Collaborative Testing Services, Inc.

Color & Appearance Testing Program

Summary Report #180 - 2nd Qtr 2017

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, 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 80 countries, currently participate in the CTS programs.

For further information concerning this report contact:

Collaborative Testing Services, Inc.
21331 Gentry Drive
Sterling, Virginia 20166 USA

+1-571-434-1925
FAX #: +1-571-434-1937
color@cts-interlab.com

Office Hours: 8:00 a.m. - 4:30 p.m. ET

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
2PYVPQ		B171	42.54	6.04	-11.28	1.11	0.06	-0.24	1.14	HW
		B172	43.65	6.09	-11.51					
2YPE86		B171	42.18	5.80	-11.05	0.93	0.04	-0.23	0.95	GB
		B172	43.11	5.84	-11.28					
4DHN6V		B171	42.20	5.84	-11.10	1.12	0.09	-0.29	1.16	XU
		B172	43.32	5.93	-11.39					
4KJ6EF		B171	42.21	6.02	-11.16	1.19	0.03	-0.25	1.22	HW
		B172	43.40	6.05	-11.40					
4M8GF7		B171	42.39	6.17	-11.15	1.10	0.07	-0.26	1.13	HW
		B172	43.49	6.23	-11.41					
8BLEL4		B171	42.44	5.77	-11.33	1.08	0.04	-0.25	1.10	XZ
		B172	43.52	5.81	-11.57					
8UX4WF		B171	42.24	6.04	-11.11	1.07	0.06	-0.26	1.10	HW
		B172	43.30	6.09	-11.37					
9769M9		B171	42.03	5.89	-11.22	1.13	0.06	-0.26	1.16	XR
		B172	43.15	5.95	-11.48					
9PY4XB	X	B171	41.82	6.66	-11.55	1.26	0.00	-0.27	1.29	NH
		B172	43.08	6.66	-11.82					
A4XBR7		B171	42.25	6.18	-11.19	0.93	0.11	-0.28	0.98	MG
		B172	43.18	6.28	-11.47					
AGHU69		B171	42.62	5.84	-10.99	0.92	0.09	-0.29	0.97	XD
		B172	43.54	5.93	-11.28					
APTCGE		B171	42.20	6.06	-11.01	0.98	0.12	-0.30	1.03	GH
		B172	43.18	6.18	-11.31					
CKCL9P		B171	42.33	5.97	-10.94	1.07	-0.05	-0.23	1.09	HG
		B172	43.40	5.92	-11.17					
D6WRC7		B171	42.38	6.04	-11.11	1.03	0.12	-0.31	1.08	GE
		B172	43.41	6.15	-11.41					
DYAWE9		B171	42.11	6.08	-11.11	1.11	0.06	-0.27	1.14	HW
		B172	43.22	6.14	-11.38					
FAHL69		B171	41.98	6.15	-11.33	1.17	0.04	-0.29	1.20	XK
		B172	43.15	6.19	-11.62					

			CIE L* a* b* Color Values			Color Difference Values				
WebCode	Flag	Samples	L*	a*	b*	ΔL*	Δa*	Δb*	ΔE*	InstrCode
FECF6V		B171	42.40	5.86	-11.11	0.91	0.12	-0.27	0.95	XM
		B172	43.31	5.97	-11.37					
FX7E63		B171	42.41	5.95	-11.24	1.04	0.07	-0.27	1.07	XO
		B172	43.44	6.01	-11.51					
GJNLEB		B171	42.22	5.94	-11.21	1.09	0.06	-0.26	1.12	HW
		B172	43.31	5.99	-11.46					
HU4X8Y		B171	42.43	5.88	-11.04	1.06	0.05	-0.25	1.09	GH
		B172	43.49	5.92	-11.29					
JFFAB7		B171	42.11	5.82	-11.15	1.15	0.13	-0.34	1.20	HK
		B172	43.26	5.95	-11.49					
KD33KH		B171	43.04	5.72	-11.22	0.92	0.11	-0.29	0.97	XE
		B172	43.96	5.83	-11.51					
KHXQ7V		B171	43.03	5.90	-11.09	1.13	0.04	-0.28	1.16	XZ
		B172	44.16	5.94	-11.37					
LFN7TF		B171	43.19	5.78	-11.11	1.10	0.10	-0.34	1.15	XZ
		B172	44.29	5.88	-11.45					
LLRAKY		B171	41.88	5.68	-11.16	1.13	0.05	-0.26	1.15	HY
		B172	43.00	5.73	-11.41					
LY3MXU		B171	42.13	5.80	-11.13	1.23	0.04	-0.25	1.25	GE
		B172	43.36	5.84	-11.38					
MLB9FC		B171	42.44	5.71	-11.29	0.94	0.08	-0.28	0.98	XZ
		B172	43.38	5.79	-11.57					
NVTEJU		B171	41.95	5.87	-11.10	1.23	0.06	-0.28	1.26	XU
		B172	43.17	5.92	-11.37					
NXXYDL		B171	41.68	5.74	-11.51	1.05	0.05	-0.26	1.08	FA
		B172	42.72	5.79	-11.77					
QCPGFN		B171	42.40	5.98	-11.09	1.15	0.08	-0.27	1.18	HW
		B172	43.55	6.06	-11.36					
QGMZHM		B171	41.82	5.55	-11.28	1.21	0.04	-0.23	1.23	MQ
		B172	43.03	5.58	-11.51					
QJQZCR		B171	42.12	5.97	-11.20	1.14	0.11	-0.30	1.18	HW
		B172	43.26	6.08	-11.49					

			CIE L* a* b* Color Values			Color Difference Values				
WebCode	Flag	Samples	L*	a*	b*	ΔL*	Δa*	Δb*	ΔE*	InstrCode
QWBFFR		B171	42.64	5.70	-11.27	1.39	0.04	-0.25	1.41	MA
		B172	44.03	5.74	-11.51					
RGH3MH		B171	41.94	5.90	-11.32	1.35	0.06	-0.21	1.37	TO
		B172	43.29	5.96	-11.52					
TE9EKW		B171	41.79	5.95	-11.23	1.13	0.06	-0.26	1.15	HY
		B172	42.91	6.01	-11.48					
VDCDX7		B171	42.27	5.94	-11.27	1.00	0.07	-0.30	1.05	XN
		B172	43.27	6.01	-11.57					
WD6QX4		B171	42.39	5.90	-11.12	0.99	0.12	-0.31	1.04	XU
		B172	43.38	6.02	-11.43					
X97YY6		B171	42.19	5.86	-11.28	1.04	0.10	-0.31	1.09	MU
		B172	43.23	5.96	-11.59					
XXKT4M		B171	42.32	6.13	-11.24	1.22	0.05	-0.26	1.25	HW
		B172	43.54	6.18	-11.50					
Y2NLXK		B171	42.41	5.91	-11.23	1.18	0.07	-0.26	1.21	XO
		B172	43.59	5.98	-11.49					
Y3YKWZ		B171	42.21	5.95	-11.07	1.01	0.11	-0.27	1.05	HW
		B172	43.22	6.06	-11.34					
YJJDHJ		B171	42.33	6.27	-11.08	1.04	0.07	-0.25	1.07	HW
		B172	43.36	6.34	-11.32					
ZMZ2U3		B171	42.81	5.75	-11.39	1.02	0.06	-0.25	1.05	MU
		B172	43.83	5.81	-11.64					

Summary Statistics

Samples	L*	a*	b*	ΔL*	Δa*	Δb*	ΔE*
Grand Means							
B171	42.28	5.91	-11.18	1.09	0.07	-0.27	1.12
B172	43.36	5.98	-11.45				
Stnd Dev Btwn Labs							
B171	0.33	0.15	0.13	0.11	0.03	0.03	0.10
B172	0.30	0.16	0.13				

Statistics based on 42 of 43 reporting participants

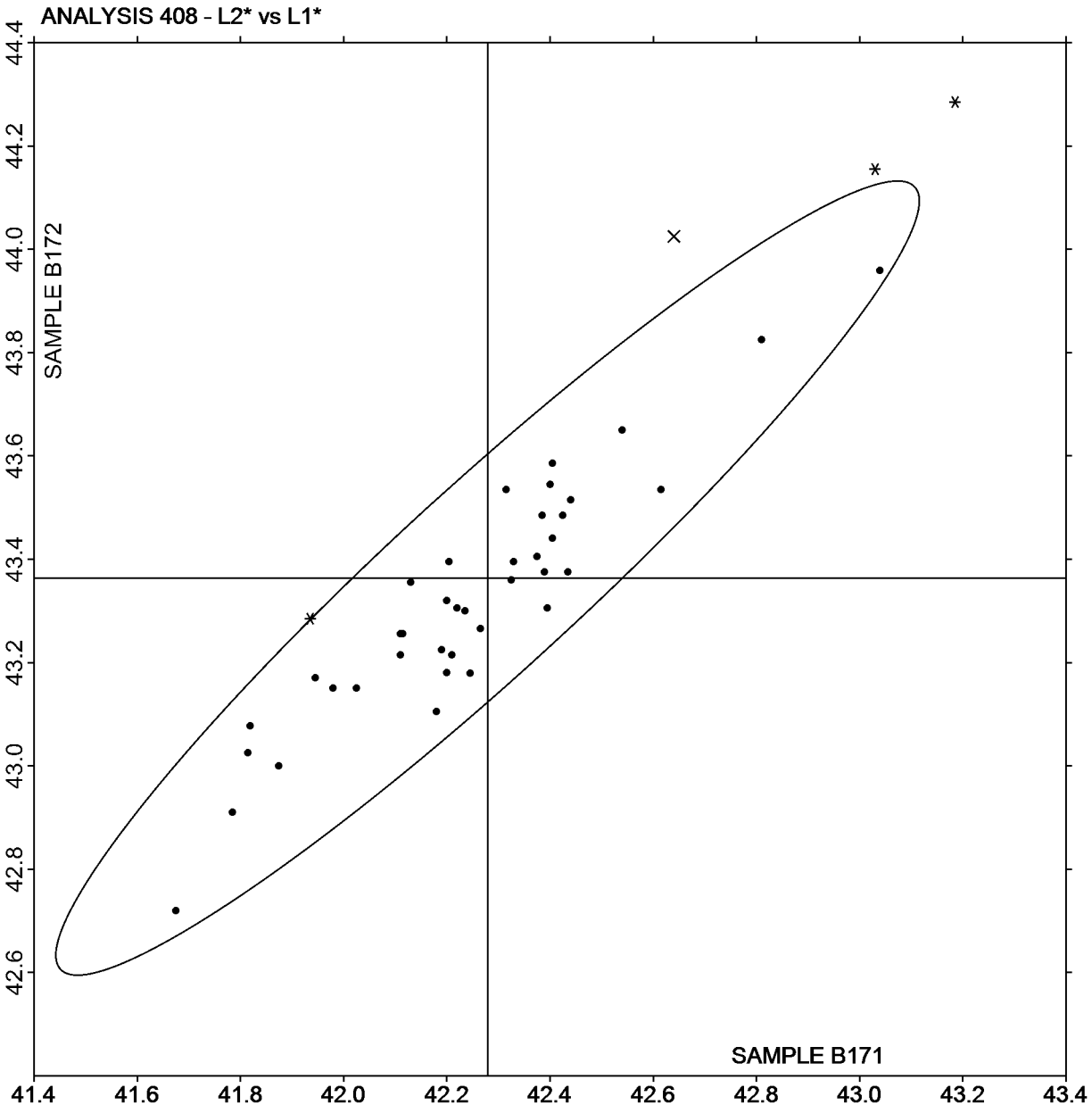
Comments Assigned on Data Flags for Test #408

9PY4XB(X) - High "a*" values

Key to Instrument Codes Reported by Participants			
FA	BYK Mac	GB	BYK-Gardner spectro-guide sphere gloss
GE	BYK-Gardner spectro-guide (45/0)	GH	BYK-Gardner Color-View
HG	Hunter ColorQUEST	HK	Hunter MiniScan XE (45/0)
HW	Hunter LabScan XE	HY	Hunter Color Flex 45/0
MA	Macbeth	MG	Macbeth 1500/PLUS or 2025+ Color Eye
MQ	Minolta CM-503c Spectrophotometer	MU	Minolta
NH	3nh Precision Colorimeter	TO	Topcon SR-3 Spectroradiometer
XD	X-Rite 500 Series SpectroDensitometer	XE	X-Rite eXact Portable Spectrophotometer
XK	X-Rite MA100 Multi-Angle Spectrophotometer	XM	X-Rite MA58 Multi-Angle Spectrophotometer
XN	X-Rite MA68 Multi-Angle Spectrophotometer	XO	X-Rite MA68 II Multi-Angle Spectrophotometer
XR	X-Rite 968 Portable Spectrophotometer	XU	X-Rite 964 Portable Spectrophotometer
XZ	X-Rite		

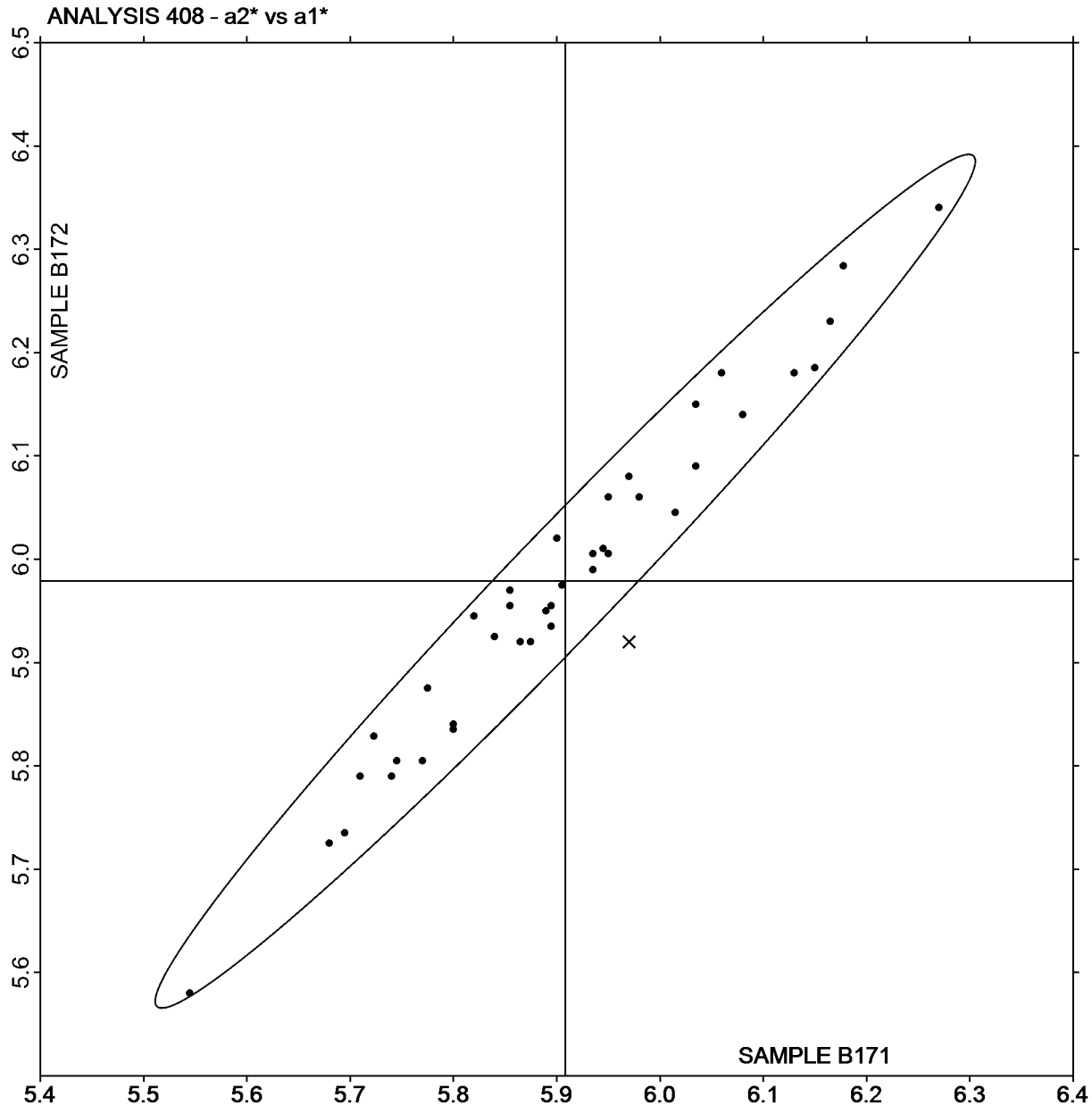
L2* vs L1*

SAMPLE B171 = 42.28 SAMPLE B172 = 43.36



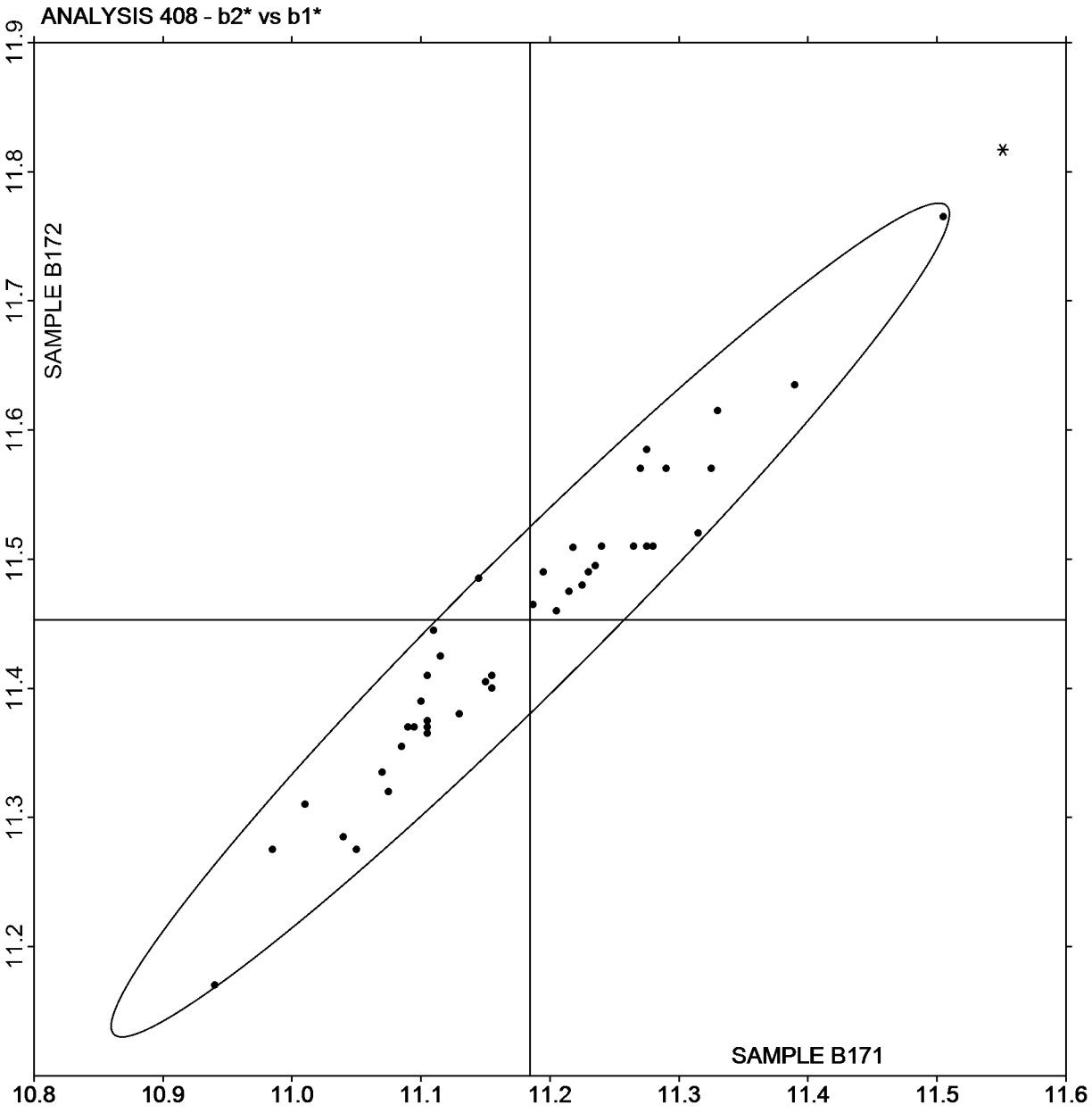
a2* vs a1*

SAMPLE B171 = 5.91 SAMPLE B172 = 5.98



b2* vs b1*

SAMPLE B171 = -11.18 SAMPLE B172 = -11.45



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
2MU9CL		B171	43.00	5.63	-11.21	1.01	0.07	-0.26	1.05	MM
		B172	44.01	5.70	-11.46					
2MWVTY		B171	42.81	5.60	-11.28	1.00	0.09	-0.25	1.03	XI
		B172	43.81	5.69	-11.53					
2QC74H		B171	42.95	5.59	-11.24	1.05	0.09	-0.24	1.08	HF
		B172	44.00	5.68	-11.47					
3APA4E		B171	42.86	5.63	-11.25	1.05	0.08	-0.26	1.08	XI
		B172	43.91	5.71	-11.51					
3JC9UK		B171	42.66	5.97	-11.36	0.98	0.07	-0.23	1.00	XZ
		B172	43.63	6.04	-11.58					
3RMP47		B171	42.68	5.58	-11.00	0.94	0.08	-0.25	0.98	XI
		B172	43.62	5.66	-11.25					
43LMQ6		B171	42.64	5.81	-11.21	1.12	0.08	-0.24	1.14	XM
		B172	43.75	5.89	-11.45					
4DHN6V		B171	42.88	5.57	-11.25	1.05	0.09	-0.28	1.09	XI
		B172	43.93	5.66	-11.53					
4UPMEX		B171	43.02	5.82	-11.37	1.03	0.05	-0.24	1.05	AO
		B172	44.04	5.87	-11.61					
4VYX7V		B171	42.72	5.75	-11.49	1.02	0.06	-0.27	1.06	AJ
		B172	43.74	5.81	-11.75					
6HQCGB		B171	42.63	5.95	-11.38	1.23	0.02	-0.26	1.26	AJ
		B172	43.86	5.97	-11.63					
6MNVJA		B171	42.86	5.70	-11.28	1.03	0.07	-0.27	1.06	XZ
		B172	43.88	5.77	-11.55					
6TDDWK		B171	43.00	5.74	-11.50	1.07	0.11	-0.28	1.11	XX
		B172	44.07	5.85	-11.78					
6WQB7T	X	B171	42.63	5.36	-11.54	0.88	0.08	-0.28	0.92	GD
		B172	43.51	5.43	-11.82					
7KUQ2L		B171	42.58	5.79	-11.39	1.11	0.08	-0.29	1.15	CA
		B172	43.69	5.87	-11.68					
7T6QWH		B171	42.71	5.81	-11.49	1.19	0.07	-0.27	1.22	AJ
		B172	43.90	5.88	-11.76					

			CIE L* a* b* Color Values			Color Difference Values				
WebCode	Flag	Samples	L*	a*	b*	ΔL*	Δa*	Δb*	ΔE*	InstrCode
8ZKQU8	X	B171 B172	0.01 0.01	0.02 0.01	-0.02 0.03	-0.01	-0.01	0.04	0.04	AQ
9PKHNA		B171 B172	42.72 43.79	5.77 5.81	-11.34 -11.57	1.07	0.05	-0.23	1.09	XI
9UQBH6		B171 B172	42.81 43.90	5.69 5.73	-11.23 -11.47	1.09	0.04	-0.23	1.11	MM
9ZFTY2		B171 B172	42.82 44.01	5.81 5.86	-11.55 -11.79	1.20	0.05	-0.24	1.22	AO
A4A6AR		B171 B172	42.81 43.79	5.74 5.83	-11.47 -11.73	0.98	0.09	-0.26	1.02	XB
AQ8GFD		B171 B172	43.13 44.17	5.82 5.90	-11.60 -11.87	1.04	0.08	-0.28	1.08	AR
AZFBCQ		B171 B172	42.78 43.85	5.75 5.84	-11.20 -11.49	1.08	0.09	-0.29	1.12	XH
B94LYQ		B171 B172	42.76 43.83	5.64 5.71	-11.32 -11.57	1.08	0.07	-0.26	1.11	AM
C7BWCP		B171 B172	43.05 44.11	5.83 5.89	-11.48 -11.69	1.06	0.06	-0.22	1.08	HH
CGWYW6		B171 B172	43.15 44.29	5.84 5.89	-11.31 -11.54	1.14	0.05	-0.23	1.16	XO
CJZUF9		B171 B172	43.00 44.07	5.84 5.87	-11.10 -11.39	1.07	0.03	-0.29	1.10	XZ
CKAXQC		B171 B172	42.74 43.81	5.80 5.84	-11.26 -11.51	1.07	0.04	-0.25	1.10	XI
CKCL9P		B171 B172	42.87 43.73	5.88 6.00	-11.33 -11.61	0.87	0.12	-0.28	0.92	XI
D2DVP2		B171 B172	42.62 43.84	5.82 5.86	-11.33 -11.60	1.22	0.04	-0.27	1.25	AS
D6FTZT		B171 B172	42.99 43.98	5.80 5.88	-11.37 -11.64	1.00	0.08	-0.28	1.04	AJ
D9F27P		B171 B172	42.93 43.92	5.71 5.76	-11.34 -11.59	1.00	0.05	-0.25	1.03	AJ

			CIE L* a* b* Color Values			Color Difference Values				
WebCode	Flag	Samples	L*	a*	b*	ΔL*	Δa*	Δb*	ΔE*	InstrCode
DCVAUN		B171	42.94	5.79	-11.42	1.08	0.04	-0.25	1.11	AO
		B172	44.02	5.82	-11.67					
DG8KJC		B171	42.91	5.75	-11.26	1.03	0.06	-0.25	1.06	XB
		B172	43.94	5.81	-11.51					
DMEQKA		B171	42.73	5.83	-11.52	1.09	0.07	-0.25	1.12	AQ
		B172	43.81	5.90	-11.77					
E2RJML	X	B171	42.50	6.31	-11.18	0.96	0.06	-0.24	0.99	XZ
		B172	43.46	6.37	-11.42					
EHFRL6		B171	42.53	5.83	-11.35	1.20	0.05	-0.27	1.23	MV
		B172	43.73	5.88	-11.62					
EN4EGB		B171	42.72	5.84	-11.38	1.12	0.04	-0.25	1.15	AJ
		B172	43.84	5.88	-11.63					
F3ZBUT		B171	42.51	5.86	-11.26	1.13	0.02	-0.24	1.15	XH
		B172	43.64	5.87	-11.50					
FAHL69		B171	42.86	5.82	-11.56	1.10	0.03	-0.25	1.13	AO
		B172	43.96	5.85	-11.81					
FP9J84	X	B171	42.90	5.89	-11.75	1.09	0.06	-0.26	1.12	CA
		B172	43.99	5.95	-12.01					
FX7E63		B171	42.71	5.88	-11.46	1.04	0.07	-0.24	1.07	MI
		B172	43.75	5.95	-11.70					
GB7EFH	X	B171	42.63	5.41	-11.07	1.01	0.08	-0.26	1.05	MJ
		B172	43.64	5.49	-11.33					
GH7RFL		B171	42.83	5.80	-11.46	1.01	0.11	-0.27	1.05	MV
		B172	43.84	5.90	-11.73					
GQKME2		B171	42.86	5.79	-11.40	1.05	0.11	-0.28	1.09	AJ
		B172	43.90	5.90	-11.68					
GXJ37U		B171	42.73	5.87	-11.35	0.95	0.11	-0.27	0.99	XC
		B172	43.67	5.98	-11.62					
H84WWG		B171	42.66	5.80	-11.20	1.04	0.07	-0.25	1.07	XH
		B172	43.70	5.86	-11.45					
HJXAT8		B171	42.98	5.82	-11.44	1.16	0.06	-0.27	1.19	AS
		B172	44.14	5.88	-11.70					

			CIE L* a* b* Color Values			Color Difference Values				
WebCode	Flag	Samples	L*	a*	b*	ΔL*	Δa*	Δb*	ΔE*	InstrCode
HU4X8Y		B171	42.82	5.79	-11.31	1.10	0.05	-0.26	1.13	MV
		B172	43.91	5.84	-11.57					
JMEW6Q		B171	42.63	5.90	-11.22	1.02	0.07	-0.27	1.05	XH
		B172	43.65	5.97	-11.49					
JNRBRZ		B171	43.00	5.85	-11.42	1.01	0.07	-0.25	1.04	AO
		B172	44.01	5.92	-11.66					
JQXVFZ		B171	42.79	5.78	-11.40	1.21	0.07	-0.29	1.24	MV
		B172	43.99	5.85	-11.68					
JW2Z7Y		B171	42.80	5.71	-11.45	1.11	0.10	-0.29	1.15	AJ
		B172	43.91	5.81	-11.74					
KBZ2PR		B171	42.70	5.63	-11.24	1.26	0.02	-0.23	1.28	MV
		B172	43.96	5.65	-11.47					
KEHGUD		B171	42.93	5.73	-11.26	0.93	0.09	-0.27	0.97	MM
		B172	43.85	5.81	-11.53					
KHGUFG		B171	42.94	5.86	-11.43	1.07	0.08	-0.26	1.10	MV
		B172	44.00	5.94	-11.69					
KN2VVU		B171	42.88	5.92	-11.17	1.00	0.09	-0.28	1.04	XI
		B172	43.88	6.01	-11.45					
LLRAKY		B171	42.76	5.67	-11.43	0.86	0.13	-0.28	0.91	HP
		B172	43.62	5.80	-11.71					
LY3MXU		B171	42.63	5.95	-11.13	1.03	0.06	-0.26	1.06	GD
		B172	43.66	6.01	-11.38					
M2PGGF		B171	42.82	5.83	-11.36	0.94	0.10	-0.25	0.97	MK
		B172	43.76	5.93	-11.61					
M3V23U		B171	42.94	5.82	-11.44	1.07	0.06	-0.25	1.10	AJ
		B172	44.01	5.88	-11.69					
M4PPJ6		B171	43.14	5.72	-11.40	0.95	0.08	-0.23	0.98	HP
		B172	44.08	5.79	-11.63					
M9LCEE		B171	42.93	5.89	-11.48	1.02	0.07	-0.24	1.05	AE
		B172	43.95	5.95	-11.72					
MDUYPU		B171	42.71	5.67	-11.26	1.04	0.10	-0.29	1.08	MM
		B172	43.74	5.76	-11.55					

			CIE L* a* b* Color Values			Color Difference Values				
WebCode	Flag	Samples	L*	a*	b*	ΔL*	Δa*	Δb*	ΔE*	InstrCode
MEDLMQ		B171	42.93	5.84	-11.37	1.11	0.06	-0.26	1.14	AS
		B172	44.04	5.89	-11.63					
MHA8DU		B171	42.74	5.68	-11.37	1.16	0.06	-0.25	1.18	XI
		B172	43.90	5.74	-11.62					
MMKFGJ		B171	42.56	5.86	-11.20	0.93	0.08	-0.26	0.97	XH
		B172	43.49	5.93	-11.46					
MMZLXU		B171	42.70	5.87	-11.31	1.16	0.06	-0.25	1.19	AJ
		B172	43.86	5.93	-11.56					
MT6HJF		B171	42.78	5.81	-11.27	1.11	0.09	-0.29	1.15	AJ
		B172	43.89	5.90	-11.56					
NCXJBC		B171	42.59	5.80	-11.23	1.15	0.04	-0.26	1.17	AO
		B172	43.74	5.84	-11.49					
NFHQDK		B171	42.83	5.78	-11.38	1.06	0.04	-0.28	1.10	AO
		B172	43.89	5.82	-11.66					
NVTEJU		B171	42.51	5.79	-11.41	1.03	0.04	-0.23	1.05	MM
		B172	43.54	5.82	-11.63					
NZKJG4		B171	42.90	5.79	-11.34	0.92	0.05	-0.23	0.95	AS
		B172	43.82	5.84	-11.57					
PAU9WN		B171	42.83	5.90	-11.36	1.10	0.05	-0.24	1.12	MM
		B172	43.92	5.94	-11.60					
PB3HPK		B171	42.72	5.82	-11.31	1.18	0.04	-0.25	1.21	MM
		B172	43.90	5.86	-11.56					
PNQLTB		B171	42.81	5.80	-11.42	1.18	0.07	-0.28	1.21	AQ
		B172	43.98	5.86	-11.70					
PPJBFD		B171	42.82	5.80	-11.53	1.10	0.08	-0.27	1.13	AO
		B172	43.91	5.88	-11.80					
PRPXQW		B171	42.93	5.72	-11.28	1.00	0.06	-0.27	1.03	MM
		B172	43.93	5.77	-11.55					
PXFDE4		B171	42.94	5.78	-11.26	0.94	0.08	-0.22	0.96	AJ
		B172	43.87	5.86	-11.47					
Q4XZPY		B171	42.58	5.82	-11.40	1.06	0.05	-0.24	1.08	XI
		B172	43.63	5.87	-11.63					

			CIE L* a* b* Color Values			Color Difference Values				
WebCode	Flag	Samples	L*	a*	b*	ΔL*	Δa*	Δb*	ΔE*	InstrCode
QWBFFR		B171	42.64	5.70	-11.27	1.39	0.04	-0.15	1.39	MM
		B172	44.03	5.74	-11.42					
RGH3MH	X	B171	41.41	5.52	-11.12	1.32	0.03	-0.27	1.34	CA
		B172	42.72	5.55	-11.39					
TZPRBY		B171	42.64	5.79	-11.21	0.83	0.13	-0.27	0.88	XH
		B172	43.46	5.91	-11.48					
U3BVHW		B171	42.93	5.76	-11.26	1.06	0.06	-0.24	1.09	MV
		B172	43.99	5.82	-11.50					
U3VCZK		B171	42.42	5.81	-11.30	1.10	0.06	-0.26	1.13	XH
		B172	43.52	5.87	-11.56					
UFGPCU		B171	43.04	5.77	-11.36	1.06	0.06	-0.21	1.08	MM
		B172	44.10	5.83	-11.56					
UGUDDL	X	B171	43.09	42.87	42.54	0.95	0.94	0.93	1.63	AJ
		B172	44.04	43.81	43.47					
UNAZMP		B171	42.90	5.83	-11.49	1.14	0.08	-0.26	1.17	AS
		B172	44.03	5.91	-11.75					
V3PL6L		B171	42.71	5.77	-11.12	0.96	0.06	-0.26	0.99	XO
		B172	43.66	5.83	-11.38					
VCE8D6	X	B171	42.60	7.98	-11.82	0.97	0.16	-0.31	1.03	MU
		B172	43.57	8.14	-12.13					
VDCDX7	X	B171	42.21	5.56	-11.22	1.05	0.07	-0.28	1.08	XO
		B172	43.25	5.63	-11.50					
VFG7PJ		B171	42.80	5.81	-11.24	0.92	0.09	-0.27	0.96	XI
		B172	43.71	5.90	-11.51					
WD6QX4		B171	42.77	5.66	-11.35	1.00	0.12	-0.29	1.05	XI
		B172	43.77	5.78	-11.63					
WJRGHD		B171	42.87	5.75	-11.50	1.05	0.04	-0.22	1.07	PE
		B172	43.92	5.79	-11.72					
XJND4T		B171	42.77	5.74	-11.45	1.12	0.05	-0.26	1.15	AQ
		B172	43.89	5.79	-11.71					
XYG7QE		B171	42.56	5.73	-11.34	1.12	0.04	-0.22	1.14	MI
		B172	43.68	5.77	-11.56					

			CIE L* a* b* Color Values			Color Difference Values				
WebCode	Flag	Samples	L*	a*	b*	ΔL*	Δa*	Δb*	ΔE*	InstrCode
YAE4EE		B171	42.76	5.83	-11.33	1.10	0.04	-0.23	1.12	MU
		B172	43.86	5.87	-11.56					
YRYUDE		B171	42.84	5.97	-11.65	0.98	0.05	-0.22	1.00	AM
		B172	43.81	6.01	-11.86					
ZADVHZ		B171	42.79	5.80	-11.42	1.08	0.07	-0.27	1.12	MT
		B172	43.87	5.87	-11.69					
ZP7LFH		B171	42.93	5.68	-11.10	1.04	0.04	-0.26	1.07	XI
		B172	43.97	5.72	-11.36					
ZTLT4G		B171	42.86	5.82	-11.32	1.15	0.06	-0.26	1.18	AS
		B172	44.01	5.87	-11.58					

Summary Statistics

Samples	L*	a*	b*	ΔL*	Δa*	Δb*	ΔE*
Grand Means							
B171	42.80	5.78	-11.34	1.06	0.06	-0.25	1.09
B172	43.85	5.85	-11.59				
Stnd Dev Btwn Labs							
B171	0.15	0.09	0.12	0.09	0.02	0.02	0.09
B172	0.17	0.09	0.12				

Statistics based on 92 of 101 reporting participants

Comments Assigned on Data Flags for Test #409

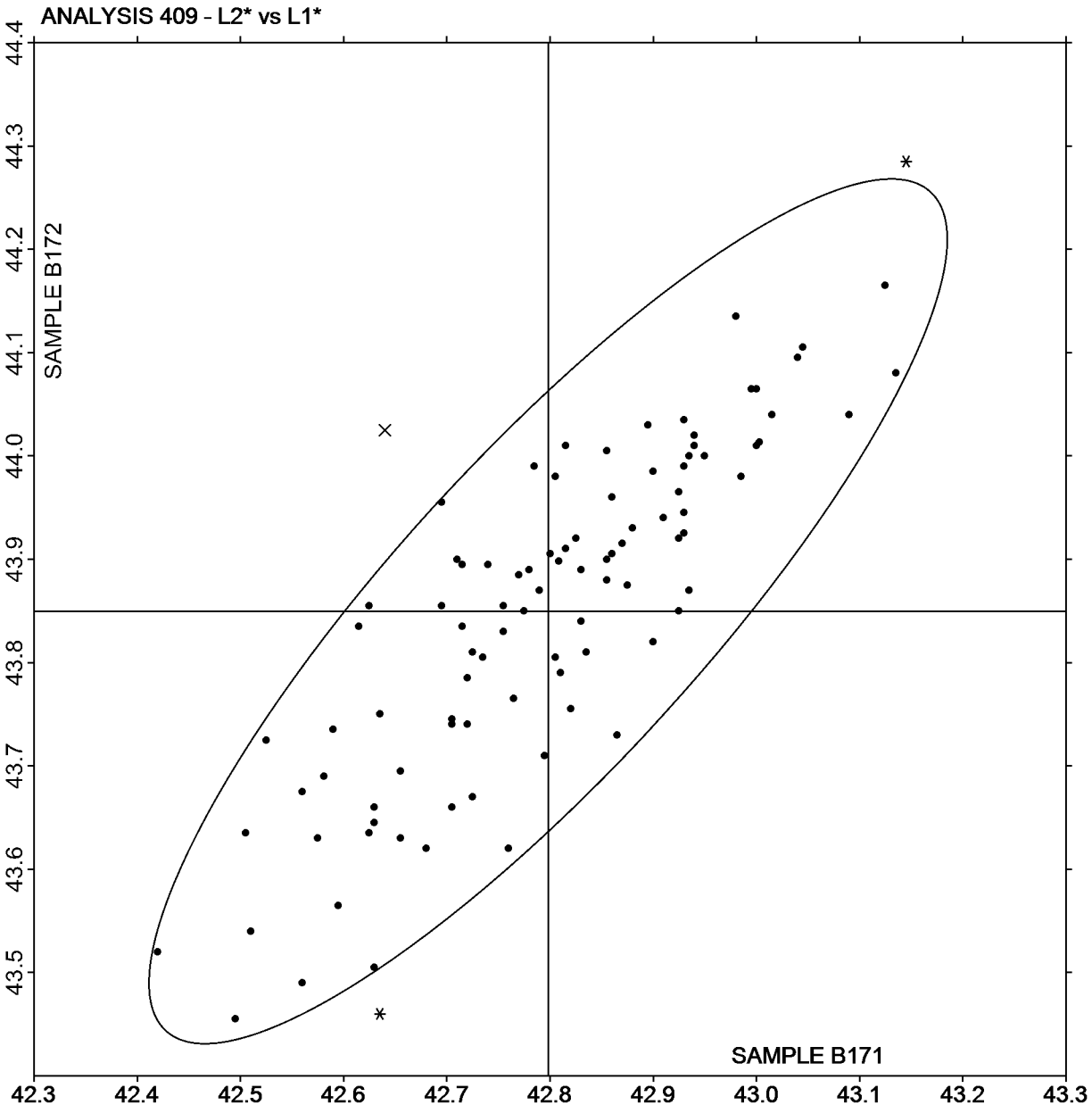
6WQB7T(X) - Low "a*" values.
8ZKQU8(X) - Extreme Data
E2RJML(X) - High "a*" values.
FP9J84(X) - Low "b*" values.
GB7EFH(X) - Low "a*" values.
RGH3MH(X) - Low "a*" values & very low "L*" values.
UGUDDL(X) - Extreme "a*" & "b*" values.
VCE8D6(X) - Very high "a*" values and low "b*" values.
VDCDX7(X) - Low "L*" values.

Key to Instrument Codes Reported by Participants

AE	ACS-Datacolor 110	AJ	ACS-Datacolor 600
AM	ACS-Datacolor 600 Plus	AO	ACS-Datacolor 650X
AQ	ACS-Datacolor 600X	AR	Datacolor 400
AS	ACS-Datacolor 800 Series	CA	Cary 5000
GD	BYK-Gardner spectro-guide sphere	HF	Hunter ColorFlex Diffuse
HH	Hunter ColorQUEST XE	HP	Hunter UltraScan PRO
MI	Macbeth Color i 5	MJ	Macbeth Color-Eye 3000
MK	Macbeth Color-Eye 7000	MM	Macbeth Color-Eye 7000a
MT	Minolta CM-2600d	MU	Minolta
MV	Minolta CM-3000d Series Spectrophotometer	PE	Perkin Elmer Spectrophotometer
XB	X-Rite Ci7000 Series Benchtop Spectrophotometer	XC	X-Rite Ci4200 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
XX	Instrument make/model not specified by lab	XZ	X-Rite

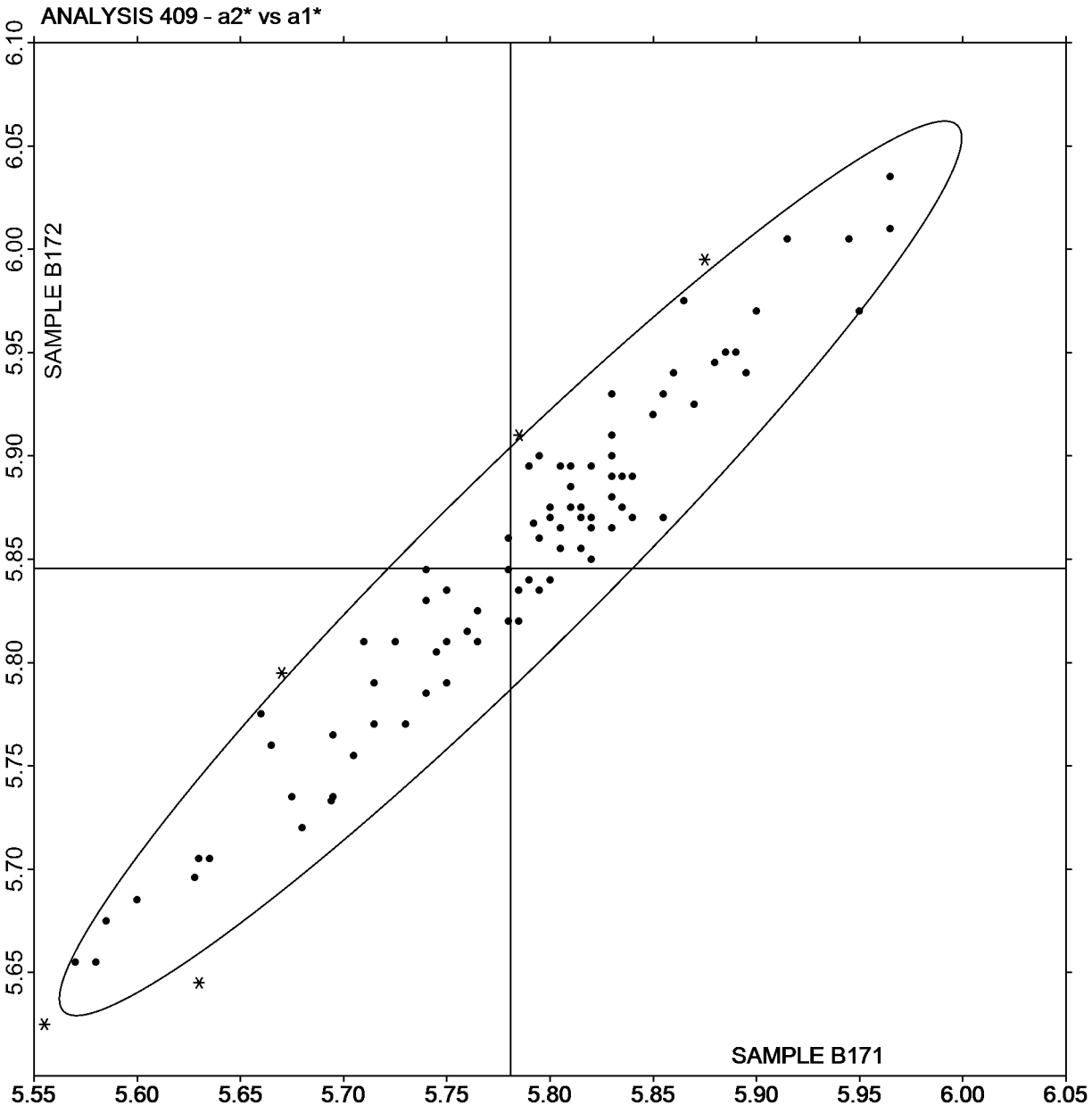
L2* vs L1*

SAMPLE B171 = 42.80 SAMPLE B172 = 43.85



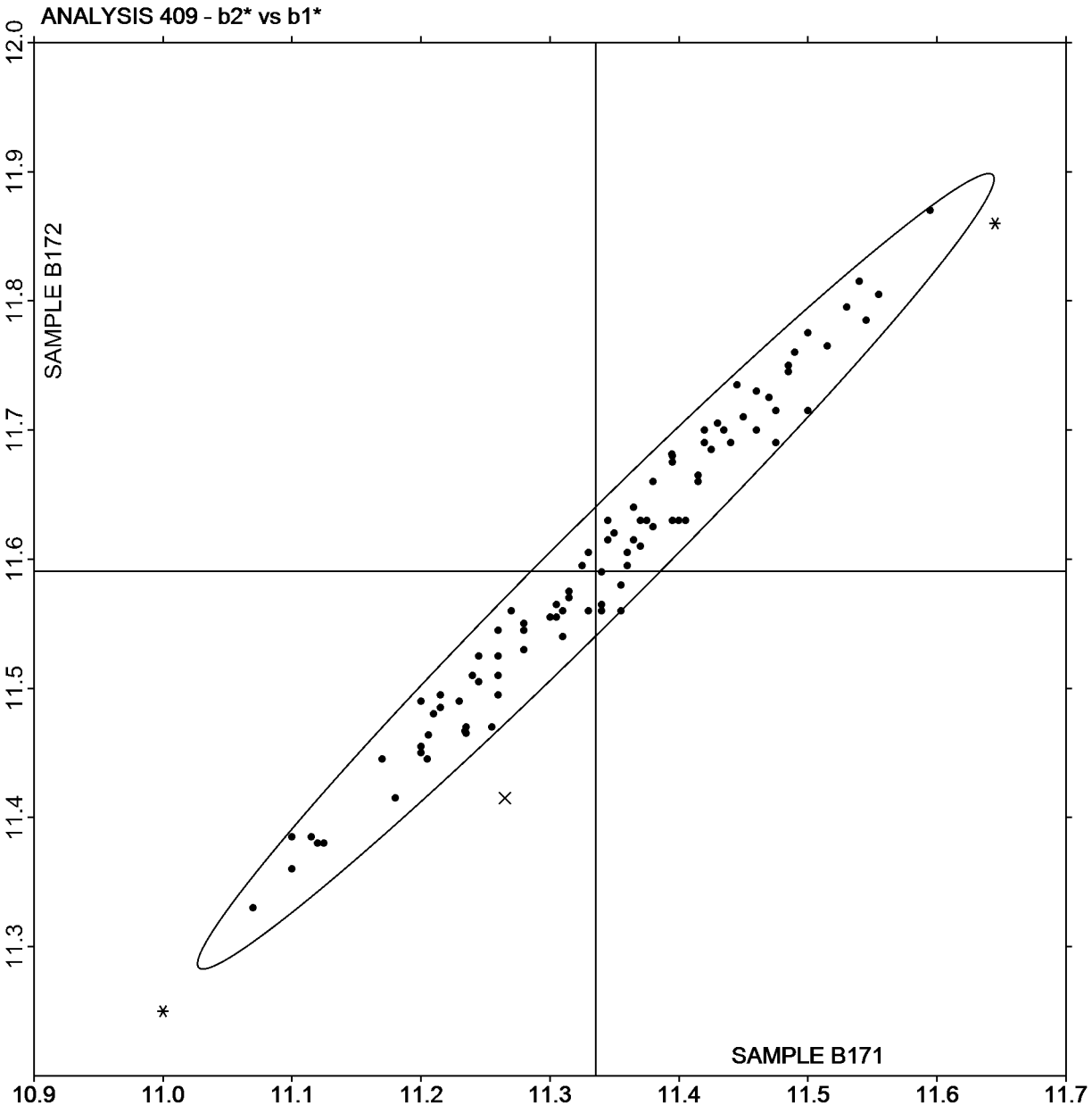
a2* vs a1*

SAMPLE B171 = 5.78 SAMPLE B172 = 5.85



b2* vs b1*

SAMPLE B171 = -11.34 SAMPLE B172 = -11.59



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 B171																		
2MU9CL		17.18	18.97	18.72	18.06	16.85	14.74	12.70	11.72	11.64	12.31	14.03	13.60	14.05	16.35	17.61	17.88	MM
2MWVTY		17.00	18.86	18.58	17.91	16.71	14.67	12.59	11.58	11.46	12.23	13.92	13.33	13.91	16.25	17.33	17.55	XI
2QC74H		17.58	19.00	18.63	17.94	16.79	14.74	12.69	11.67	11.51	12.29	13.99	13.65	13.70	15.16X	17.70	18.09	HF
3APA4E		17.01	18.88	18.55	17.93	16.75	14.69	12.64	11.62	11.50	12.25	13.96	13.40	14.00	16.31	17.41	17.61	XI
3JC9UK		16.92	18.81	18.51	17.77	16.40*	14.44	12.39	11.47	11.36	12.16	13.89	13.30	13.93	16.28	17.45	17.68	XF
3RMP47		16.97	18.68	18.35	17.60	16.51	14.46	12.52	11.51	11.41	12.19	13.84	13.20	13.90	16.21	17.29	17.37	XI
43LMQ6		17.64	18.91	18.62	17.94	16.71	14.61	12.57	11.63	11.55	12.39	14.21	13.28	13.80	16.31	15.91X	17.71	HW
4DHN6V		17.09	18.85	18.59	17.95	16.74	14.72	12.65	11.66	11.53	12.26	13.97	13.38	13.87	16.28	17.47	17.82	XI
4UPMEX		17.40	19.10	18.80	18.10	16.90	14.80	12.70	11.70	11.60	12.30	14.20	13.60	14.00	16.60	17.75	17.70	AO
4VYX7V		17.03	18.92	18.62	17.92	16.76	14.60	12.49	11.56	11.42	12.04	13.91	13.40	13.70	16.16	17.42	17.69	AJ
6HQCGB		17.07	18.79	18.44	17.75	16.57	14.49	12.40	11.46	11.41	12.07	13.93	13.37	13.82	16.31	17.36	17.44	AJ
6MNVJA		17.15	18.92	18.58	17.90	16.80	14.70	12.61	11.64	11.48	12.24	14.04	13.35	13.96	16.41	17.48	17.69	XI
6TDDWK		17.43	19.11	18.83	18.12	16.94	14.77	12.68	11.76	11.64	12.28	14.07	13.54	13.90	16.32	17.60	17.75	AH
6WQB7T		18.40X	18.65	18.48	17.90	16.90	14.79	12.52	11.46	11.32	11.85X	13.52X	13.29	13.83	16.09	17.31	16.88X	GD
7KUQ2L		17.11	18.68	18.44	17.79	16.67	14.47	12.39	11.40	11.29	11.96*	13.94	13.25	13.62*	16.18	17.44	17.64	CA
7T6QWH		17.13	18.83	18.58	17.88	16.72	14.60	12.49	11.55	11.44	12.07	13.91	13.38	13.79	16.25	17.42	17.46	AJ
8ZKQU8		17.75	18.94	18.74	18.02	16.80	14.67	12.56	11.64	11.54	12.20	13.94	13.45	13.90	16.36	17.57	17.72	AQ
9PKHNA		17.07	18.80	18.55	17.82	16.67	14.57	12.53	11.51	11.40	12.18	13.89	13.33	13.88	16.24	17.27	17.50	XI
9UQBH6		16.97	18.78	18.55	17.89	16.69	14.63	12.55	11.59	11.46	12.16	13.93	13.47	13.94	16.26	17.52	17.79	MM
9ZFTY2		17.27	18.95	18.68	18.02	16.83	14.64	12.56	11.64	11.50	12.15	13.98	13.43	13.82	16.22	17.46	17.71	AO
A4A6AR		17.23	18.96	18.66	17.96	16.80	14.67	12.59	11.58	11.46	12.15	14.04	13.34	13.76	16.20	17.36	17.43	XB
AQ8GFD		17.71	19.27*	19.01*	18.31*	17.04	14.85	12.57	11.81*	11.69	12.38	14.15	13.63	14.04	16.51	17.72	17.86	AR
B94LYQ		16.60	18.72	18.56	17.87	16.68	14.59	12.56	11.59	11.48	12.17	13.81	13.37	13.89	16.17	17.37	17.51	AM
C7BWCP		17.41	19.15	18.96*	18.15	16.93	14.78	12.67	11.73	11.56	12.35	14.30*	13.37	13.75	16.70*	17.93	18.06	HH
CGWYW6		17.28	19.10	18.93	18.20	16.98	14.81	12.72	11.80*	11.67	12.44*	14.25	13.64	14.21X	16.65	17.93	18.14*	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 B171																		
CJZUF9		15.73X	18.75	18.64	17.95	16.69	14.75	12.65	11.71	11.56	12.36	14.20	13.69*	14.10	16.57	17.88	18.12*	XZ
CKAXQC		17.02	18.80	18.47	17.81	16.63	14.56	12.51	11.52	11.42	12.19	13.93	13.34	13.98	16.27	17.34	17.55	XI
CKCL9P		17.09	18.98	18.62	17.93	16.78	14.68	12.57	11.60	11.50	12.23	14.04	13.52	14.07	16.36	17.53	17.76	XI
D2DVP2		17.22	18.72	18.41	17.73	16.60	14.52	12.40	11.50	11.37	12.04	13.90	13.30	13.74	16.25	17.41	17.60	AS
D6FTZT		17.47	19.01	18.76	18.04	16.89	14.75	12.65	11.72	11.63	12.29	14.10	13.62	13.98	16.41	17.67	17.77	AJ
D9F27P	X	18.10*	19.95X	19.69X	18.80X	17.77X	15.55X	13.28X	12.27X	12.15X	12.83X	14.79X	14.17X	14.61X	17.22X	18.33X	18.35X	AJ
DCVAUN		17.20	18.90	18.80	18.00	16.90	14.75	12.60	11.70	11.60	12.20	14.10	13.50	14.00	16.50	17.60	17.60	AO
DG8KJC		17.19	18.87	18.63	17.95	16.81	14.67	12.61	11.65	11.54	12.26	14.10	13.42	13.98	16.41	17.52	17.76	XB
DMEQKA		17.27	18.86	18.64	17.93	16.70	14.59	12.48	11.54	11.48	12.11	13.90	13.32	13.77	16.20	17.50	17.61	AQ
E2RJML		16.75	18.55	18.25*	17.52*	16.33*	14.30*	12.26*	11.34*	11.24*	12.01	13.73	13.14*	13.71	16.06	17.25	17.50	XF
EHFRL6		16.99	18.66	18.38	17.70	16.49	14.40	12.33	11.41	11.28	12.01	13.84	13.21	13.69	16.13	17.34	17.56	MS
EN4EGB		17.07	18.78	18.54	17.85	16.69	14.61	12.47	11.55	11.44	12.10	13.96	13.42	13.82	16.29	17.47	17.45	AJ
F3ZBUT		16.62	18.61	18.31	17.63	16.41*	14.39	12.36	11.40	11.27	12.06	13.75	13.24	13.86	16.13	17.36	17.58	XH
FAHL69		17.21	19.02	18.73	18.04	16.89	14.72	12.58	11.65	11.53	12.17	13.99	13.49	13.90	16.36	17.56	17.73	AO
FP9J84		17.71	19.30*	18.96*	18.31*	17.12*	14.89	12.76	11.74	11.65	12.32	14.31*	13.60	14.00	16.53	17.79	18.01	CA
FX7E63		16.99	18.82	18.61	17.87	16.68	14.57	12.48	11.50	11.40	12.14	13.90	13.40	13.89	16.20	17.44	17.73	MI
GH7RFL		17.70	19.05	18.65	17.97	16.79	14.70	12.56	11.55	11.45	12.16	14.07	13.41	13.81	16.39	17.61	17.86	MV
GQKME2		17.29	18.89	18.67	17.96	16.84	14.71	12.58	11.61	11.55	12.18	14.09	13.44	13.89	16.35	17.49	17.34	AO
GXJ37U		17.09	18.84	18.54	17.82	16.61	14.52	12.46	11.52	11.42	12.18	13.92	13.33	13.91	16.25	17.43	17.70	XC
H84WWG		16.65	18.62	18.38	17.75	16.57	14.50	12.44	11.48	11.38	12.14	13.90	13.31	13.91	16.19	17.39	17.59	XH
HJXAT8		17.24	19.01	18.81	18.07	16.92	14.80	12.63	11.73	11.62	12.29	14.12	13.55	14.00	16.48	17.74	17.60	AM
HU4X8Y		16.92	18.86	18.56	17.95	16.76	14.65	12.51	11.56	11.45	12.18	14.07	13.45	13.86	16.29	17.62	17.86	MV
JMEW6Q		16.90	18.63	18.38	17.75	16.51	14.41	12.41	11.47	11.38	12.12	13.87	13.34	13.94	16.20	17.41	17.62	XH
JNRBRZ		16.98	18.86	18.47	17.77	16.64	14.69	12.58	11.55	11.39	12.15	13.90	13.31	13.89	16.31	17.39	17.58	XI
JQXVFZ		16.95	18.95	18.60	17.95	16.75	14.70	12.55	11.50	11.40	12.10	14.05	13.40	13.80	16.30	17.60	17.80	MV

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 B171																		
JW2Z7Y		17.14	18.89	18.65	17.97	16.77	14.63	12.54	11.62	11.48	12.12	13.93	13.41	13.82	16.24	17.43	17.56	AJ
KBZ2PR		16.34*	18.56	18.41	17.85	16.72	14.64	12.46	11.48	11.35	12.06	13.99	13.33	13.70	16.27	17.51	17.77	MV
KEHGUD		17.17	18.91	18.67	17.98	16.80	14.70	12.63	11.65	11.54	12.25	14.06	13.50	14.03	16.40	17.63	17.84	MM
KHGUFG		17.25	19.08	18.75	18.05	16.83	14.73	12.57	11.62	11.50	12.26	14.19	13.48	13.90	16.41	17.66	17.91	MV
KN2VVU		17.32	18.83	18.58	17.87	16.65	14.66	12.56	11.64	11.50	12.30	14.09	13.54	14.14*	16.47	17.65	18.01	XI
LY3MXU		17.34	18.60	18.38	17.63	16.42	14.46	12.10X	11.60	11.33	12.34	13.99	13.40	13.73	16.12	17.57	17.72	GD
M2PGGF		17.13	18.87	18.61	17.93	16.75	14.63	12.56	11.58	11.48	12.21	14.01	13.44	13.94	16.32	17.53	17.75	MK
M3V23U		18.19*	18.94	18.78	18.03	16.90	14.74	12.62	11.70	11.58	12.24	14.04	13.60	13.94	16.40	17.63	17.81	AJ
M4PPJ6		17.72	19.20	18.90	18.24	17.07*	14.93*	12.76	11.77	11.72*	12.30	14.26	13.60	14.01	16.48	17.84	17.97	HP
M9LCEE		17.29	18.98	18.74	18.07	16.94	14.78	12.62	11.69	11.53	12.18	14.21	13.55	13.96	16.65	17.56	17.08X	AE
MDUYPU		17.35	19.25*	19.01*	18.32*	17.10*	14.95*	12.84*	11.83*	11.71*	12.43*	14.21	13.74*	14.22X	16.55	17.85	18.09	MM
MEDLMQ		17.25	18.88	18.70	18.01	16.91	14.72	12.62	11.69	11.58	12.23	14.11	13.55	13.95	16.46	17.55	17.48	AS
MHA8DU		16.89	18.85	18.51	17.88	16.70	14.62	12.52	11.58	11.42	12.16	13.89	13.29	13.85	16.27	17.35	17.57	XI
MMKFGJ		16.77	18.65	18.31	17.64	16.45	14.42	12.37	11.40	11.34	12.11	13.81	13.27	13.88	16.18	17.24	17.44	XH
MT6HJF		17.01	18.75	18.50	17.86	16.71	14.61	12.53	11.61	11.47	12.15	14.00	13.46	13.89	16.39	17.47	17.47	AJ
NCXJBC		16.66	18.57	18.38	17.72	16.54	14.44	12.36	11.47	11.38	12.09	13.73	13.33	13.86	16.23	17.14	17.21*	AO
NFHQDK		17.24	18.83	18.63	17.94	16.81	14.67	12.56	11.62	11.45	12.18	14.09	13.40	13.87	16.39	17.51	17.44	AO
NZKJG4		17.32	18.89	18.69	17.98	16.83	14.73	12.61	11.67	11.56	12.21	14.09	13.53	13.95	16.40	17.53	17.51	AS
PB3HPK		16.99	18.74	18.50	17.83	16.67	14.56	12.50	11.51	11.42	12.13	13.93	13.38	13.89	16.29	17.50	17.70	MM
PNQLTB		18.17*	18.88	18.62	17.94	16.74	14.64	12.54	11.60	11.50	12.15	13.95	13.46	13.87	16.36	17.57	17.74	AQ
PPJBFD		17.16	18.94	18.63	18.05	16.80	14.69	12.56	11.59	11.50	12.15	13.97	13.42	13.82	16.28	17.55	17.71	AO
PRPXQW		17.18	18.92	18.68	18.01	16.81	14.70	12.64	11.65	11.53	12.23	14.05	13.50	14.01	16.40	17.62	17.83	MM
Q4XZPY		16.94	18.71	18.43	17.74	16.56	14.46	12.41	11.43	11.32	12.05	13.81	13.22	13.82	16.18	17.26	17.48	XI
QWBFFR		16.91	18.89	18.62	17.96	16.79	14.70	12.64	11.67	11.56	12.25	13.99	13.55	13.98	16.30	17.57	17.85	MM
RGH3MH	X	15.65X	17.38X	17.24X	16.67X	15.67X	13.67X	11.69X	10.74X	10.64X	11.25X	13.09X	12.45X	12.79X	15.19X	16.44X	16.73X	CA

Spectrophotometric Reflectance values (as %) at selected wavelengths

Sample B171

WebCode	Data Flag	400	420	440	460	480	500	520	540	560	580	600	620	640	660	680	700	Instr Code
TZPRBY		16.78	18.68	18.41	17.71	16.53	14.45	12.46	11.44	11.36	12.11	13.85	13.35	13.90	16.18	17.40	17.64	XH
U3VCZK		16.59	18.53*	18.25*	17.59*	16.41*	14.32*	12.33	11.36*	11.26*	11.95*	13.71*	13.16*	13.72	16.02	17.24	17.43	XH
UFGPCU		17.31	19.03	18.80	18.13	16.94	14.80	12.73	11.72	11.62	12.33	14.13	13.59	14.07	16.47	17.71	17.94	MM
UNAZMP		17.76	18.95	18.76	18.01	16.89	14.73	12.62	11.66	11.53	12.18	14.10	13.48	13.93	16.44	17.78	17.78	AS
V3PL6L		17.01	18.63	18.41	17.71	16.57	14.46	12.44	11.55	11.44	12.16	13.97	13.28	13.93	16.23	17.50	17.67	XO
VCE8D6		17.20	19.10	18.80	18.20	16.95	14.80	12.65	11.70	11.60	12.40*	14.25	13.50	14.00	16.50	17.60	17.90	MU
VDCDX7	X	16.60	18.21X	18.10X	17.36X	16.29X	14.18X	12.21X	11.24X	11.12X	11.87X	13.54X	12.87X	13.52X	15.67X	16.67X	16.78X	XO
VFG7PJ		16.85	18.80	18.50	17.89	16.70	14.60	12.56	11.54	11.47	12.23	13.97	13.42	14.02	16.35	17.50	17.75	XI
WD6QX4		17.14	18.90	18.56	17.85	16.64	14.64	12.56	11.59	11.42	12.21	13.91	13.32	13.78	16.10	17.35	17.64	XI
WJRGHD		17.58	19.02	18.75	18.06	16.87	14.68	12.55	11.59	11.48	12.18	14.13	13.38	13.81	16.35	17.59	17.79	PE
XJND4T		17.05	18.86	18.59	17.96	16.76	14.66	12.54	11.56	11.50	12.13	13.93	13.40	13.81	16.25	17.44	17.65	AQ
XYG7QE		16.60	18.62	18.37	17.73	16.51	14.53	12.41	11.42	11.31	12.06	13.77	13.25	13.77	16.08	17.33	17.48	MI
YAE4EE		16.92	18.88	18.52	17.89	16.72	14.61	12.48	11.50	11.41	12.14	14.03	13.43	13.80	16.26	17.63	17.82	MV
YRYUDE		17.12	19.13	18.80	18.02	16.77	14.70	12.56	11.55	11.47	12.21	14.00	13.48	13.99	16.33	17.62	17.56	AM
ZADVHZ		16.99	18.90	18.62	17.99	16.75	14.65	12.54	11.54	11.43	12.14	14.00	13.43	13.84	16.33	17.60	17.86	MT
ZTLT4G		17.55	18.85	18.58	17.95	16.80	14.67	12.56	11.62	11.54	12.19	14.11	13.48	13.90	16.38	17.59	17.70	AS

Summary Statistics

	400	420	440	460	480	500	520	540	560	580	600	620	640	660	680	700
Grand Means	17.15	18.87	18.60	17.92	16.74	14.64	12.54	11.59	11.47	12.18	13.99	13.42	13.89	16.30	17.50	17.67
SD Btwn Labs	0.38	0.17	0.17	0.16	0.16	0.13	0.12	0.11	0.11	0.11	0.14	0.12	0.11	0.18	0.24	0.22

Comments Assigned on Data Flags for Test #411

D9F27P (X) - High % reflectance data at all wavelengths.

RGH3MH (X) - Low % reflectance data at all wavelengths.

VDCDX7 (X) - Low % reflectance data for most wavelengths.

Key to Instrument Codes Reported by Participants

AE ACS-Datacolor 110	AH ACS-Datacolor 550	AJ ACS-Datacolor 600
AM ACS-Datacolor 600 Plus	AO ACS-Datacolor 650	AQ ACS-Datacolor 600X
AR Datacolor 400	AS ACS-Datacolor 800 Series	CA Cary 5000
GD BYK-Gardner spectro-guide sphere	HF Hunter ColorFlex Diffuse	HH Hunter ColorQUEST XE
HP Hunter UltraScan PRO	HW Hunter UltraScan XE	MI Macbeth Color i5
MK Macbeth Color-Eye 7000 Spectrophotometer	MM Macbeth Color-Eye 7000a	MS Minolta CM-600d
MT Minolta CM-2600d	MU Minolta	MV Minolta CM-3000d Series Spectrophotometer
PE Perkin Elmer Spectrophotometer	XB X-Rite Ci7000 Series Benchtop Spectrophotometer	XC X-Rite Ci4200 Benchtop Spectrophotometer
XF X-Rite Ci6x Series Portable Spectrophotometer	XH X-Rite Color i5	XI X-Rite Color i7
XO X-Rite SP64	XZ X-Rite	

WebCode	Data Flag	Sample F171 Lab Mean	Sample F171 Diff from Grand Mean	Sample F171 CPV	Sample F172 Lab Mean	Sample F172 Diff from Grand Mean	Sample F172 CPV	Instr Code
2YPE86	*	42.33	-2.48	-2.72	54.15	-2.55	-2.93	GB
3JC9UK		46.28	1.47	1.60	58.70	2.00	2.29	GK
3RMP47		43.88	-0.93	-1.02	55.88	-0.83	-0.95	GK
43LMQ6		44.38	-0.43	-0.48	55.90	-0.80	-0.92	GK
4DHN6V		45.30	0.49	0.54	56.40	-0.30	-0.35	GL
6WQB7T	X	43.50	-1.31	-1.43	57.13	0.42	0.48	GB
7T6QWH		43.90	-0.91	-1.00	55.90	-0.80	-0.92	GK
7UGM49		43.90	-0.91	-1.00	56.33	-0.38	-0.44	GL
8W3QER		44.20	-0.61	-0.67	56.40	-0.30	-0.35	GK
8ZKQU8		45.03	0.22	0.24	57.40	0.70	0.80	GK
92PZYA		44.35	-0.46	-0.50	56.30	-0.40	-0.46	GK
9K6AZA	X	34.15	-10.66	-11.68	33.23	-23.48	-26.97	GL
9UQBH6		43.85	-0.96	-1.05	55.98	-0.73	-0.84	GL
A4A6AR		45.30	0.49	0.54	57.03	0.32	0.37	GL
ANYN3P		43.83	-0.98	-1.08	55.93	-0.78	-0.89	GL
APGDNQ		45.15	0.34	0.37	57.00	0.30	0.34	GK
APTCGE		44.33	-0.48	-0.53	56.23	-0.48	-0.55	GX
BDDN48		44.55	-0.26	-0.28	56.75	0.05	0.05	GL
BKD4VZ		44.55	-0.26	-0.28	56.43	-0.28	-0.32	GL
CGWYW6		44.58	-0.23	-0.26	57.18	0.47	0.54	XX
CKAXQC		43.93	-0.88	-0.97	55.55	-1.15	-1.33	GL
CKCL9P		46.15	1.34	1.47	57.78	1.07	1.23	GL
D6WRC7		44.73	-0.08	-0.09	56.75	0.05	0.05	GK
D9F27P		44.08	-0.73	-0.81	55.60	-1.10	-1.27	XX
DMEQKA	*	44.30	-0.51	-0.56	57.53	0.82	0.94	PC
DUTU83		46.38	1.57	1.71	58.00	1.30	1.49	GL
EHFRL6		44.73	-0.08	-0.09	55.88	-0.83	-0.95	GK
EN4EGB		46.58	1.77	1.93	57.43	0.72	0.83	MW
FAHL69		44.93	0.12	0.13	57.80	1.10	1.26	GQ
FECF6V		44.13	-0.68	-0.75	56.23	-0.48	-0.55	GL

WebCode	Data Flag	Sample F171 Lab Mean	Sample F171 Diff from Grand Mean	Sample F171 CPV	Sample F172 Lab Mean	Sample F172 Diff from Grand Mean	Sample F172 CPV	Instr Code
FX7E63		44.15	-0.66	-0.72	56.58	-0.13	-0.15	GL
GH7RFL		43.83	-0.98	-1.08	56.00	-0.70	-0.81	RA
H84WWG		44.25	-0.56	-0.61	56.50	-0.20	-0.23	GK
JFFAB7		44.05	-0.76	-0.83	55.58	-1.13	-1.30	GL
JMEW6Q		45.30	0.49	0.54	56.83	0.12	0.14	GL
KFVVK8		44.70	-0.11	-0.12	56.33	-0.38	-0.44	GK
KHXQ7V		45.15	0.34	0.37	57.28	0.57	0.66	RA
KN2VVU		44.28	-0.53	-0.59	56.60	-0.10	-0.12	MH
LY3MXU		45.88	1.07	1.17	58.08	1.37	1.57	GN
M9LCEE		44.03	-0.78	-0.86	56.48	-0.23	-0.26	GL
MLB9FC	*	47.20	2.39	2.62	58.35	1.65	1.89	GK
MMKFGJ		44.84	0.03	0.03	56.56	-0.15	-0.17	GL
MMZLXU		44.35	-0.46	-0.50	56.78	0.07	0.08	MW
MNDDQC		46.15	1.34	1.47	57.55	0.85	0.97	XX
NXXYDL		44.40	-0.41	-0.45	56.23	-0.48	-0.55	GL
PB3HPK		44.03	-0.78	-0.86	57.08	0.37	0.43	RA
PRPXQW		45.70	0.89	0.97	56.70	0.00	0.00	GL
PXFDE4		46.78	1.97	2.15	58.50	1.80	2.06	GL
Q7PY4X		43.70	-1.11	-1.22	55.13	-1.58	-1.81	GL
RGH3MH		44.30	-0.51	-0.56	56.88	0.17	0.20	GL
RHAYAQ		44.40	-0.41	-0.45	55.88	-0.83	-0.95	GN
TZPRBY		45.75	0.94	1.03	57.45	0.75	0.86	GL
U3BVHW		45.13	0.32	0.35	56.20	-0.50	-0.58	GN
UNUXFG		45.38	0.57	0.62	57.63	0.92	1.06	GN
V3PL6L		45.13	0.32	0.35	56.63	-0.08	-0.09	GN
VDCDX7		44.80	-0.01	-0.01	56.75	0.05	0.05	GL
VDMKRL		46.58	1.77	1.93	58.58	1.87	2.15	GL
VFG7PJ		44.33	-0.48	-0.53	56.37	-0.34	-0.39	GL
WD6QX4		44.70	-0.11	-0.12	56.00	-0.70	-0.81	GL
XYG7QE		44.53	-0.28	-0.31	56.40	-0.30	-0.35	GL

Interlaboratory Testing Program for Color & Appearance

Analysis 440

60 Degree Gloss - Paint Chips

ASTM Method D 523

WebCode	Data Flag	Sample F171 Lab Mean	Sample F171 Diff from Grand Mean	Sample F171 CPV	Sample F172 Lab Mean	Sample F172 Diff from Grand Mean	Sample F172 CPV	Instr Code
YAE4EE		44.55	-0.26	-0.28	55.90	-0.80	-0.92	GL
ZMZ2U3		44.60	-0.21	-0.23	56.63	-0.08	-0.09	GK
ZNR2UY		45.80	0.99	1.08	57.33	0.62	0.71	GL
ZP7LFH		45.98	1.17	1.28	57.60	0.90	1.03	GL

Summary Statistics

	Sample F171	Sample F172
Grand Means	44.81 Gloss Units	56.70 Gloss Units
Stnd Dev Btwn Labs	0.91 Gloss Units	0.87 Gloss Units

Statistics based on 62 of 64 reporting participants

Comments on Assigned Data Flags for Test #440

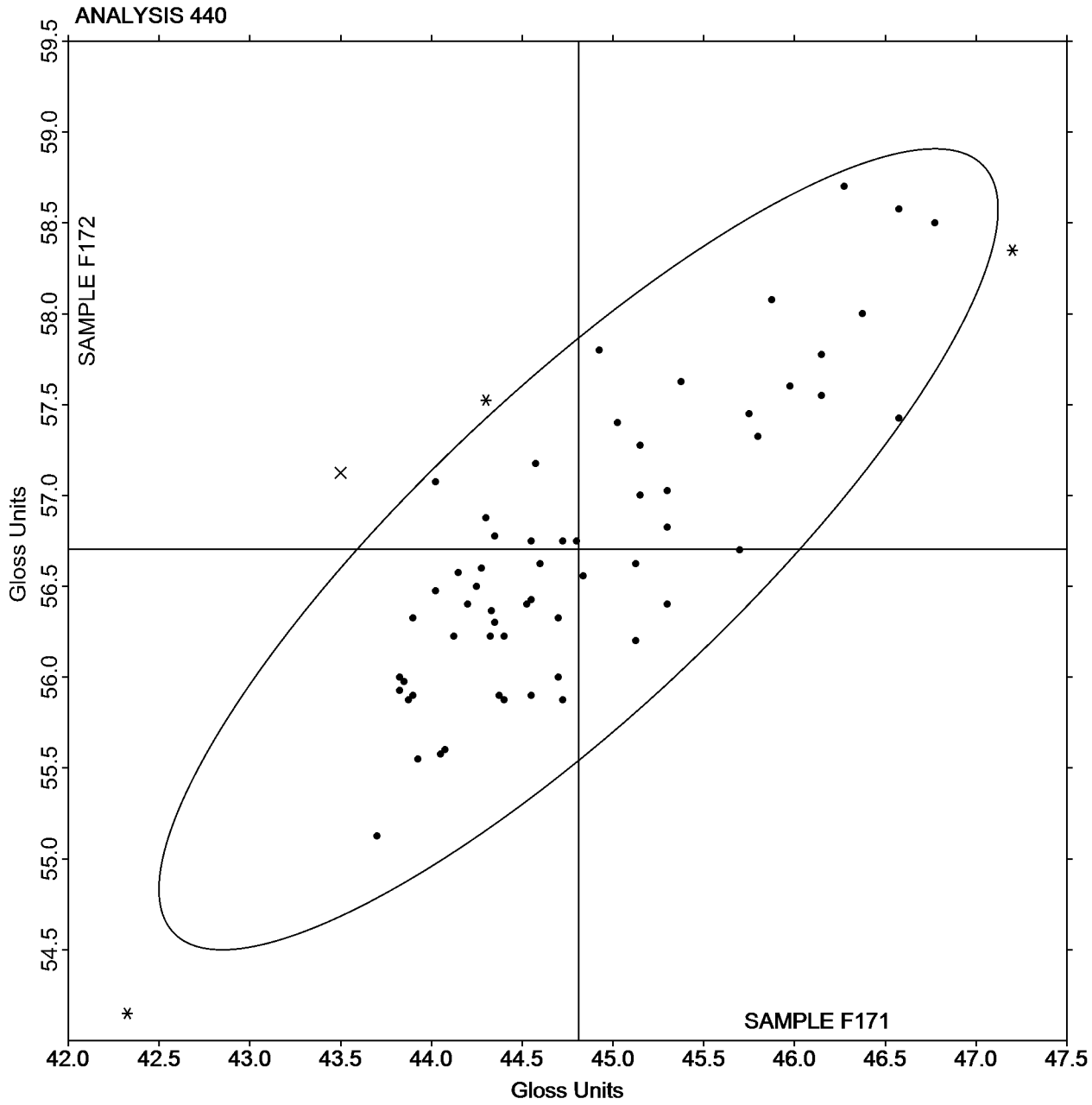
6WQB7T(X) - Inconsistent in testing between samples.

9K6AZA(X) - Data for both samples are low. Possible systematic error.

Key to Instrument Codes Reported by Participants

GB	BYK Gardner Spectro - Guide Sphere Gloss	GK	BYK-Gardner micro-gloss (60)
GL	BYK-Gardner micro-TRI-gloss	GN	BYK-Gardner new micro-TRI-gloss
GQ	BYK-Gardner haze-gloss	GX	BYK-Gardner (model not specified)
MH	X-Rite/Macbeth Color-Eye XTH	MW	Minolta Multi-Gloss 268
PC	Picogloss 503 Erichson	RA	Rhopoint Novo-Gloss Glossmeter
XX	Instrument make/model not specified by lab		

SAMPLE F171 = 44.81 Gloss Units SAMPLE F172 = 56.70 Gloss Units



Interlaboratory Testing Program for Color & Appearance

Analysis 442

85 Degree Gloss - Paint Chips

ASTM Method D 523

WebCode	Data Flag	Sample K171 Lab Mean	Sample K171 Diff from Grand Mean	Sample K171 CPV	Sample K172 Lab Mean	Sample K172 Diff from Grand Mean	Sample K172 CPV	Instr Code
9UQBH6		7.05	0.11	0.40	11.00	0.15	0.38	GN
CKAXQC		6.85	-0.09	-0.30	11.23	0.37	0.94	GL
CKCL9P		7.20	0.26	0.92	11.05	0.20	0.50	GL
LY3MXU		7.43	0.49	1.71	11.55	0.70	1.76	GN
MMKFGJ		7.13	0.20	0.68	11.04	0.18	0.46	GL
PRPXQW		6.98	0.04	0.13	10.73	-0.13	-0.32	GL
RGH3MH		6.65	-0.29	-1.00	10.15	-0.70	-1.77	GL
RHAYAQ		6.63	-0.31	-1.09	10.53	-0.33	-0.82	XX
UNUXFG		6.43	-0.51	-1.79	10.40	-0.45	-1.14	XX
V3PL6L		6.95	0.01	0.05	10.73	-0.13	-0.32	GN
YAE4EE		7.03	0.09	0.31	10.98	0.12	0.31	GL

Summary Statistics

	Sample K171	Sample K172
Grand Means	6.94 Gloss Units	10.85 Gloss Units
Stnd Dev Btwn Labs	0.29 Gloss Units	0.40 Gloss Units

Statistics based on 11 of 11 reporting participants

Key to Instrument Codes Reported by Participants

GL	BYK-Gardner micro-TRI-gloss	GN	BYK-Gardner new micro-TRI-gloss
XX	Instrument make/model not specified by lab		

SAMPLE K171 = 6.94 Gloss Units SAMPLE K172 = 10.85 Gloss Units