Collaborative Testing Services, Inc.

Color & Appearance Testing Program

Summary Report #203 - 1st Qtr 2023

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
23PH9B		A231	54.02	9.39	12.21	0.96	-0.31	-0.31	1.06	HW
		A232	54.98	9.08	11.90					
2CCQL7		A231	54.11	9.26	12.77	0.88	-0.33	-0.32	0.99	GE
		A232	54.98	8.93	12.45					
2GKDGP		A231	53.77	9.70	12.49	0.90	-0.34	-0.33	1.02	HK
		A232	54.67	9.36	12.16					
2H4VGV		A231	54.11	9.36	12.18	0.99	-0.33	-0.31	1.09	XO
		A232	55.10	9.03	11.87					
39BRYK		A231	53.89	9.33	12.24	0.99	-0.30	-0.32	1.08	XU
		A232	54.88	9.03	11.91					
47HBCP		A231	54.35	9.40	12.30	0.95	-0.35	-0.30	1.06	HW
		A232	55.30	9.05	12.00					
6LPTFA	X	A231	55.03	10.26	13.07	0.88	-0.40	-0.34	1.03	XE
		A232	55.91	9.87	12.73					
7Y9TP9		A231	54.07	9.54	12.45	0.89	-0.30	-0.31	0.99	GA
		A232	54.95	9.24	12.14					
8XCXKB		A231	54.01	9.51	12.38	0.85	-0.33	-0.28	0.96	GE
		A232	54.87	9.18	12.10					
9EJCHK		A231	54.18	9.28	12.32	0.93	-0.29	-0.32	1.02	HW
		A232	55.11	8.98	12.01					
A6MKMC		A231	53.83	9.31	12.15	0.91	-0.27	-0.26	0.98	MD
		A232	54.74	9.04	11.90					
AZDFZH		A231	54.18	9.34	12.17	0.96	-0.34	-0.36	1.08	XM
		A232	55.14	9.00	11.80					
B4QFUN		A231	54.46	9.24	12.13	0.86	-0.30	-0.27	0.95	XW
		A232	55.32	8.94	11.86					
BVXAWG		A231	53.62	9.50	12.14	0.96	-0.33	-0.26	1.05	HX
		A232	54.59	9.17	11.88					
BWUP68		A231	53.75	9.34	11.97	0.94	-0.39	-0.37	1.08	HK
		A232	54.69	8.95	11.60					
C9Y8C2		A231	53.77	9.35	12.63	0.92	-0.29	-0.30	1.01	BG
		A232	54.69	9.05	12.33					

			CIE L* a* b* Color Values			Color Difference Values				
WebCode	Flag	Samples	L*	a*	b*	ΔL*	Δa*	Δb*	ΔE*	InstrCode
CVREQF		A231	54.33	9.36	12.30	0.88	-0.36	-0.36	1.01	HW
		A232	55.21	9.00	11.95					
F9QBNY		A231	54.05	9.30	12.31	0.99	-0.32	-0.34	1.10	HW
		A232	55.04	8.99	11.97					
FFMJJQ		A231	54.35	9.25	12.15	0.85	-0.30	-0.25	0.94	HW
		A232	55.20	8.95	11.90					
G6JLBG		A231	53.73	9.62	12.33	0.96	-0.30	-0.31	1.06	HK
		A232	54.70	9.32	12.01					
GULLZX		A231	54.02	9.37	12.16	0.91	-0.32	-0.29	1.01	XU
		A232	54.93	9.05	11.87					
JT2LVY		A231	54.04	9.32	12.28	0.93	-0.28	-0.28	1.01	XS
		A232	54.97	9.04	11.99					
MLC8J4		A231	53.81	9.34	12.45	0.94	-0.31	-0.30	1.03	BG
		A232	54.74	9.03	12.15					
N9XP2K		A231	53.80	9.27	12.17	0.91	-0.33	-0.30	1.01	MT
		A232	54.71	8.94	11.87					
NDV974		A231	54.00	9.27	11.61	0.91	-0.35	-0.36	1.04	XH
		A232	54.91	8.92	11.25					
NFUVX2		A231	54.02	9.22	12.21	0.98	-0.29	-0.34	1.08	HW
		A232	55.00	8.93	11.88					
NXYU7A		A231	54.05	9.27	12.24	0.91	-0.27	-0.27	0.99	XU
		A232	54.96	9.01	11.96					
NYNNKK		A231	54.03	9.17	11.61	0.88	-0.34	-0.32	1.00	XH
		A232	54.92	8.83	11.29					
RD6AMM		A231	54.08	9.63	12.47	0.99	-0.32	-0.35	1.10	GE
		A232	55.07	9.31	12.12					
RJAXE3		A231	54.30	9.15	12.20	0.95	-0.15	-0.15	0.97	HL
		A232	55.25	9.00	12.05					
TKYJMK		A231	54.29	9.19	12.40	0.96	-0.26	-0.23	1.02	GH
		A232	55.25	8.93	12.17					
TLPRRE		A231	54.08	9.52	12.98	0.92	-0.36	-0.31	1.04	GE
		A232	55.01	9.16	12.67					

			CIE L* a* b* Color Values			Color Difference Values				
WebCode	Flag	Samples	L*	a*	b*	ΔL*	Δa*	Δb*	ΔE*	InstrCode
TVH33A	X	A231	49.95	8.79	10.74	0.92	-0.33	-0.25	1.01	PR
		A232	50.88	8.46	10.48					
ULLK3R		A231	53.86	9.39	12.37	0.97	-0.32	-0.30	1.06	XU
		A232	54.83	9.07	12.07					
UT8F7G		A231	54.20	9.31	12.38	0.98	-0.35	-0.37	1.11	HW
		A232	55.18	8.96	12.02					
V83E8J		A231	54.06	9.28	11.94	0.98	-0.27	-0.27	1.05	XE
		A232	55.03	9.01	11.67					
VCDCYC		A231	53.67	9.24	12.24	0.91	-0.33	-0.29	1.01	GG
		A232	54.59	8.92	11.96					
VY99DH		A231	53.97	9.22	12.39	0.99	-0.31	-0.31	1.08	MG
		A232	54.96	8.91	12.08					
XZBQMX		A231	53.93	9.25	12.34	0.95	-0.32	-0.30	1.05	HW
		A232	54.88	8.93	12.04					
YNYYHN	X	A231	56.91	8.79	12.29	1.03	-0.27	-0.30	1.11	XP
		A232	57.94	8.52	11.98					
YQ74AQ		A231	54.45	9.30	12.20	0.95	-0.35	-0.30	1.06	HL
		A232	55.40	8.95	11.90					
YRBTBE	X	A231	54.21	9.40	11.11	0.87	-0.27	-0.21	0.93	XD
		A232	55.08	9.13	10.90					
YZ2ZPT		A231	53.45	9.14	11.68	0.90	-0.28	-0.23	0.97	XF
		A232	54.35	8.86	11.45					

Summary Statistics

Samples	L*	a*	b*	ΔL*	Δa*	Δb*	ΔE*
Grand Means							
A231	54.02	9.34	12.28	0.93	-0.31	-0.30	1.03
A232	54.95	9.03	11.97				
Stnd Dev Btwn Labs							
A231	0.23	0.13	0.29	0.04	0.04	0.04	0.04
A232	0.23	0.12	0.29				

Statistics based on 39 of 43 reporting participants

Comments Assigned on Data Flags for Test #408

6LPTFA(X) - High L* values for both samples. Large replication difference for Sample A232 L*. Extreme data for both a* values.

TVH33A(X) - Extreme data for both L* values. Very low a* and b* values for both samples.

YNYYHN(X) - Extreme data for both L* values. Low a* values for both samples.

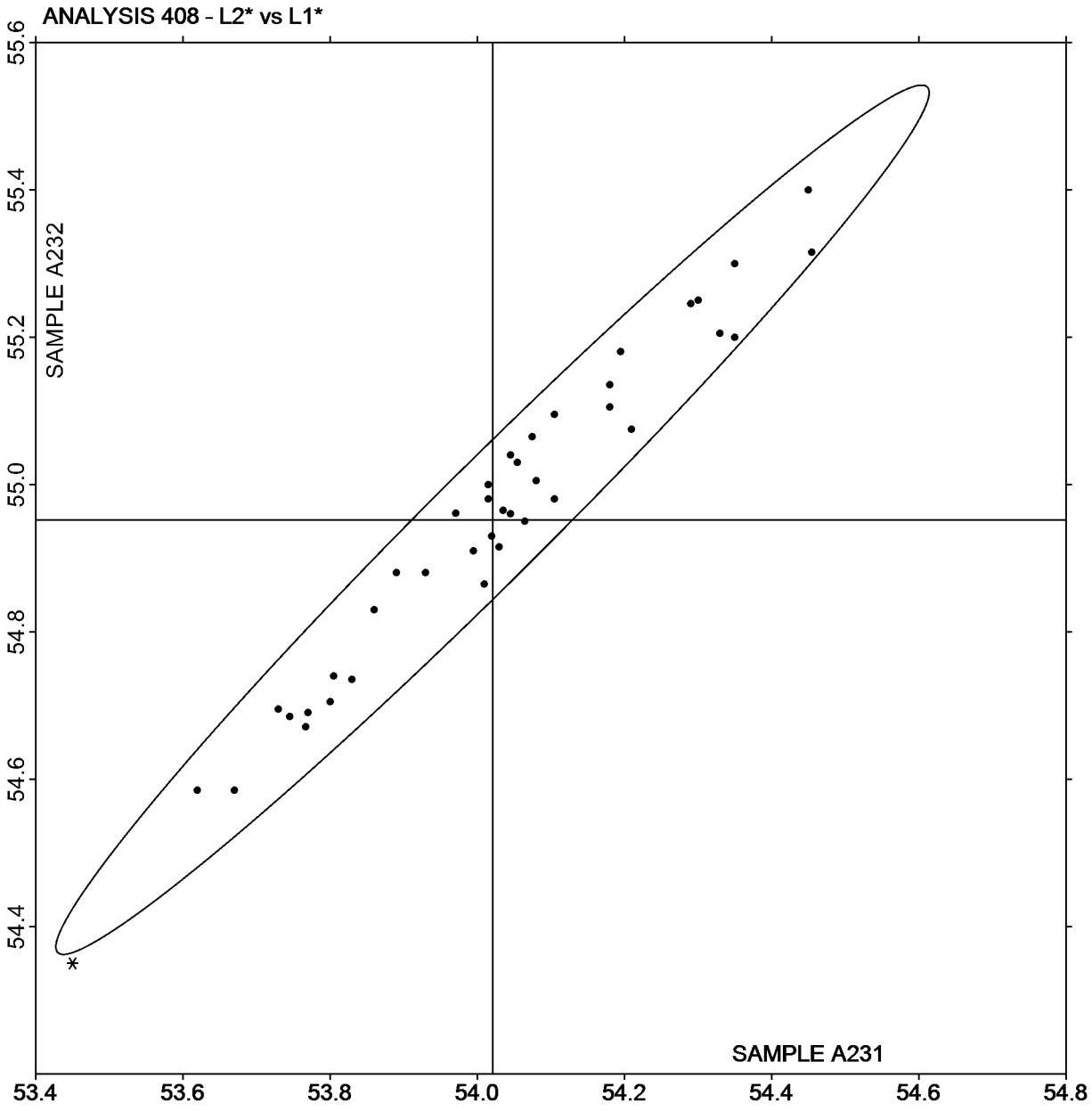
YRBTBE(X) - Low b* values for both samples.

Key to Instrument Codes Reported by Participants

BG	BYK Mac i	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)
HL	Hunter Agera	HW	Hunter LabScan XE
HX	Hunter Color FlexEZ 45/0	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		

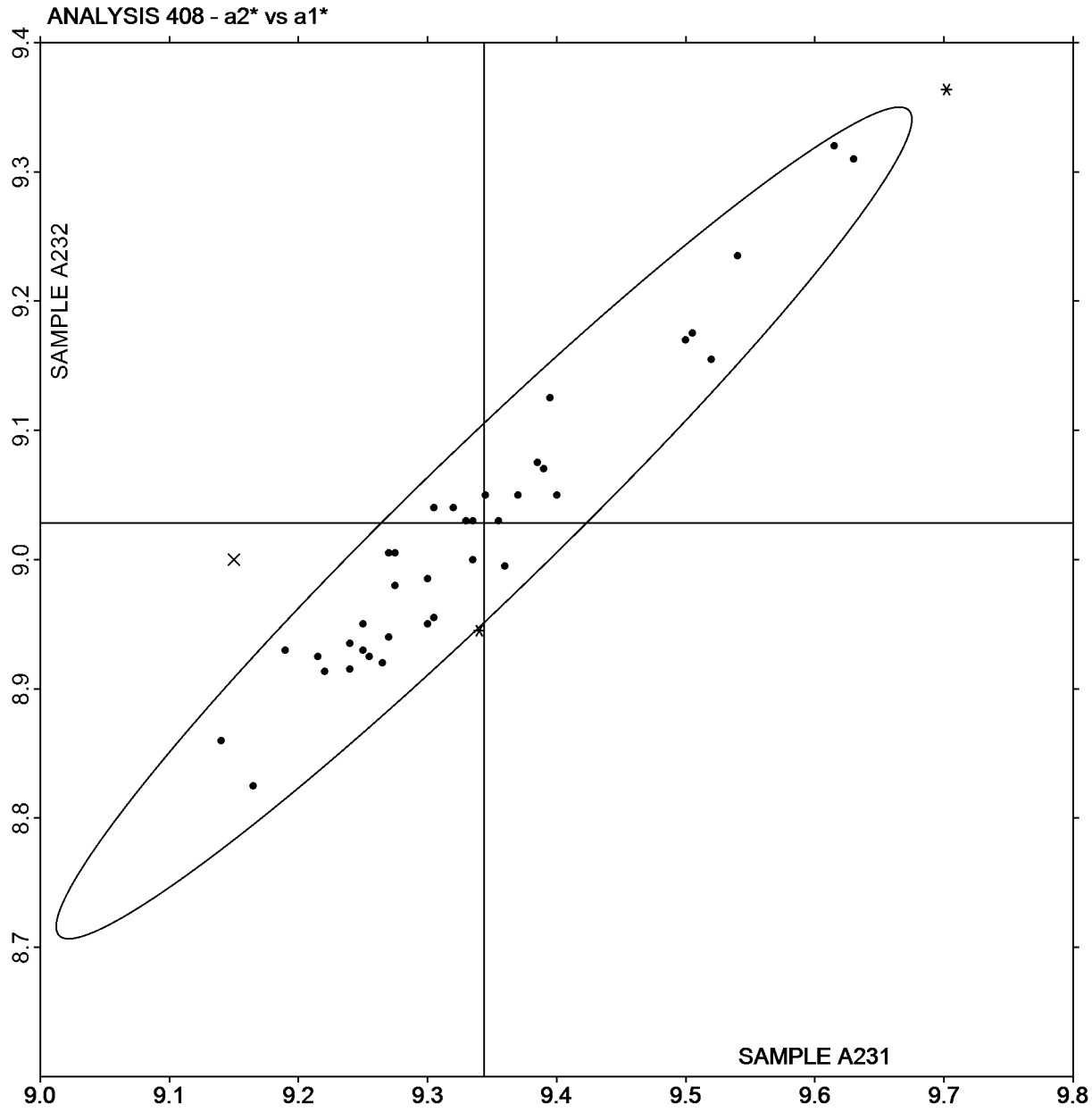
L2* vs L1*

SAMPLE A231 = 54.02 SAMPLE A232 = 54.95



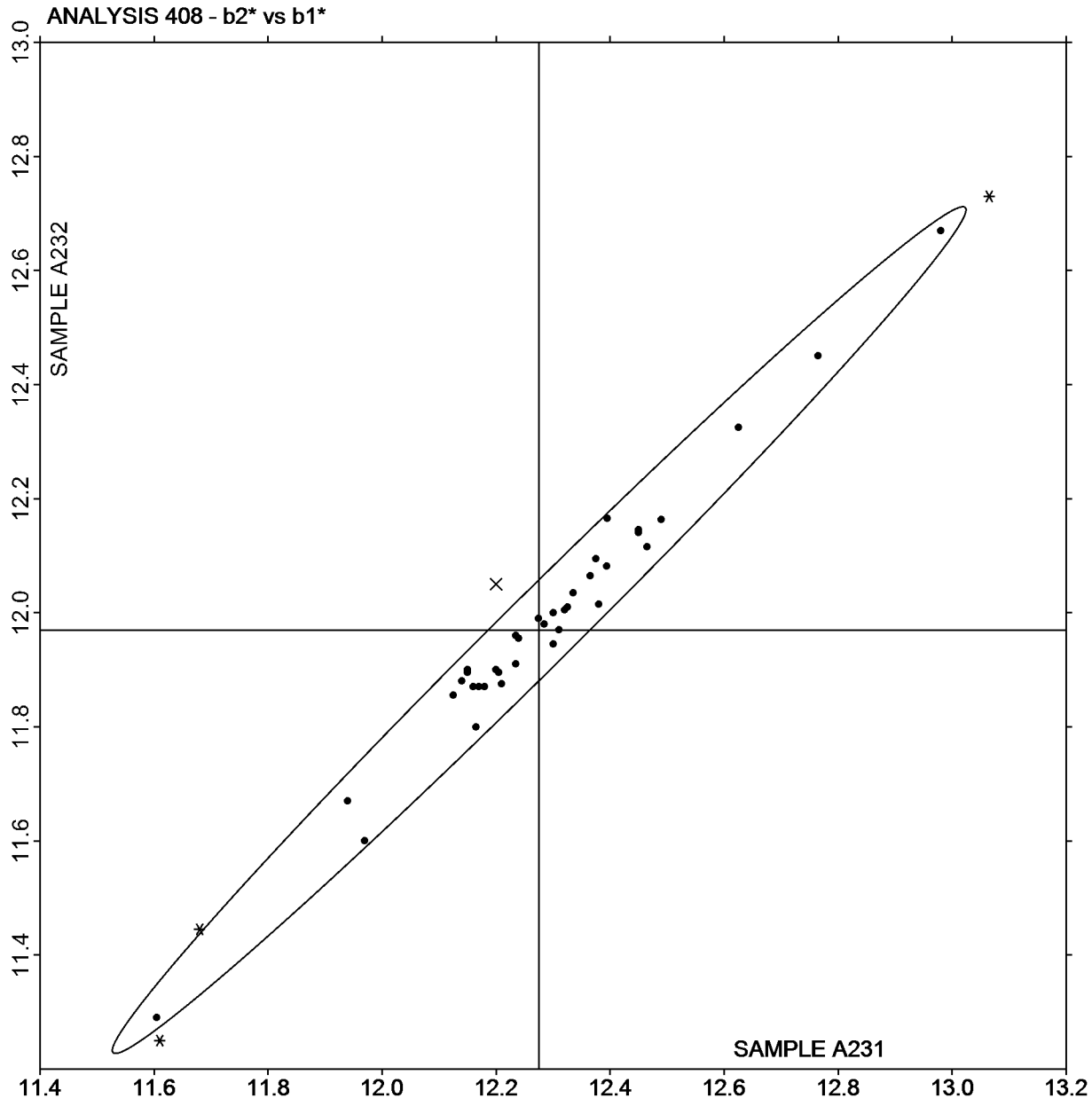
a2* vs a1*

SAMPLE A231 = 9.34 SAMPLE A232 = 9.03



b2* vs b1*

SAMPLE A231 = 12.28 SAMPLE A232 = 11.97



			CIE L* a* b* Color Values			Color Difference Values				
WebCode	Flag	Samples	L*	a*	b*	ΔL*	Δa*	Δb*	ΔE*	InstrCode
28KGET		A231	54.06	9.14	11.59	0.95	-0.38	-0.34	1.08	XI
		A232	55.02	8.76	11.25					
2CCQL7		A231	53.84	9.06	11.72	0.88	-0.35	-0.33	1.00	GD
		A232	54.71	8.72	11.39					
2QGL69		A231	54.21	9.31	11.71	0.89	-0.36	-0.33	1.01	MV
		A232	55.09	8.96	11.37					
2ZJZAE		A231	54.16	9.27	11.68	0.90	-0.33	-0.31	1.00	XB
		A232	55.06	8.94	11.37					
39BRYK		A231	54.23	9.18	11.58	0.94	-0.32	-0.33	1.05	XE
		A232	55.16	8.86	11.24					
3WVWR8		A231	54.00	9.30	11.57	0.94	-0.32	-0.31	1.03	MY
		A232	54.94	8.98	11.26					
62MYUX		A231	54.24	9.17	11.60	0.92	-0.31	-0.27	1.01	AJ
		A232	55.16	8.86	11.33					
6J8HVC		A231	53.85	9.34	11.77	0.90	-0.38	-0.30	1.03	XH
		A232	54.76	8.96	11.46					
6KVZNW		A231	54.19	9.17	11.56	0.93	-0.33	-0.30	1.03	XD
		A232	55.12	8.84	11.26					
6NXY4V		A231	54.31	9.06	11.50	0.91	-0.29	-0.30	1.00	XI
		A232	55.22	8.77	11.20					
7FKAWB		A231	54.28	9.25	11.65	0.89	-0.34	-0.31	1.01	AP
		A232	55.18	8.91	11.34					
7Y9TP9		A231	54.16	9.30	11.61	0.88	-0.35	-0.30	0.99	AJ
		A232	55.04	8.95	11.31					
8WXDR2		A231	54.08	9.14	11.54	0.97	-0.32	-0.30	1.06	MM
		A232	55.05	8.82	11.24					
8WZLL2		A231	54.25	9.11	11.69	0.88	-0.30	-0.28	0.97	XD
		A232	55.12	8.81	11.40					
9K28YA		A231	54.31	9.18	11.52	0.83	-0.29	-0.26	0.91	AJ
		A232	55.14	8.90	11.26					
9PZW63		A231	54.18	9.26	11.68	0.94	-0.30	-0.36	1.04	AW
		A232	55.11	8.96	11.32					

			CIE L* a* b* Color Values			Color Difference Values				
WebCode	Flag	Samples	L*	a*	b*	ΔL*	Δa*	Δb*	ΔE*	InstrCode
9ZJ9GE		A231	54.21	9.27	11.70	0.96	-0.32	-0.33	1.06	AS
		A232	55.17	8.95	11.37					
AJP6DF		A231	53.96	9.14	11.85	0.98	-0.37	-0.35	1.10	XM
		A232	54.94	8.77	11.50					
BCHZRA		A231	54.17	9.20	11.64	0.94	-0.30	-0.28	1.02	AQ
		A232	55.11	8.89	11.36					
BW8CML		A231	53.93	9.27	11.66	0.94	-0.25	-0.23	1.00	XH
		A232	54.87	9.02	11.44					
C6FWYC		A231	54.14	9.08	11.80	0.94	-0.29	-0.29	1.02	XR
		A232	55.08	8.79	11.52					
CAU9XJ		A231	54.22	9.20	11.64	0.93	-0.34	-0.34	1.05	XD
		A232	55.15	8.86	11.30					
CJJU8M		A231	54.25	9.20	11.77	0.98	-0.31	-0.32	1.08	AE
		A232	55.23	8.88	11.45					
CW9NL3		A231	54.19	9.24	11.63	0.95	-0.37	-0.35	1.08	XD
		A232	55.14	8.87	11.28					
CYXV7Y		A231	54.20	9.20	11.52	0.89	-0.33	-0.31	1.00	HP
		A232	55.09	8.87	11.21					
D4GKY8		A231	54.18	9.11	11.43	1.00	-0.33	-0.32	1.10	HP
		A232	55.17	8.78	11.11					
EP2NE6		A231	54.22	9.28	11.66	0.93	-0.40	-0.37	1.08	AJ
		A232	55.15	8.87	11.30					
FA2DAX		A231	54.23	9.23	11.63	0.89	-0.32	-0.32	1.00	AT
		A232	55.12	8.91	11.31					
FJMLPE		A231	54.14	9.17	11.61	0.96	-0.25	-0.30	1.04	MK
		A232	55.10	8.91	11.31					
FLRGCX		A231	54.27	9.38	11.71	0.84	-0.36	-0.29	0.96	AS
		A232	55.12	9.02	11.42					
FNHFMF		A231	54.32	9.22	11.68	0.92	-0.31	-0.31	1.02	AT
		A232	55.24	8.91	11.37					
FNZ9JJ		A231	54.52	9.33	11.70	0.94	-0.30	-0.30	1.03	CA
		A232	55.46	9.02	11.40					

			CIE L* a* b* Color Values			Color Difference Values				
WebCode	Flag	Samples	L*	a*	b*	ΔL*	Δa*	Δb*	ΔE*	InstrCode
G89TVD		A231	54.09	9.21	11.62	0.85	-0.34	-0.25	0.95	MW
		A232	54.94	8.88	11.38					
GDWBDV		A231	54.22	9.17	11.63	0.95	-0.28	-0.30	1.03	AS
		A232	55.17	8.88	11.33					
GE6UQX	X	A231	55.50	6.97	13.79	0.87	-0.20	-0.27	0.93	AQ
		A232	56.37	6.78	13.53					
GULLZX		A231	54.22	9.09	11.56	0.90	-0.24	-0.23	0.95	XI
		A232	55.12	8.85	11.33					
HAWKNV		A231	54.12	9.09	11.68	1.01	-0.30	-0.33	1.11	XG
		A232	55.13	8.79	11.35					
HDRHTT		A231	54.29	9.19	11.61	0.99	-0.28	-0.29	1.07	XD
		A232	55.27	8.91	11.32					
HE7ZUD		A231	54.35	9.12	11.44	0.96	-0.27	-0.28	1.04	XB
		A232	55.32	8.84	11.15					
HHQPHW		A231	54.26	9.11	11.80	0.89	-0.34	-0.30	0.99	XF
		A232	55.14	8.78	11.49					
HMZ8CH		A231	54.30	9.25	11.71	0.92	-0.30	-0.28	1.00	AP
		A232	55.22	8.95	11.43					
HRQKAZ		A231	54.24	9.12	11.47	0.87	-0.31	-0.28	0.96	XD
		A232	55.11	8.80	11.20					
J9DLKQ		A231	54.19	9.25	11.66	0.95	-0.33	-0.30	1.05	AJ
		A232	55.14	8.92	11.36					
JD8ML7		A231	54.11	9.19	11.43	0.93	-0.26	-0.27	1.00	HP
		A232	55.04	8.93	11.16					
JKB2RL		A231	54.00	9.07	11.55	0.86	-0.23	-0.25	0.93	XI
		A232	54.86	8.83	11.30					
JT2LVY		A231	54.01	9.22	11.89	0.97	-0.34	-0.37	1.09	AJ
		A232	54.98	8.88	11.52					
K6RVVD		A231	54.12	9.18	11.69	1.03	-0.33	-0.33	1.13	XD
		A232	55.15	8.85	11.35					
KZW9XH		A231	54.54	9.30	11.69	0.95	-0.38	-0.35	1.08	CA
		A232	55.48	8.92	11.35					

			CIE L* a* b* Color Values			Color Difference Values				
WebCode	Flag	Samples	L*	a*	b*	ΔL*	Δa*	Δb*	ΔE*	InstrCode
LEE38M		A231	54.22	9.24	11.70	0.89	-0.32	-0.30	0.99	AS
		A232	55.11	8.91	11.40					
N9GDNL		A231	54.00	9.27	11.59	0.98	-0.30	-0.32	1.07	XI
		A232	54.98	8.97	11.27					
N9XP2K		A231	54.27	9.16	11.63	0.95	-0.28	-0.29	1.03	XB
		A232	55.22	8.88	11.34					
NDV974		A231	54.02	9.32	11.62	0.93	-0.41	-0.36	1.08	XH
		A232	54.95	8.92	11.26					
NXYU7A		A231	54.10	9.13	11.53	0.91	-0.26	-0.23	0.97	XI
		A232	55.00	8.87	11.30					
PDCKLN		A231	54.14	9.11	11.58	0.91	-0.34	-0.33	1.03	XI
		A232	55.05	8.77	11.26					
PJZ33K		A231	54.31	9.20	11.58	0.94	-0.28	-0.34	1.03	MI
		A232	55.25	8.92	11.24					
PPK8VL		A231	54.28	9.02	11.67	1.05	-0.34	-0.34	1.15	GG
		A232	55.33	8.68	11.32					
R7ZFKE		A231	54.25	9.24	11.47	0.95	-0.31	-0.33	1.06	AJ
		A232	55.21	8.93	11.14					
RED8AC		A231	54.21	9.11	11.52	0.97	-0.30	-0.30	1.06	AJ
		A232	55.18	8.81	11.22					
RLXAD9		A231	54.24	9.22	11.72	0.92	-0.29	-0.28	1.00	AS
		A232	55.16	8.93	11.45					
TAFAXQ		A231	54.19	9.14	11.63	0.94	-0.37	-0.35	1.07	XH
		A232	55.13	8.77	11.28					
TKYJMK		A231	54.34	9.19	11.78	0.94	-0.31	-0.29	1.03	MV
		A232	55.28	8.88	11.49					
TVH33A		A231	54.05	9.22	11.60	1.03	-0.37	-0.33	1.14	CA
		A232	55.08	8.85	11.27					
U79EP8		A231	54.18	9.21	11.65	0.84	-0.31	-0.27	0.94	MU
		A232	55.02	8.89	11.38					
ULLK3R		A231	54.27	9.13	11.53	0.94	-0.26	-0.30	1.02	XB
		A232	55.21	8.87	11.23					

			CIE L* a* b* Color Values			Color Difference Values				
WebCode	Flag	Samples	L*	a*	b*	ΔL*	Δa*	Δb*	ΔE*	InstrCode
V4J86B		A231	54.25	9.19	11.78	0.88	-0.28	-0.25	0.96	AT
		A232	55.13	8.91	11.53					
V6XP7V	X	A231	53.74	9.24	11.70	0.93	-0.31	-0.30	1.02	MR
		A232	54.67	8.93	11.41					
V9T7WP		A231	54.08	9.28	11.70	0.97	-0.40	-0.40	1.12	MQ
		A232	55.05	8.87	11.30					
VA7AUT	X	A231	54.41	9.55	11.59	0.97	-0.46	-0.34	1.12	HP
		A232	55.38	9.09	11.26					
VCDCYC	X	A231	53.88	9.25	12.01	0.93	-0.38	-0.35	1.06	GE
		A232	54.81	8.88	11.67					
VUGZ8Q		A231	54.22	9.26	11.60	0.89	-0.32	-0.30	0.99	XI
		A232	55.11	8.93	11.30					
VV84YC		A231	54.34	9.17	11.72	0.85	-0.34	-0.32	0.97	AO
		A232	55.19	8.83	11.40					
WCA8W9		A231	54.14	9.22	11.69	0.88	-0.28	-0.26	0.96	MW
		A232	55.02	8.94	11.42					
WPGB4N		A231	54.16	9.26	11.60	0.94	-0.35	-0.32	1.05	XI
		A232	55.10	8.92	11.27					
WUNADM		A231	54.21	9.28	11.67	0.95	-0.31	-0.34	1.06	AV
		A232	55.16	8.97	11.33					
X9B7GC		A231	54.09	9.17	11.56	0.91	-0.37	-0.34	1.04	XI
		A232	55.00	8.81	11.21					
XFRL6E		A231	54.19	9.11	11.61	0.92	-0.27	-0.27	1.00	XE
		A232	55.11	8.84	11.34					
XJAW2J		A231	54.39	9.32	11.83	0.94	-0.37	-0.35	1.07	AS
		A232	55.33	8.95	11.48					
XKXKAD		A231	54.10	9.20	11.59	0.91	-0.29	-0.25	0.98	XI
		A232	55.00	8.91	11.34					
XXBFXP		A231	54.18	9.30	11.67	0.91	-0.35	-0.33	1.04	AU
		A232	55.10	8.95	11.34					
Y673Z9		A231	54.32	9.12	11.56	0.92	-0.31	-0.30	1.02	AO
		A232	55.24	8.81	11.25					

			CIE L* a* b* Color Values			Color Difference Values				
WebCode	Flag	Samples	L*	a*	b*	ΔL*	Δa*	Δb*	ΔE*	InstrCode
Y7GPUG		A231	53.96	9.15	11.87	0.98	-0.30	-0.33	1.07	XO
		A232	54.94	8.86	11.55					
Y7WAYC	X	A231	55.36	9.54	11.48	0.95	-0.34	-0.30	1.06	MT
		A232	56.31	9.20	11.18					
Y7ZNVK		A231	54.29	9.22	11.66	0.91	-0.31	-0.29	1.00	XD
		A232	55.19	8.91	11.37					
Y9J9DP		A231	54.20	9.17	11.75	0.93	-0.31	-0.30	1.03	AS
		A232	55.13	8.86	11.46					
YJPKWJ		A231	53.98	9.15	11.81	0.93	-0.35	-0.35	1.05	XO
		A232	54.91	8.81	11.46					
YNYYHN		A231	54.09	9.06	11.68	0.85	-0.27	-0.27	0.93	XF
		A232	54.94	8.79	11.41					
Z38KFD		A231	54.08	9.27	11.67	0.91	-0.36	-0.32	1.02	MW
		A232	54.98	8.92	11.35					
ZFCLPE		A231	54.32	9.24	11.71	0.90	-0.33	-0.28	1.00	MT
		A232	55.22	8.91	11.43					
ZFGYDB		A231	54.04	9.13	11.44	0.95	-0.39	-0.34	1.08	MM
		A232	54.99	8.74	11.09					
ZP986U		A231	54.16	9.32	11.69	0.95	-0.33	-0.33	1.06	MY
		A232	55.12	8.99	11.37					

Summary Statistics

Samples	L*	a*	b*	ΔL*	Δa*	Δb*	ΔE*
Grand Means							
A231	54.18	9.20	11.64	0.93	-0.32	-0.31	1.03
A232	55.11	8.88	11.33				
Stnd Dev Btwn Labs							
A231	0.13	0.08	0.10	0.04	0.04	0.03	0.05
A232	0.13	0.07	0.10				

Statistics based on 85 of 90 reporting participants

Comments Assigned on Data Flags for Test #409

GE6UQX(X) - Extreme data for both samples for L*, a* & b*. Large Delta a.

V6XP7V(X) - Low L* values for both samples.

VA7AUT(X) - High a* values for both samples. Large replication difference for Sample A232 for a*. Small Delta a.

VCDCYC(X) - High b* values for both samples.

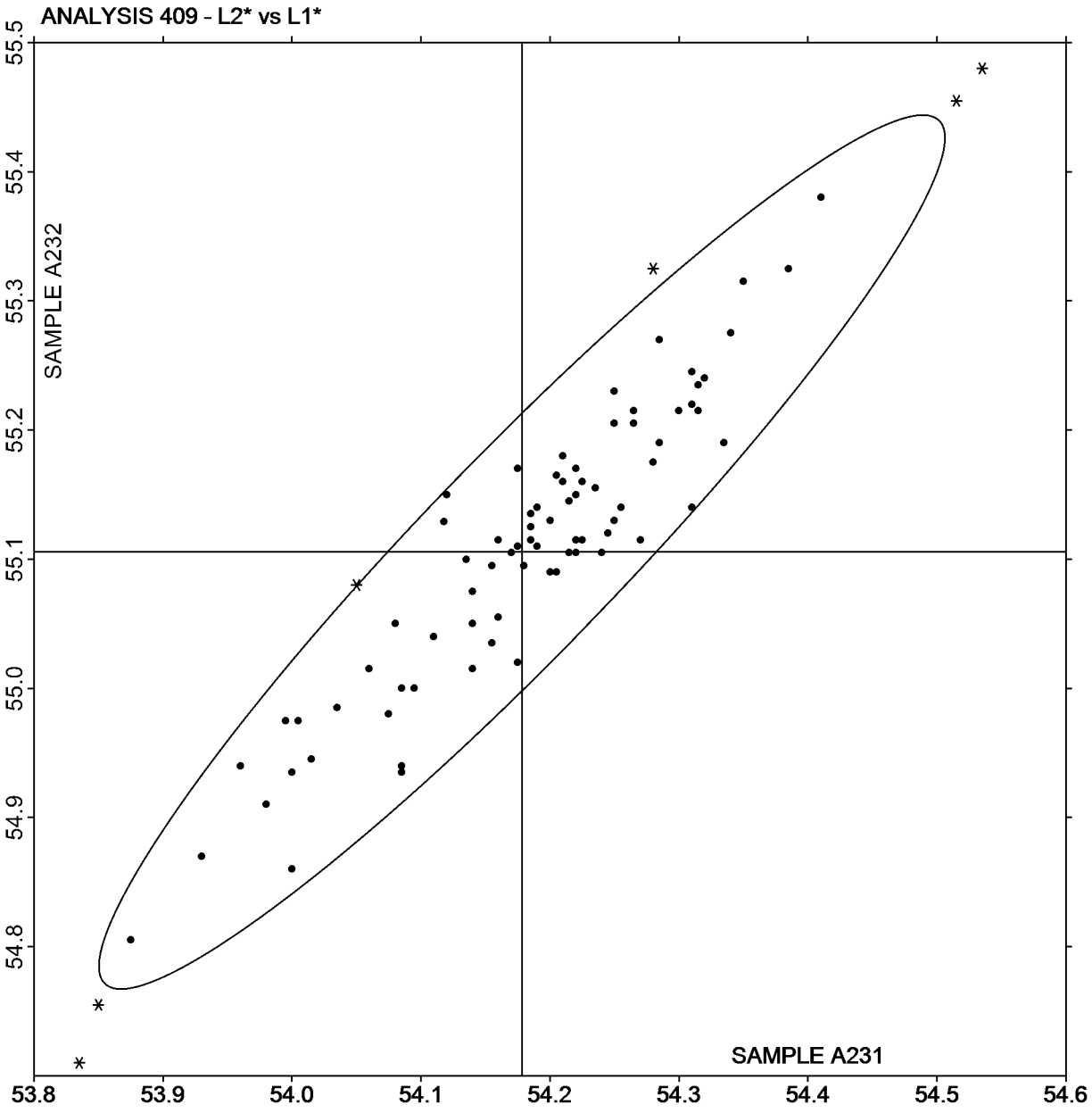
Y7WAYC(X) - Extreme data for both L* values. High a* values for both samples.

Key to Instrument Codes Reported by Participants

AE	Datacolor 110	AJ	Datacolor 600
AO	Datacolor 650x	AP	Datacolor 750
AQ	Datacolor 600x	AS	Datacolor 800
AT	Datacolor 850	AU	Datacolor 1000
AV	Datacolor 700	AW	Datacolor 1050
CA	Cary 5000	GD	BYK-Gardner Spectro-Guide Sphere
GE	BYK-Gardner Spectro2-Guide Sphere Gloss	GG	BYK-Gardner TCS II
HP	Hunter UltraScan PRO	MI	Macbeth Color i5
MK	Macbeth Color-Eye 7000	MM	Macbeth Color-Eye 7000a
MQ	Minolta CM-700d	MR	Minolta CM-5
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
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		

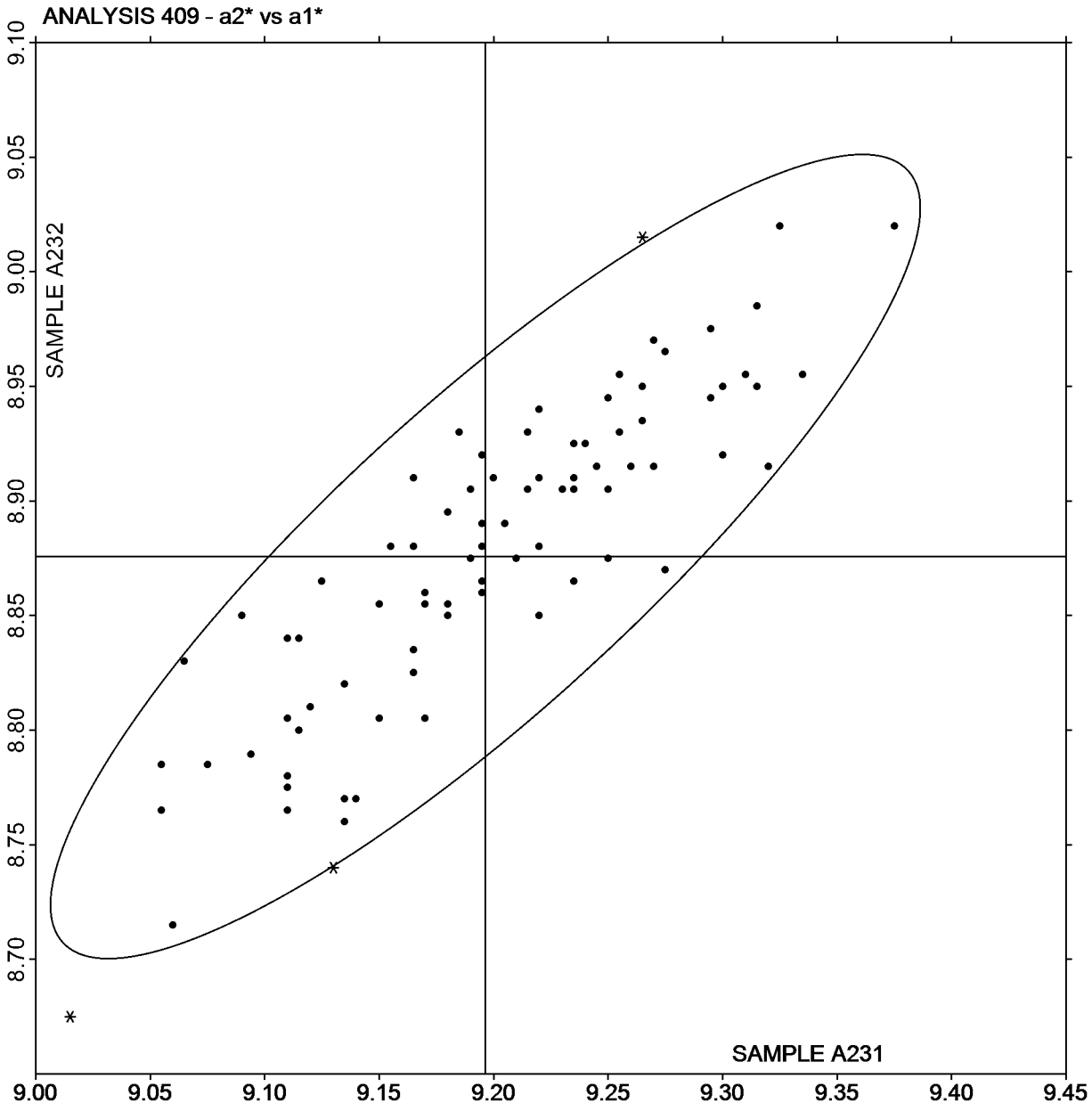
L2* vs L1*

SAMPLE A231 = 54.18 SAMPLE A232 = 55.11



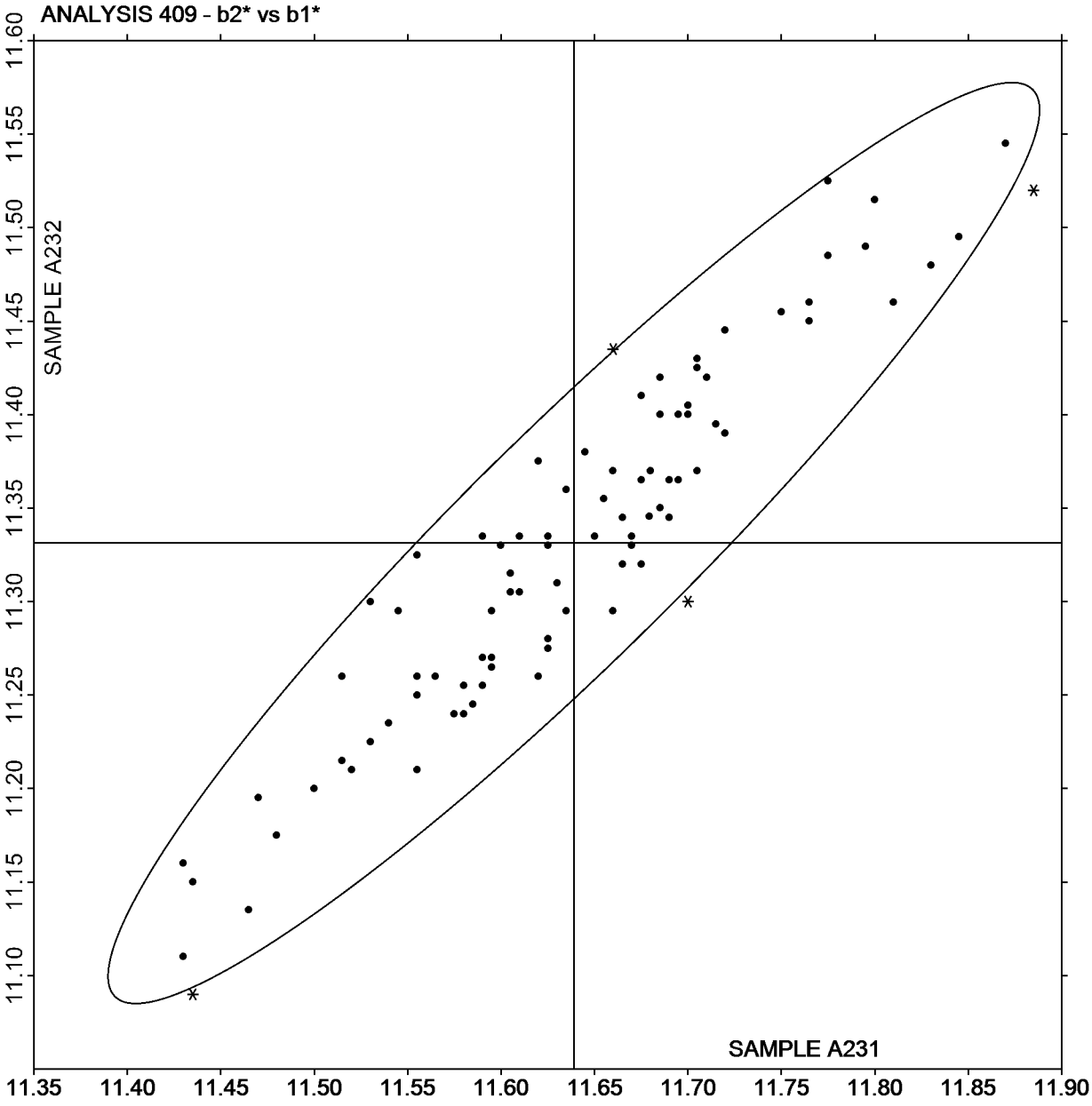
a2* vs a1*

SAMPLE A231 = 9.20 SAMPLE A232 = 8.88



b2* vs b1*

SAMPLE A231 = 11.64 SAMPLE A232 = 11.33



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 A231																		
2CCQL7		13.42	14.61	15.84X	16.47*	16.64	17.27	18.26*	19.40*	21.35*	25.87	28.35X	28.77*	28.65*	28.51*	28.54	28.86	GD
2QGL69		13.21	14.85	16.17	16.78	16.78	17.43	18.48	19.65	21.69	26.25	29.05	29.33	29.03	28.93	28.85	28.86	MV
2ZJZAE		13.68	14.89	16.16	16.70	16.78	17.39	18.45	19.63	21.72	26.09	28.87	29.24	29.04	28.86	28.74	28.72	XB
39BRYK		13.52	14.96	16.27	16.82	16.86	17.47	18.54	19.71	21.80	26.16	28.88	29.22	29.03	28.89	28.77	28.72	XE
3WVWR8		13.15	14.74	16.09	16.71	16.68	17.28	18.35	19.44	21.47	25.95	28.77	29.09	28.84	28.68	28.60	28.12	MY
62MYUX		13.42	14.92	16.10	16.88	16.96	17.58	18.53	19.71	21.73	26.09	28.94	29.34	29.11	29.05	28.82	28.67	AJ
6KVZNW		13.46	14.93	16.26	16.79	16.84	17.46	18.51	19.68	21.75	26.12	28.82	29.19	28.94	28.82	28.68	28.62	XD
6NXY4V		13.60	15.12	16.36	16.92	16.93	17.57	18.60	19.77	21.92	26.25	28.89	29.25	29.04	28.84	28.72	28.58	XI
7FKAWB		13.39	14.97	16.26	16.84	16.96	17.52	18.59	19.72	21.81	26.20	29.08	29.39	29.24	29.12	28.80	28.43	AP
8WXDR2		13.35	14.84	16.15	16.76	16.80	17.40	18.43	19.60	21.61	25.90	28.73	29.15	28.95	28.82	28.74	28.71	MM
8WZLL2		14.04*	14.92	16.22	16.80	16.86	17.46	18.54	19.71	21.82	26.20	28.90	29.24	29.02	28.88	28.75	28.67	XD
9K28YA		13.78	15.04	16.36	16.90	16.99	17.55	18.60	19.75	21.84	26.21	28.99	29.35	29.09	28.98	28.90	28.73	AJ
9PZW63		13.45	14.87	16.14	16.75	16.86	17.46	18.47	19.59	21.73	26.18	28.98	29.24	29.04	29.01	28.48	27.75X	AW
9ZJ9GE		13.69	14.81	16.16	16.79	16.90	17.44	18.54	19.67	21.66	26.08	28.98	29.36	29.20	29.11	28.91	28.79	AS
AJP6DF		13.70	14.90	16.40	16.90	16.90	17.50	18.65	19.80	22.20X	26.60X	29.20	29.50	29.20	29.00	28.90	28.90	HW
BCHZRA		13.24	14.88	16.20	16.79	16.89	17.43	18.52	19.59	21.75	26.13	28.88	29.18	29.00	28.80	28.71	28.59	AQ
BW8CML		13.21	14.72	16.00	16.57	16.57*	17.18*	18.23*	19.42*	21.55	25.90	28.57	28.94	28.72	28.50*	28.44	28.40	XH
CAU9XJ		13.45	14.92	16.23	16.79	16.84	17.44	18.51	19.68	21.81	26.23	28.85	29.19	29.01	28.86	28.75	28.68	XD
CJJU8M		13.44	14.85	16.06	16.82	16.95	17.50	18.52	19.72	21.72	26.25	28.97	29.31	29.10	29.07	28.86	28.02*	AE
CW9NL3		13.37	14.89	16.22	16.77	16.82	17.42	18.48	19.66	21.76	26.08	28.85	29.25	29.05	28.95	28.87	28.80	XD
D4GKY8		13.66	15.04	16.29	16.92	16.94	17.52	18.62	19.73	21.62	25.82*	28.84	29.32	29.13	29.17	28.92	28.81	HP
EP2NE6		13.36	14.88	16.21	16.79	16.89	17.50	18.51	19.65	21.71	26.14	28.99	29.34	29.14	29.05	28.74	28.51	AJ

WebCode	Data Flag	Spectrophotometric Reflectance values (as %) at selected wavelengths																Instr Code
		400	420	440	460	480	500	520	540	560	580	600	620	640	660	680	700	
									Sample A231									
FA2DAX		13.50	14.91	16.25	16.80	16.90	17.48	18.52	19.64	21.74	26.25	28.98	29.23	29.03	28.89	28.45	28.29	AT
FJMLPE		13.24	14.83	16.15	16.77	16.82	17.43	18.49	19.64	21.68	26.00	28.78	29.18	28.97	28.81	28.69	28.62	MK
FLRGCX		13.69	14.98	16.22	16.78	16.92	17.48	18.51	19.67	21.84	26.26	29.10	29.38	29.26	29.32*	29.30*	29.09	AS
FNHFMF		13.47	14.97	16.27	16.86	16.96	17.56	18.59	19.76	21.85	26.28	29.07	29.39	29.23	29.02	28.99	28.24	AT
FNZ9JJ		13.67	15.13	16.48*	17.11*	17.11*	17.70*	18.81*	19.93*	21.98	26.56*	29.34*	29.63*	29.34	29.13	29.06	29.01	CA
GDWBDV		13.66	14.91	16.23	16.79	16.92	17.51	18.54	19.71	21.74	26.10	28.92	29.27	29.13	29.03	28.86	28.80	AS
GE6UQX		14.45X	15.06	16.34	16.93	17.01	17.59	18.60	19.71	21.85	26.24	29.00	29.36	29.56X	29.04	28.94	28.81	AQ
GULLZX		13.31	14.95	16.23	16.84	16.91	17.50	18.58	19.68	21.79	26.08	28.83	29.20	28.99	28.80	28.69	28.58	XI
HAWKNV		13.38	14.85	16.14	16.69	16.77	17.36	18.43	19.63	21.72	26.03	28.72	29.13	28.93	28.74	28.65	28.59	XD
HDRHTT		13.47	14.96	16.31	16.85	16.94	17.51	18.61	19.76	21.81	26.24	29.01	29.34	29.02	28.84	28.76	28.62	XD
HE7ZUD		13.64	15.14	16.43	16.97	17.00	17.59	18.64	19.83	21.95	26.28	28.95	29.27	29.04	28.85	28.76	28.62	XB
HHQPHW		13.48	14.86	16.18	16.71	16.81	17.48	18.52	19.66	21.93	26.28	28.89	29.18	29.02	28.88	28.82	28.86	XF
HMZ8CH		13.47	14.93	16.27	16.85	16.95	17.55	18.58	19.72	21.82	26.34	29.09	29.38	29.17	29.03	28.87	28.10	AP
HRQKAZ		13.55	15.04	16.31	16.89	16.92	17.52	18.59	19.74	21.79	26.13	28.84	29.22	29.00	28.82	28.72	28.61	XD
J9DLKQ		13.36	14.86	16.17	16.78	16.87	17.46	18.52	19.66	21.69	26.06	28.92	29.29	29.16	29.05	28.69	28.35	AJ
JD8ML7	M	13.35	14.87	16.27	16.77	16.80	17.53	18.50	19.61	21.52	25.70X	28.79	29.12	28.79	28.82	28.75	28.62	HP
JKB2RL		13.18	14.80	16.09	16.67	16.73	17.35	18.37	19.51	21.63	25.93	28.57	28.88*	28.65*	28.46*	28.33*	28.35	XI
K6RVVD		13.32	14.82	16.13	16.69	16.74	17.36	18.42	19.60	21.71	26.11	28.78	29.07	28.85	28.70	28.58	28.46	XD
KZW9XH		13.60	15.05	16.45*	17.04*	17.08	17.69*	18.78*	19.93*	21.96	26.56*	29.39*	29.71*	29.48*	29.31*	29.24*	29.22*	CA
LEE38M		13.32	14.88	16.17	16.76	16.89	17.52	18.52	19.65	21.75	26.14	28.95	29.29	29.15	28.99	28.51	28.34	AS
N9XP2K		13.39	14.94	16.25	16.85	16.94	17.50	18.60	19.76	21.80	26.21	28.96	29.31	28.98	28.76	28.69	28.58	XB
NDV974		13.32	14.18X	16.06	16.67	16.65	17.23	18.30	19.50	21.60	25.96	28.69	29.10	28.84	28.68	28.63	28.56	XH

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 A231																		
NXYU7A		13.43	14.90	16.19	16.74	16.78	17.36	18.41	19.61	21.71	26.05	28.68	29.04	28.79	28.58	28.47	28.37	XI
PDCKLN		13.41	14.88	16.18	16.78	16.78	17.41	18.44	19.62	21.75	26.16	28.70	29.02	28.85	28.62	28.54	28.37	XI
PJZ33K		13.42	14.99	16.37	16.92	16.97	17.58	18.62	19.79	21.97	26.26	29.04	29.41	29.14	28.95	28.83	28.79	MI
PPK8VL		13.47	14.85	16.17	16.92	16.94	17.58	18.63	19.76	21.89	26.25	28.95	29.33	29.09	28.88	28.78	28.74	GG
R7ZFKE		13.55	15.08	16.33	16.89	16.96	17.50	18.58	19.69	21.77	26.18	28.96	29.33	29.12	29.05	28.47	28.29	AJ
RED8AC		13.50	14.97	16.29	16.82	16.95	17.52	18.55	19.68	21.66	26.07	28.91	29.22	29.08	29.00	28.79	28.44	AJ
RLXAD9		13.36	14.87	16.19	16.75	16.86	17.47	18.53	19.66	21.79	26.16	28.99	29.25	29.15	29.06	28.94	28.30	AS
TAFAXQ		13.42	14.91	16.21	16.79	16.82	17.41	18.48	19.65	21.77	26.14	28.84	29.16	28.97	28.78	28.69	28.66	XH
TKYJMK		13.38	14.89	16.26	16.85	16.92	17.51	18.60	19.72	21.93	26.30	29.13	29.39	29.23	29.02	28.96	28.96	MV
TVH33A		13.23	14.71	16.06	16.69	16.70	17.31	18.39	19.51	21.51	26.04	28.82	29.12	28.85	28.69	28.64	28.57	CA
U79EP8		13.21	14.86	16.14	16.80	16.85	17.38	18.50	19.59	21.65	26.00	28.92	29.23	29.01	28.85	28.80	28.77	MV
ULLK3R		13.54	15.01	16.31	16.87	16.92	17.52	18.58	19.74	21.80	26.16	28.85	29.18	29.02	28.86	28.74	28.69	XB
V4J86B		13.49	14.90	16.18	16.71	16.88	17.47	18.54	19.68	21.76	26.28	29.05	29.29	29.17	29.02	28.47	28.41	AT
V6XP7V	X	12.92*	14.50*	15.81X	16.41X	16.47X	17.04X	18.12X	19.24X	21.31X	25.57X	28.40X	28.82*	28.69*	28.55	28.53	28.53	MR
V9T7WP		13.23	14.76	16.08	16.70	16.72	17.30	18.41	19.56	21.60	25.92	28.83	29.24	29.06	28.94	28.89	28.91	MQ
VA7AUT		13.59	15.19*	16.27	16.99	17.08	17.58	18.65	19.96*	21.17X	26.14	29.43X	30.05X	29.70X	29.55X	29.52X	29.53X	HP
VCDCYC		12.87*	14.42X	15.86X	16.33X	16.50X	17.09X	18.15X	19.35*	21.49	25.85	28.57	28.98	28.84	28.76	28.79	28.87	GE
VUGZ8Q		13.42	14.95	16.24	16.82	16.86	17.44	18.50	19.68	21.78	26.15	28.91	29.29	29.06	28.88	28.75	28.64	XI
VV84YC		13.50	15.00	16.20	16.90	17.00	17.60	18.60	19.80	21.80	26.25	29.10	29.50	29.30	29.20	28.90	28.60	AN
WCA8W9		13.15	14.80	16.10	16.75	16.80	17.35	18.50	19.55	21.65	26.05	28.95	29.25	29.00	28.85	28.75	28.75	MW
WPGB4N		13.38	14.91	16.19	16.78	16.80	17.39	18.45	19.63	21.72	26.07	28.84	29.23	29.00	28.84	28.72	28.63	XI
XFRL6E		13.50	14.92	16.25	16.77	16.81	17.43	18.51	19.70	21.80	26.15	28.78	29.13	28.92	28.72	28.59	28.56	XE

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 A231																		
XJAW2J		13.45	14.94	16.16	16.86	16.97	17.56	18.59	19.78	21.90	26.43	29.21	29.57	29.29	29.21	29.17	28.20	AS
XKXKAD		13.24	14.88	16.13	16.74	16.76	17.41	18.42	19.56	21.66	25.98	28.76	29.15	28.94	28.65	28.60	28.56	XI
XXBFXP		13.62	14.85	16.18	16.76	16.85	17.43	18.50	19.62	21.72	26.08	28.94	29.29	29.15	29.23	29.26*	28.94	AU
Y673Z9		13.55	15.00	16.30	16.90	17.00	17.60	18.60	19.80	21.80	26.20	29.05	29.40	29.20	29.10	28.70	28.30	AN
Y7GPUG		12.96*	14.63	15.93*	16.53*	16.64	17.29	18.34	19.51	21.68	26.00	28.72	29.04	28.93	28.74	28.78	28.74	XO
Y7WAYC	X	14.93X	16.88X	18.12X	18.80X	18.63X	19.03X	20.27X	21.74X	23.66X	28.61X	31.43X	31.52X	31.09X	30.75X	30.47X	30.37X	MT
Y7ZNVK		13.45	14.95	16.26	16.84	16.88	17.48	18.55	19.73	21.86	26.29	28.96	29.29	29.07	28.92	28.85	28.85	XD
Y9J9DP		13.36	14.82	16.21	16.71	16.82	17.47	18.50	19.61	21.74	26.20	28.93	29.25	29.07	29.03	28.68	28.15	AS
YJPKWJ		13.10	14.70	15.96	16.54*	16.64	17.19*	18.30	19.48	21.67	25.97	28.59	28.94	28.79	28.70	28.64	28.62	XO
YNYYHN		13.17	14.75	16.10	16.62	16.68	17.31	18.37	19.54	21.67	25.87	28.60	28.97	28.81	28.66	28.56	28.55	XR
Z38KFD		13.10	14.81	16.05	16.74	16.75	17.33	18.44	19.54	21.58	25.89	28.86	29.25	29.04	28.88	28.83	28.82	MW
ZFCLPE		13.26	14.83	16.25	16.92	16.93	17.51	18.62	19.75	21.82	26.24	29.08	29.45	29.27	29.03	28.90	29.00	MT
ZP986U		13.52	14.79	16.14	16.80	16.79	17.36	18.48	19.56	21.67	26.09	29.03	29.31	29.05	28.87	28.81	28.79	NA

Summary Statistics

	400	420	440	460	480	500	520	540	560	580	600	620	640	660	680	700
Grand Means	13.43	14.88	16.20	16.79	16.85	17.45	18.51	19.66	21.74	26.14	28.91	29.26	29.06	28.91	28.77	28.62
SD Btwn Labs	0.22	0.15	0.12	0.12	0.12	0.11	0.11	0.11	0.15	0.16	0.18	0.18	0.18	0.20	0.20	0.28

JD8ML7 (M) - Data for Measurement 2 missing.

V6XP7V (X) - Low % reflectance data for most wavelengths.

Y7WAYC (X) - High % reflectance data at all wavelengths.

Key to Instrument Codes Reported by Participants

AE	Datacolor 110	AJ	Datacolor 600	AN	Datacolor 650
AP	Datacolor 750	AQ	Datacolor 600x	AS	Datacolor 800
AT	Datacolor 850	AU	Datacolor 1000	AW	Datacolor 1050
CA	Cary 5000	GD	BYK-Gardner Spectro-Guide Sphere	GE	BYK-Gardner Spectro2-Guide Sphere Gloss
GG	BYK-Gardner TCS II	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	MR	Minolta CM-5	MT	Minolta CM-2600d
MV	Minolta CM-3000d Spectrophotometer	MW	Minolta CM 3700a Spectrophotometer	MY	Minolta Benchtop Spectrophotometer CM-3600a
NA	Minolta Benchtop Spectrophotometer CM-3700A	XB	X-Rite Ci7000 Series Benchtop Spectrophotometer	XD	X-Rite Ci7800 Benchtop Spectrophotometer
XE	X-Rite Ci7600 Benchtop Spectrophotometer	XF	X-Rite Ci6x Portable Spectrophotometer	XH	X-Rite Color i5 Benchtop Spectrophotometer
XI	X-Rite Color i7 Benchtop Spectrophotometer	XO	X-Rite SP64 Sphere Spectrophotometer	XR	X-Rite

Interlaboratory Testing Program for Color & Appearance

Analysis 440

60 Degree Gloss - Paint Chips

ASTM Method D 523

WebCode	Data Flag	Sample E231 Lab Mean	Sample E231 Diff from Grand Mean	Sample E231 CPV	Sample E232 Lab Mean	Sample E232 Diff from Grand Mean	Sample E232 CPV	Instr Code
28KGET		27.18	0.08	0.09	35.60	-0.37	-0.39	GL
2CCQL7		28.33	1.22	1.41	35.83	-0.14	-0.15	GN
2H4VGV		25.55	-1.55	-1.79	34.90	-1.07	-1.13	EN
39BRYK		27.83	0.72	0.83	37.58	1.61	1.70	GL
62MYUX		28.93	1.82	2.10	37.38	1.41	1.49	NH
6J8HVC		27.49	0.39	0.45	36.53	0.56	0.59	GL
6KVZNW		28.15	1.05	1.21	37.45	1.48	1.57	GL
73X32V		28.23	1.12	1.29	36.98	1.01	1.07	GN
7Y9TP9		25.83	-1.28	-1.47	34.65	-1.32	-1.40	GK
8WXDR2		27.03	-0.07	-0.08	36.58	0.62	0.65	GL
8WZLL2		27.83	0.72	0.83	37.10	1.13	1.20	RA
8XCXKB		26.43	-0.68	-0.78	35.98	0.01	0.01	GK
99CHQA	*	29.53	2.42	2.79	37.35	1.38	1.46	RA
9EJCHK		27.43	0.32	0.37	36.18	0.21	0.22	GL
9K28YA		26.35	-0.75	-0.87	35.18	-0.79	-0.84	GK
A22K9B		26.73	-0.38	-0.44	35.35	-0.62	-0.65	RQ
AJP6DF		26.18	-0.93	-1.07	35.35	-0.62	-0.65	GK
AZDFZH		27.08	-0.03	-0.03	35.53	-0.44	-0.47	GL
B4QFUN		27.95	0.85	0.98	36.58	0.61	0.64	GN
BWUP68		26.05	-1.05	-1.21	35.45	-0.52	-0.55	GL
C6FWYC		27.25	0.15	0.17	35.45	-0.52	-0.55	GL
C9Y8C2		26.25	-0.85	-0.98	35.68	-0.29	-0.31	GL
CECW6B		27.63	0.52	0.60	36.43	0.46	0.48	GK
CJJU8M		27.20	0.10	0.11	36.58	0.61	0.64	GL
CPZE49	*	29.63	2.52	2.91	38.63	2.66	2.82	XX
CRUXC2		27.08	-0.03	-0.03	35.60	-0.37	-0.39	GL
CVXMY4		26.80	-0.30	-0.35	36.40	0.43	0.46	GN
CYXV7Y		26.83	-0.28	-0.32	34.88	-1.09	-1.16	GL
DGZXU9		25.93	-1.18	-1.36	35.43	-0.54	-0.57	XX
DXMC92		26.68	-0.43	-0.49	36.93	0.96	1.01	XX

Interlaboratory Testing Program for Color & Appearance

Analysis 440

60 Degree Gloss - Paint Chips

ASTM Method D 523

WebCode	Data Flag	Sample E231 Lab Mean	Sample E231 Diff from Grand Mean	Sample E231 CPV	Sample E232 Lab Mean	Sample E232 Diff from Grand Mean	Sample E232 CPV	Instr Code
EDYAQ8	*	24.93	-2.18	-2.51	34.53	-1.44	-1.53	GL
G89TVD		26.18	-0.93	-1.07	35.68	-0.29	-0.31	GN
GULLZX		28.33	1.22	1.41	36.90	0.93	0.99	GN
HNP6GX		25.43	-1.68	-1.93	34.00	-1.97	-2.08	XX
J9DLKQ	*	25.15	-1.95	-2.25	33.03	-2.94	-3.12	GL
JKB2RL		27.10	0.00	0.00	35.25	-0.72	-0.76	MM
JL287Q		27.00	-0.10	-0.12	34.73	-1.24	-1.32	GL
JT2LVY		26.85	-0.25	-0.29	36.00	0.03	0.03	GL
JT3EU7		27.25	0.15	0.17	35.03	-0.94	-1.00	RB
JY2Q44	X	26.33	-0.78	-0.90	26.73	-9.24	-9.79	GL
KFP2P7		26.90	-0.20	-0.23	35.63	-0.34	-0.36	GD
KPV4QW		26.83	-0.28	-0.32	35.83	-0.14	-0.15	ST
LEE38M		27.03	-0.08	-0.09	36.03	0.06	0.06	GL
MAZTMW	X	28.68	1.57	1.81	35.23	-0.74	-0.79	XX
N9GDNL		25.60	-1.50	-1.73	34.95	-1.02	-1.08	GL
N9XP2K	*	27.13	0.02	0.03	37.88	1.91	2.02	ZA
NDV974		27.15	0.05	0.05	36.23	0.26	0.27	GL
NUTUMJ		27.63	0.52	0.60	35.78	-0.19	-0.20	GL
NXYU7A		27.15	0.05	0.05	35.45	-0.52	-0.55	GL
PDCKLN		27.53	0.43	0.49	36.68	0.71	0.75	GL
PFCTQY		27.38	0.27	0.31	35.55	-0.42	-0.44	ZA
PJZ33K		27.48	0.37	0.43	35.73	-0.24	-0.26	GL
QX7GAM		28.03	0.92	1.06	37.08	1.11	1.17	GX
RD6AMM		27.28	0.17	0.20	35.28	-0.69	-0.73	GD
RED8AC		27.10	0.00	0.00	36.48	0.51	0.54	GL
RLXAD9		26.58	-0.53	-0.61	35.25	-0.72	-0.76	GK
TAFAXQ		27.30	0.20	0.23	36.45	0.48	0.51	GL
TLPRRE		26.98	-0.13	-0.15	35.93	-0.04	-0.04	GN
TM3GVR		26.95	-0.15	-0.18	35.83	-0.14	-0.15	GK
TVH33A		26.55	-0.55	-0.64	35.55	-0.42	-0.44	GL

Interlaboratory Testing Program for Color & Appearance

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1st Qtr 2023

Analysis 440

60 Degree Gloss - Paint Chips

ASTM Method D 523

WebCode	Data Flag	Sample E231 Lab Mean	Sample E231 Diff from Grand Mean	Sample E231 CPV	Sample E232 Lab Mean	Sample E232 Diff from Grand Mean	Sample E232 CPV	Instr Code
U79EP8		27.65	0.55	0.63	35.70	-0.27	-0.28	GL
ULLK3R		27.53	0.42	0.49	36.88	0.91	0.96	GL
V83E8J		27.18	0.07	0.08	37.03	1.06	1.12	RQ
V9T7WP		26.83	-0.28	-0.32	35.18	-0.79	-0.84	MX
WCA8W9		27.88	0.77	0.89	36.73	0.76	0.80	GK
WEGM7Y		26.28	-0.83	-0.95	35.48	-0.49	-0.52	GN
WUNADM		27.35	0.25	0.28	36.65	0.68	0.72	GL
X9B7GC		27.60	0.50	0.57	36.68	0.71	0.75	GL
Y7GPUG	X	24.43	-2.68	-3.09	29.33	-6.64	-7.04	GN
Y9J9DP		27.48	0.37	0.43	35.70	-0.27	-0.28	GL
YGKQGM		27.00	-0.10	-0.12	35.43	-0.54	-0.57	GK
YJPKWJ		27.85	0.75	0.86	37.08	1.11	1.17	MW
YNYYHN		27.78	0.67	0.77	36.90	0.93	0.99	GL
YPJF8G		27.20	0.10	0.11	34.88	-1.09	-1.16	GL
YRU49G		25.63	-1.48	-1.70	35.20	-0.77	-0.81	XX
Z38KFD		26.73	-0.38	-0.44	34.98	-0.99	-1.05	GT
ZB46LK		27.23	0.12	0.14	37.08	1.11	1.17	GL
ZP986U		27.55	0.45	0.52	35.93	-0.04	-0.04	GL

Summary Statistics

Grand Means

27.10 Gloss Units — 35.97 Gloss Units

Stnd Dev Btwn Labs

0.87 Gloss Units — 0.94 Gloss Units

Statistics based on 75 of 78 reporting participants

Comments on Assigned Data Flags for Test #440

JY2Q44(X) - Extreme data for Sample E232.

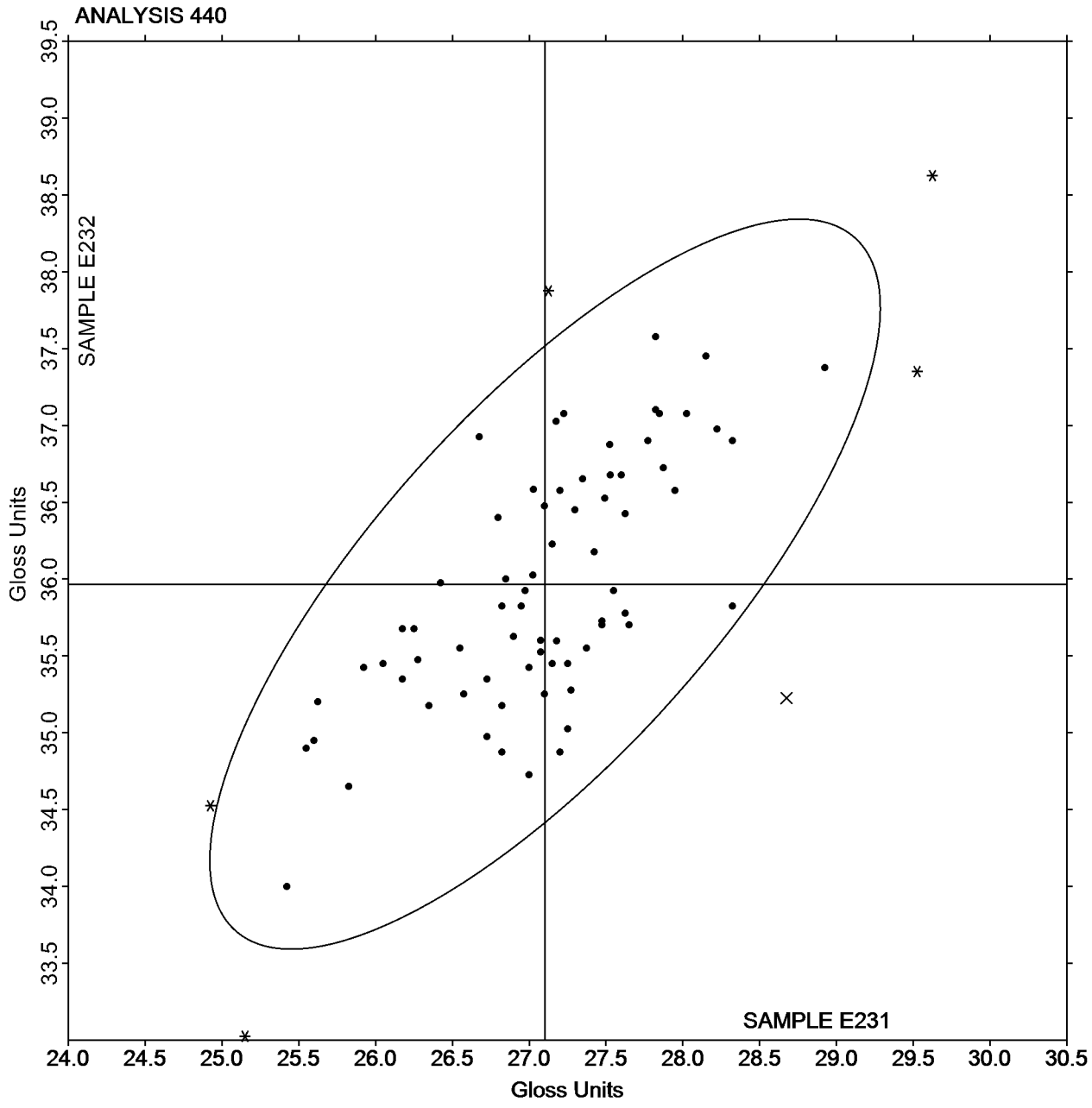
MAZTMW(X) - Inconsistent in testing between samples.

Y7GPUG(X) - Extreme data.

Key to Instrument Codes Reported by Participants

EN	Elcometer 480	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)
GX	BYK-Gardner (model not specified)	MM	Macbeth Lab-Gloss
MW	Minolta Multi-Gloss 268	MX	Minolta Multi-Gloss 268 Plus
NH	3nh NHG268 Multi-angle Precise Gloss Meter	RA	Rhopoint Novo-Gloss Glossmeter
RB	Rhopoint Novo-Gloss LITE Glossmeter	RQ	Rhopoint IQ Goniophotometer 20/60/85°
ST	Sheen Tri-Glossmaster	XX	Instrument make/model not specified by lab
ZA	Zehntner ZGM Series		

SAMPLE E231 = 27.10 Gloss Units SAMPLE E232 = 35.97 Gloss Units



-End of Report-