.

3Y38RJ (X) - Low % reflectance data at all wavelengths.

YKFVNE (X) - Extreme data for all wavelengths.

Key to Instrument Codes Reported by Participants

AB Datacolor 100
AJ Datacolor 600
AN Datacolor 650
AP Datacolor 750
AQ Datacolor 600x
AS Datacolor 800
AT Datacolor 850
AU Datacolor 1000
CA Cary 5000
GD BYK-Gardner Spectro-Guide Sphere
GE BYK-Gardner Spectro2-Guide Sphere Gloss
HP Hunter UltraScan PRO
HW Hunter UltraScan XE
MI Macbeth Color i5
MK Macbeth Color-Eye 7000
MM Macbeth Color-Eye 7000a
MQ Minolta CM-700d
MS Minolta CM-600d
MT Minolta CM-2600d
MV Minolta CM-3000d Spectrophotometer
MW Minolta CM 3700a Spectrophotometer
MY Minolta Benchtop Spectrophotometer CM-3600a
XB X-Rite Ci7000 Series Benchtop Spectrophotometer
XC X-Rite Ci4200 Benchtop Spectrophotometer
XD X-Rite Ci7800 Benchtop Spectrophotometer
XG X-Rite Ci7860 Benchtop Spectrophotometer
XH X-Rite Color i5 Benchtop Spectrophotometer
XI X-Rite Color i7 Benchtop Spectrophotometer
XM X-Rite SP62 Sphere Spectrophotometer
XO X-Rite SP64 Sphere Spectrophotometer
XR X-Rite
XX Instrument make/model not specified by lab

WebCode	Data Flag	Sample G221 Lab Mean	Sample G221 Diff from Grand Mean	Sample G221 CPV	Sample G222 Lab Mean	Sample G222 Diff from Grand Mean	Sample G222 CPV	Instr Code
2B4FUB		45.78	-1.62	-1.39	55.55	-1.79	-1.63	GD
2CCHNM		45.73	-1.67	-1.43	55.41	-1.93	-1.77	GL
2LJ6WM		47.93	0.53	0.45	58.33	0.99	0.90	GK
2MFL8Y		48.15	0.76	0.65	57.13	-0.21	-0.19	RA
3Y6WWG		47.70	0.31	0.26	57.58	0.24	0.22	GL
44FC2Y		46.23	-1.17	-1.00	55.40	-1.94	-1.77	GL
48DQPN		48.90	1.51	1.29	58.70	1.36	1.25	ZA
4FLPUJ		48.13	0.73	0.63	58.93	1.59	1.45	GN
4NFQE4		45.70	-1.69	-1.45	56.45	-0.89	-0.81	GL
6L9RGF	X	0.90	-46.49	-39.87	0.95	-56.39	-51.54	GD
7BKZQG		46.43	-0.97	-0.83	58.00	0.66	0.61	GK
7JL9FH		48.48	1.08	0.93	57.78	0.44	0.40	GK
7NDK89		48.20	0.81	0.69	57.45	0.11	0.10	GL
84GF2Q		46.50	-0.89	-0.77	56.03	-1.31	-1.20	GK
8UVDXX		48.48	1.08	0.93	58.40	1.06	0.97	GK
93M8BM		45.25	-2.14	-1.84	55.25	-2.09	-1.91	GL
99PC6R		46.08	-1.32	-1.13	56.85	-0.49	-0.45	GL
A8YDN8	X	43.23	-4.17	-3.58	46.98	-10.36	-9.47	GD
A96ZYR	X	19.20	-28.19	-24.18	49.70	-7.64	-6.98	QT
AAFXBM		49.53	2.13	1.83	59.08	1.74	1.59	GL
AB9X7D		45.63	-1.77	-1.52	55.45	-1.89	-1.73	GL
AC3LN9		48.23	0.83	0.71	57.83	0.49	0.45	GL
C2KGW4		48.28	0.88	0.75	58.25	0.91	0.83	GL
CADQ3R		48.33	0.93	0.80	58.05	0.71	0.65	GL
CG9WWT		48.38	0.98	0.84	57.90	0.56	0.51	GK
DD8C6E		48.60	1.21	1.03	58.53	1.19	1.09	GL
DZ4PGR		47.00	-0.39	-0.34	58.03	0.69	0.63	GL
EA4YY2		48.25	0.86	0.73	58.28	0.94	0.86	GN
FLVK6V		47.53	0.13	0.11	57.80	0.46	0.42	GL
GF4V2X		46.90	-0.49	-0.42	57.75	0.41	0.38	GL

WebCode	Data Flag	Sample G221 Lab Mean	Sample G221 Diff from Grand Mean	Sample G221 CPV	Sample G222 Lab Mean	Sample G222 Diff from Grand Mean	Sample G222 CPV	Instr Code
GLNX39		47.08	-0.32	-0.27	56.33	-1.01	-0.93	PA
GXJ7LB		46.38	-1.02	-0.87	57.45	0.11	0.10	GK
GYXQEL		48.33	0.93	0.80	58.00	0.66	0.61	GN
H3BVG9		47.43	0.03	0.03	56.75	-0.59	-0.54	GL
H87MRQ		47.75	0.36	0.30	57.15	-0.19	-0.17	GL
HE3E37		46.28	-1.12	-0.96	57.70	0.36	0.33	GL
HJF3WB		47.83	0.43	0.37	57.73	0.39	0.35	GL
HP6HPN		45.75	-1.64	-1.41	56.08	-1.26	-1.15	GT
JVUGJA		48.58	1.18	1.01	58.90	1.56	1.43	GL
JXX8M4		48.25	0.86	0.73	57.85	0.51	0.47	GK
KANJE8		48.05	0.66	0.56	57.93	0.59	0.54	RQ
KFAEC6		48.00	0.61	0.52	57.60	0.26	0.24	GN
KPXEN9		44.83	-2.57	-2.20	55.58	-1.76	-1.61	GK
KTXJJ2		48.18	0.78	0.67	57.20	-0.14	-0.13	GN
LFN6ZF		49.18	1.78	1.53	58.65	1.31	1.20	GL
MHDQBH		46.28	-1.12	-0.96	57.38	0.04	0.03	GL
MKGNFJ		46.35	-1.04	-0.90	57.08	-0.26	-0.24	MX
MQ8W4J		45.18	-2.22	-1.90	56.05	-1.29	-1.18	GL
MVB63Y		45.00	-2.39	-2.05	55.25	-2.09	-1.91	GK
NMZZVZ	X	46.58	-0.82	-0.70	54.30	-3.04	-2.78	XX
P3BYHC		47.68	0.28	0.24	57.28	-0.06	-0.06	GL
P839LJ		46.25	-1.14	-0.98	55.25	-2.09	-1.91	ED
PB3JGJ		48.98	1.58	1.36	58.28	0.94	0.86	GL
PXG86A		48.75	1.36	1.16	58.13	0.79	0.72	GL
Q7N9Z9		47.80	0.41	0.35	57.45	0.11	0.10	GN
QF9CAT		46.73	-0.67	-0.57	56.63	-0.71	-0.65	GL
QGM2C7		47.53	0.14	0.12	56.53	-0.81	-0.74	GL
QTFH28		45.40	-1.99	-1.71	55.93	-1.41	-1.29	GK
RA3FMY		46.80	-0.59	-0.51	56.70	-0.64	-0.58	GK
RCLEU2		46.95	-0.44	-0.38	56.10	-1.24	-1.13	GL

Interlaboratory Testing Program for Color & Appearance

Analysis 440

60 Degree Gloss - Paint Chips

ASTM Method D 523

WebCode	Data Flag	Sample G221 Lab Mean	Sample G221 Diff from Grand Mean	Sample G221 CPV	Sample G222 Lab Mean	Sample G222 Diff from Grand Mean	Sample G222 CPV	Instr Code
RFMHLN		47.15	-0.24	-0.21	56.63	-0.71	-0.65	GL
RYZVK7		48.10	0.71	0.60	58.08	0.74	0.67	GL
T4RL4M		46.64	-0.76	-0.65	55.94	-1.40	-1.28	GL
TLT883		47.08	-0.32	-0.27	57.25	-0.09	-0.08	MW
UKTQ9B		48.03	0.63	0.54	57.80	0.46	0.42	RB
ULKPH3		47.09	-0.31	-0.27	57.21	-0.13	-0.12	GL
UMZ7G3		48.30	0.91	0.78	58.43	1.09	0.99	GL
UW8NBU		47.40	0.01	0.00	58.70	1.36	1.25	GK
VJGCEA		46.45	-0.94	-0.81	56.78	-0.56	-0.51	GK
VNAHTC		48.33	0.93	0.80	58.08	0.74	0.67	GN
VY9B3N		49.25	1.86	1.59	59.05	1.71	1.56	NH
VYP67J		48.58	1.18	1.01	58.83	1.49	1.36	GL
WPKKEB		47.50	0.11	0.09	58.38	1.04	0.95	XX
X7XKKW		46.87	-0.52	-0.45	56.86	-0.48	-0.44	GK
XMNLF3		46.30	-1.09	-0.94	56.98	-0.36	-0.33	GK
XWCD72		47.63	0.23	0.20	56.93	-0.41	-0.38	GL
Y3WRAY	*	46.10	-1.29	-1.11	54.68	-2.66	-2.43	GL
Y6JGNK		49.60	2.21	1.89	58.50	1.16	1.06	GL
YAHTNQ		48.80	1.41	1.21	58.80	1.46	1.34	MM
YPRWQW		49.03	1.63	1.40	57.98	0.64	0.58	RA
ZM2W9R		47.45	0.06	0.05	58.18	0.84	0.77	GL

Summary Statistics

Grand Means

47.39 Gloss Units — 57.34 Gloss Units

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1.17 Gloss Units — 1.09 Gloss Units

Statistics based on 77 of 81 reporting participants

Comments on Assigned Data Flags for Test #440

6L9RGF(X) - Extreme data.

A8YDN8(X) - Extreme data.

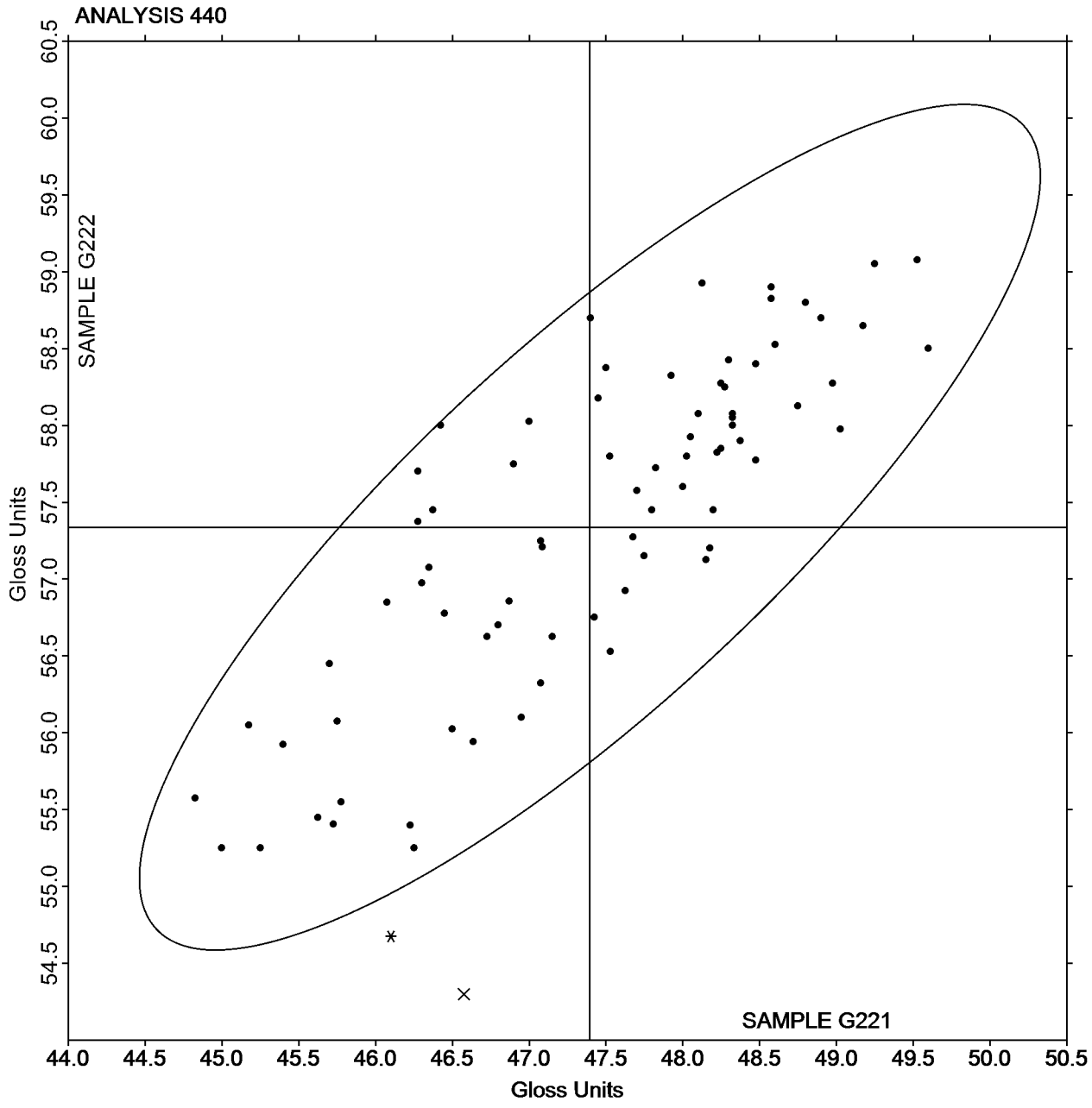
A96ZYR(X) - Extreme data.

NMZZVZ(X) - Low data for Sample G222.

Key to Instrument Codes Reported by Participants

ED	Elcometer 407	GD	BYK Gardner Spectro2Guide 45/0
GK	BYK-Gardner micro-gloss (60)	GL	BYK-Gardner micro-TRI-gloss
GN	BYK-Gardner new micro-TRI-gloss	GT	Gardco Novo-Gloss (20/60/85)
MM	Macbeth Lab-Gloss	MW	Minolta Multi-Gloss 268
MX	Minolta Multi-Gloss 268 Plus	NH	3nh NHG268 Multi-angle Precise Gloss Meter
PA	Photovolt micto-TRI-gloss G3	QT	Qualitest Micro-Tri-Gloss
RA	Rhopoint Novo-Gloss Glossmeter	RB	Rhopoint Novo-Gloss LITE Glossmeter
RQ	Rhopoint IQ Goniophotometer 20/60/85°	XX	Instrument make/model not specified by lab
ZA	Zehntner ZGM Series		

SAMPLE G221 = 47.39 Gloss Units SAMPLE G222 = 57.34 Gloss Units



-End of Report-