Collaborative Testing Services, Inc.

Color & Appearance Testing Program

Summary Report #182 - 4th Qtr 2017

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 (GlossTests)

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.

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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
2PJD2Y		D171	61.11	-19.12	8.31	1.05	0.10	-0.29	1.09	HW
		D172	62.16	-19.03	8.03					
38Z4D4		D171	61.36	-19.25	8.44	1.20	0.16	-0.32	1.25	MU
		D172	62.56	-19.10	8.13					
3WDXK7		D171	61.41	-19.19	8.78	1.10	0.13	-0.20	1.12	XD
		D172	62.51	-19.06	8.58					
4JKVH4		D171	61.21	-19.31	8.83	1.08	0.13	-0.24	1.11	XU
		D172	62.29	-19.18	8.60					
4VYXYV		D171	61.24	-19.19	8.67	1.15	0.08	-0.31	1.19	XN
		D172	62.39	-19.12	8.37					
4W9ZMF		D171	61.31	-19.39	8.80	1.08	0.13	-0.25	1.12	XM
		D172	62.39	-19.27	8.55					
4YHZXN		D171	61.20	-19.09	8.54	1.07	0.13	-0.28	1.11	XK
		D172	62.27	-18.96	8.26					
4ZAVMH		D171	61.70	-19.07	7.86	1.01	0.07	-0.22	1.03	XE
		D172	62.70	-19.00	7.64					
83T67U		D171	61.46	-19.27	9.25	0.96	0.06	-0.25	0.99	GB
		D172	62.41	-19.21	9.01					
9KZVFA		D171	61.24	-19.44	8.27	1.04	0.09	-0.28	1.08	HW
		D172	62.28	-19.35	7.99					
A23XQM		D171	61.52	-19.59	8.43	1.05	0.14	-0.32	1.10	HW
		D172	62.57	-19.45	8.11					
A3FKBL		D171	61.27	-19.26	8.93	1.04	0.13	-0.23	1.07	XZ
		D172	62.31	-19.13	8.71					
AERWJA		D171	61.50	-19.48	8.69	1.01	0.12	-0.29	1.05	XZ
		D172	62.51	-19.36	8.40					
AQ7RYA		D171	61.15	-19.43	8.49	1.14	0.14	-0.32	1.19	HW
		D172	62.29	-19.29	8.17					
AQLBGL		D171	60.66	-19.28	8.78	0.96	0.08	-0.26	0.99	HY
		D172	61.61	-19.20	8.52					
DBG44T	X	D171	61.27	-19.63	9.04	1.06	-0.03	-0.12	1.07	FA
		D172	62.33	-19.66	8.93					

			CIE L* a* b* Color Values			Color Difference Values				
WebCode	Flag	Samples	L*	a*	b*	ΔL*	Δa*	Δb*	ΔE*	InstrCode
EXBCVT		D171	61.41	-19.52	8.62	1.02	0.13	-0.26	1.06	XZ
		D172	62.43	-19.39	8.36					
FNYBDY		D171	61.35	-19.42	8.51	1.08	0.12	-0.18	1.10	XO
		D172	62.43	-19.30	8.33					
FXPY8F		D171	60.81	-19.51	8.13	1.16	0.17	-0.25	1.20	MG
		D172	61.97	-19.35	7.88					
H6G36A		D171	61.38	-19.42	9.11	1.16	0.17	-0.38	1.23	GH
		D172	62.53	-19.25	8.74					
HNVPEN		D171	60.79	-19.37	9.02	1.08	0.03	-0.53	1.20	TO
		D172	61.87	-19.34	8.49					
JTGUYC		D171	61.23	-19.28	8.61	1.31	0.10	-0.28	1.34	XO
		D172	62.54	-19.18	8.34					
JZN9TU		D171	61.54	-19.59	8.56	1.06	0.13	-0.22	1.09	XB
		D172	62.59	-19.47	8.34					
K7NCWX	X	D171	98.20	1.17	-16.23	0.06	-0.17	0.26	0.31	HW
		D172	98.26	1.00	-15.97					
LRE79C		D171	61.31	-19.45	8.22	1.11	0.12	-0.30	1.15	HW
		D172	62.41	-19.33	7.93					
NNTQ7M		D171	61.28	-19.59	9.30	1.26	0.20	-0.30	1.31	GE
		D172	62.54	-19.39	9.00					
PPMWZM		D171	61.41	-19.28	8.90	0.98	0.10	-0.26	1.02	GE
		D172	62.39	-19.18	8.64					
PURV9Q		D171	61.11	-19.44	8.16	1.14	0.17	-0.24	1.17	HW
		D172	62.24	-19.27	7.92					
R98HT9		D171	61.21	-19.39	8.98	1.13	0.13	-0.35	1.18	XU
		D172	62.33	-19.26	8.63					
REW4F2		D171	60.83	-19.38	8.77	0.94	0.06	-0.21	0.97	HY
		D172	61.77	-19.32	8.56					
RG4CQ8		D171	61.15	-19.38	8.88	1.03	0.09	-0.46	1.13	XU
		D172	62.17	-19.29	8.42					
RPTAAZ		D171	61.10	-19.02	8.23	1.07	0.13	-0.28	1.11	HK
		D172	62.17	-18.89	7.96					

			CIE L* a* b* Color Values			Color Difference Values				
WebCode	Flag	Samples	L*	a*	b*	ΔL*	Δa*	Δb*	ΔE*	InstrCode
RX4LA4		D171	61.59	-19.34	8.83	1.06	0.12	-0.19	1.08	GH
		D172	62.64	-19.22	8.64					
T29CGJ	X	D171	60.99	61.70	60.18	1.03	1.03	1.03	1.78	MA
		D172	62.02	62.72	61.21					
TB8CJP		D171	62.06	-19.37	7.95	1.10	0.19	-0.36	1.17	NH
		D172	63.15	-19.19	7.59					
WHWUWN		D171	61.22	-19.62	8.09	1.09	0.20	-0.20	1.12	HW
		D172	62.30	-19.42	7.89					
XKGC4Y		D171	61.49	-19.60	8.29	1.03	0.08	-0.28	1.07	HW
		D172	62.52	-19.52	8.01					
Y92VXE		D171	61.04	-19.47	8.85	1.06	0.17	-0.22	1.09	XR
		D172	62.10	-19.30	8.63					
YKWWNW		D171	61.44	-19.45	8.26	0.94	0.10	-0.24	0.97	HW
		D172	62.38	-19.35	8.03					
YQH28P		D171	60.97	-19.38	8.95	0.87	0.11	-0.27	0.91	XU
		D172	61.83	-19.27	8.68					
YUZ7VM		D171	61.19	-19.50	8.79	0.97	0.08	-0.20	0.99	MU
		D172	62.16	-19.42	8.60					

Summary Statistics

Samples	L*	a*	b*	ΔL*	Δa*	Δb*	ΔE*
Grand Means							
D171	61.26	-19.37	8.61	1.07	0.12	-0.27	1.11
D172	62.32	-19.25	8.34				
Stnd Dev Btwn Labs							
D171	0.26	0.15	0.36	0.09	0.04	0.07	0.09
D172	0.28	0.14	0.36				

Statistics based on 38 of 41 reporting participants

Comments Assigned on Data Flags for Test #408

DBG44T(X) - Low "a*" value for Sample D172.

K7NCWX(X) - Extreme Data. May have measured back of the samples.

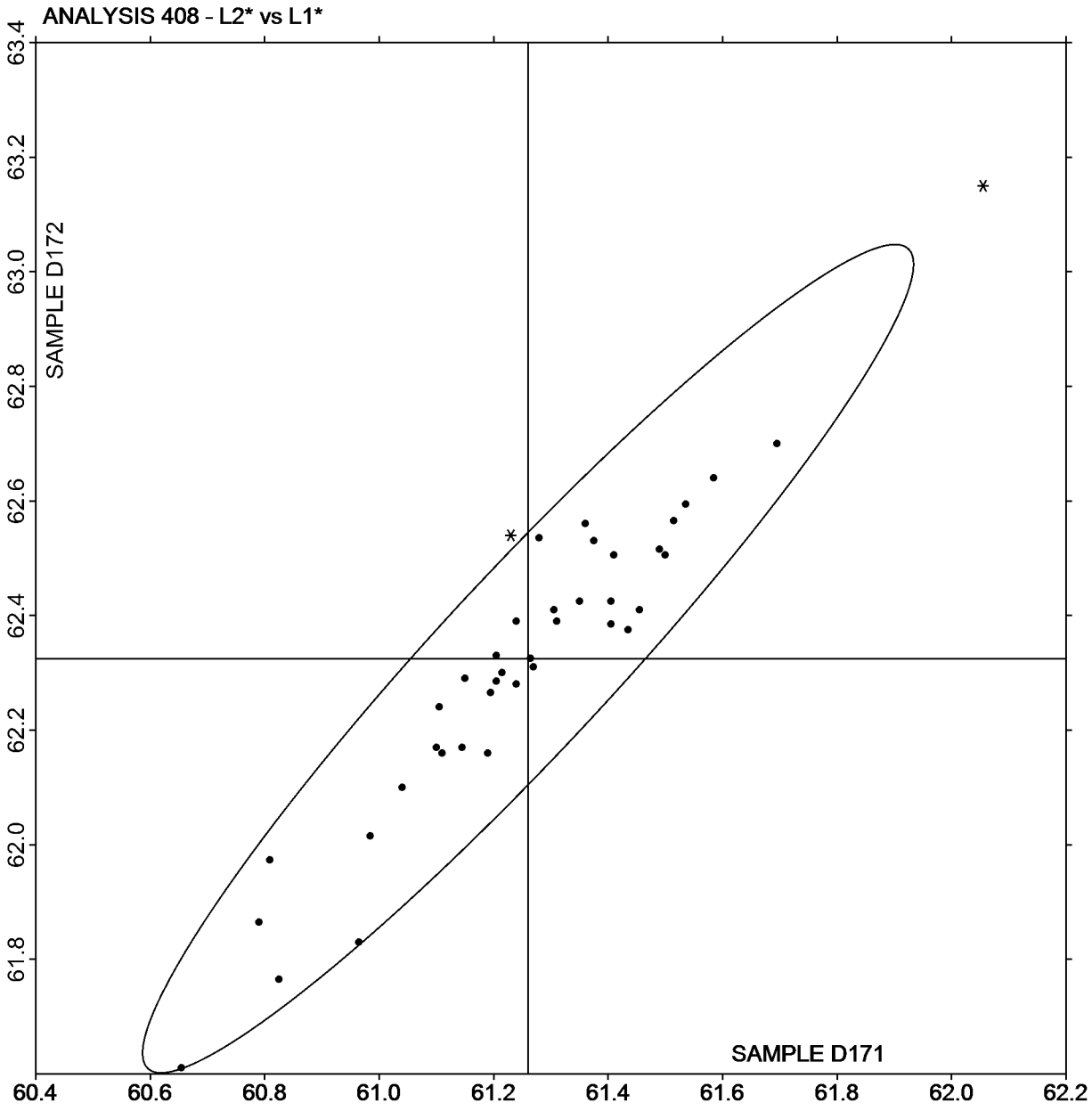
T29CGJ(X) - Extreme "a*" and "b*" data.

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
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	MU	Minolta
NH	3nh Precision Colorimeter	TO	Topcon SR-3 Spectroradiometer
XB	X-Rite i1Basic Pro 2	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

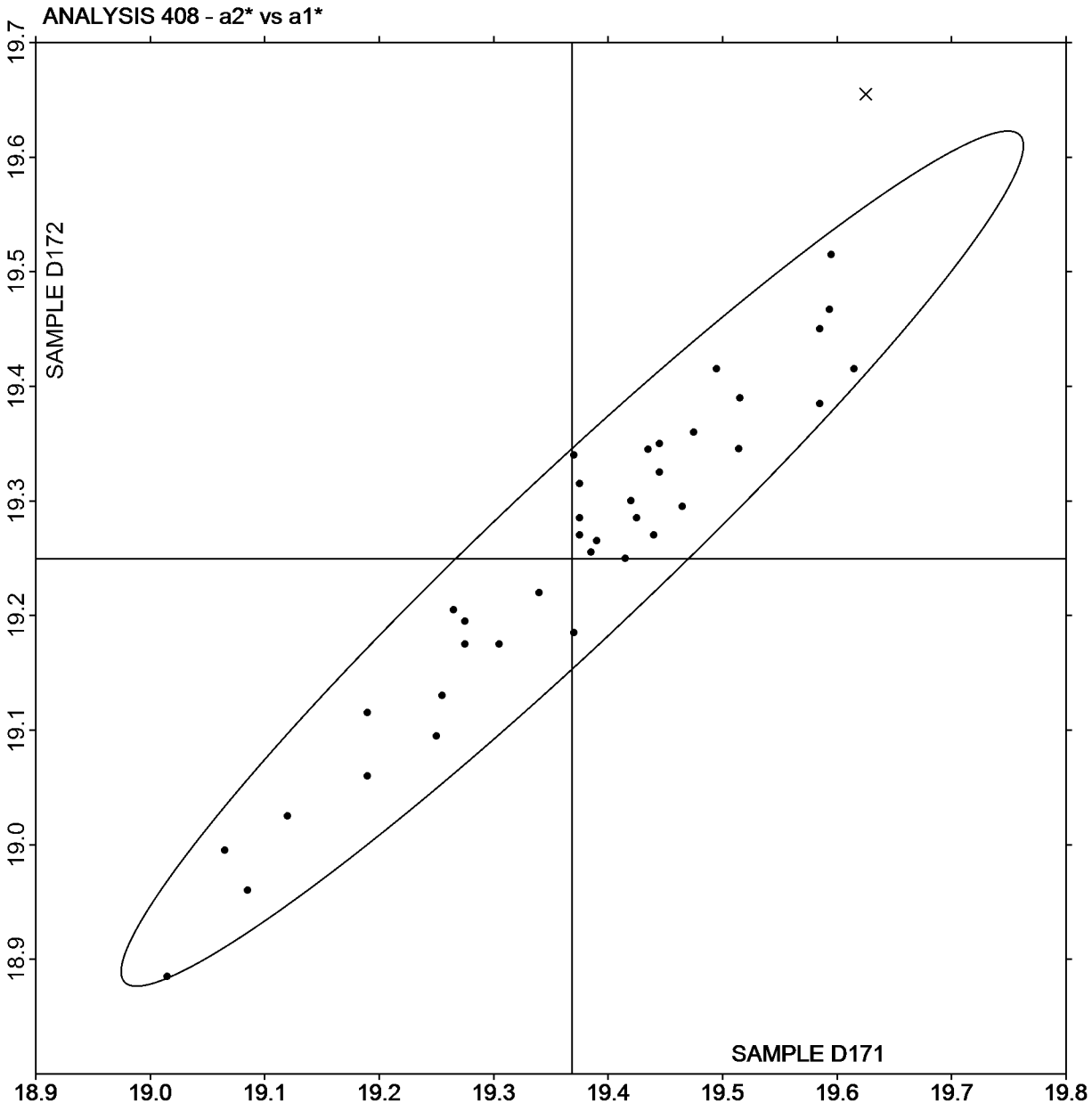
L2* vs L1*

SAMPLE D171 = 61.26 SAMPLE D172 = 62.32



a2* vs a1*

SAMPLE D171 = -19.37 SAMPLE D172 = -19.25

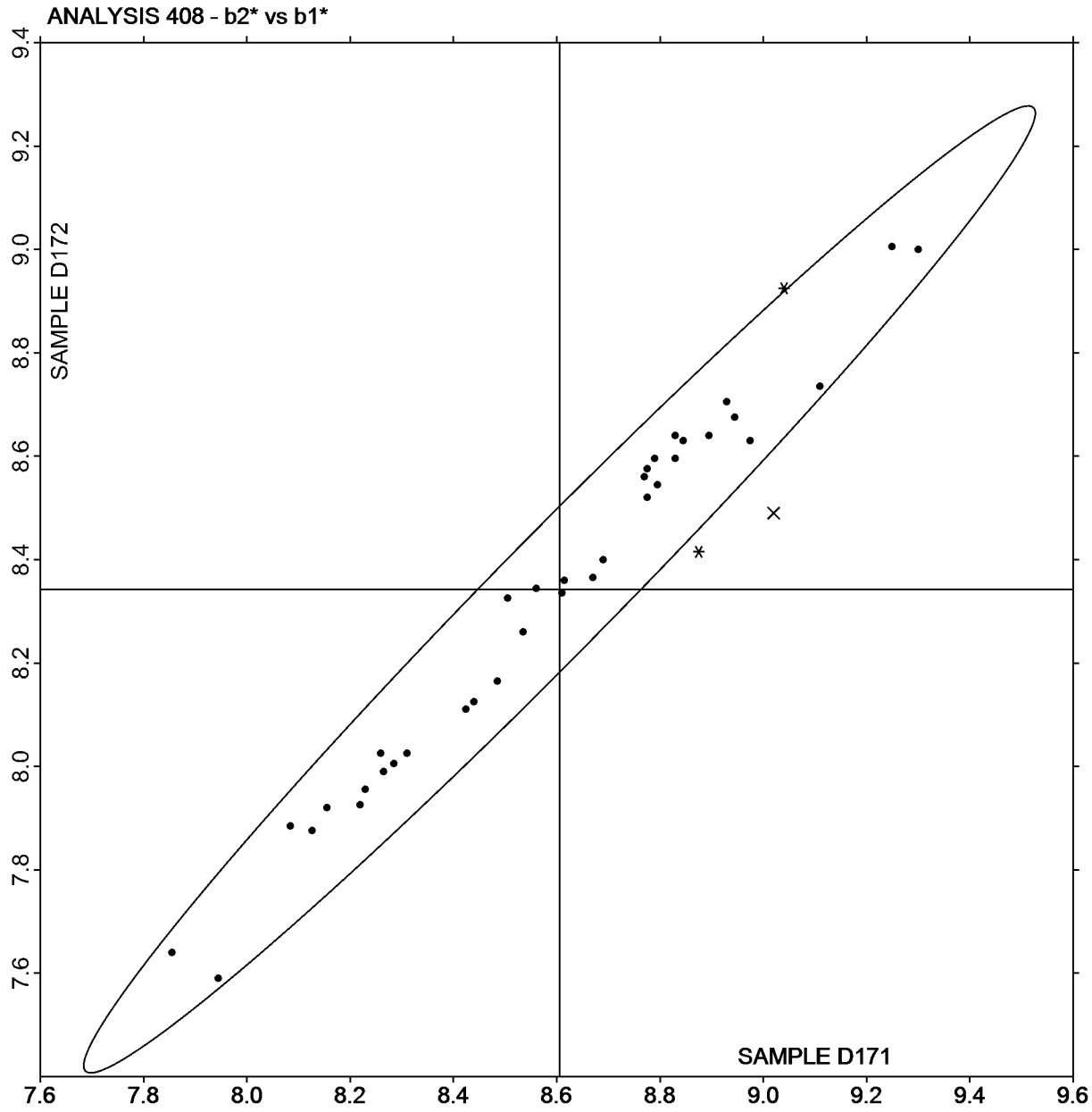


Plot created using absolute values.

b2* vs b1*

SAMPLE D171 = 8.61

SAMPLE D172 = 8.34



			CIE L* a* b* Color Values			Color Difference Values				
WebCode	Flag	Samples	L*	a*	b*	ΔL*	Δa*	Δb*	ΔE*	InstrCode
2GLP2M		D171	61.71	-19.14	8.49	0.95	0.12	-0.27	0.99	AQ
		D172	62.66	-19.02	8.23					
3G2CBN		D171	61.46	-19.17	8.36	1.08	0.10	-0.26	1.11	SH
		D172	62.54	-19.07	8.11					
3PX79M		D171	61.43	-19.41	8.64	1.04	0.12	-0.28	1.09	CA
		D172	62.47	-19.29	8.36					
3TGEJ8		D171	61.40	-19.30	8.50	1.27	0.20	-0.30	1.32	MV
		D172	62.67	-19.11	8.20					
3V43TM		D171	61.14	-18.95	8.54	0.97	0.08	-0.25	1.00	XH
		D172	62.11	-18.87	8.29					
44WNHK		D171	61.65	-19.46	8.46	1.01	0.10	-0.26	1.04	XB
		D172	62.65	-19.36	8.20					
4EFZX4		D171	61.64	-19.29	8.48	1.00	0.16	-0.21	1.03	AS
		D172	62.64	-19.14	8.27					
4JKVH4		D171	61.18	-19.09	8.29	1.06	0.12	-0.17	1.08	MM
		D172	62.24	-18.98	8.12					
4VYXYV	X	D171	60.54	-19.04	7.98	1.01	-0.12	-0.28	1.05	XO
		D172	61.55	-19.16	7.70					
4X7BJH		D171	61.29	-19.18	8.20	1.00	0.12	-0.20	1.02	XI
		D172	62.28	-19.06	8.01					
4YHZXN		D171	61.69	-19.28	8.34	1.09	0.13	-0.30	1.13	AO
		D172	62.77	-19.16	8.04					
662HTB	X	D171	60.57	-19.31	8.02	1.04	0.14	-0.24	1.07	XM
		D172	61.60	-19.17	7.78					
66JLAN	X	D171	0.01	0.01	-0.01	0.00	0.01	-0.02	0.02	AQ
		D172	0.01	0.01	-0.03					
6ATPCJ		D171	61.65	-19.03	8.46	0.98	0.10	-0.25	1.01	AJ
		D172	62.63	-18.93	8.21					
6EQ2FW		D171	61.71	-19.13	8.48	0.89	0.11	-0.20	0.92	AS
		D172	62.60	-19.02	8.28					
6FXNMA		D171	61.66	-19.18	8.53	0.99	0.11	-0.26	1.03	MT
		D172	62.65	-19.08	8.27					

			CIE L* a* b* Color Values			Color Difference Values				
WebCode	Flag	Samples	L*	a*	b*	ΔL*	Δa*	Δb*	ΔE*	InstrCode
6L4C73		D171	61.50	-19.09	8.47	1.01	0.09	-0.22	1.04	AJ
		D172	62.51	-19.00	8.25					
6ML2WA		D171	61.32	-19.25	8.33	1.08	0.15	-0.23	1.11	XI
		D172	62.40	-19.11	8.10					
6PTG72		D171	61.74	-19.39	8.42	1.07	0.13	-0.18	1.09	CA
		D172	62.81	-19.27	8.24					
6U23UY		D171	61.54	-19.18	8.42	1.14	0.17	-0.20	1.16	AS
		D172	62.67	-19.01	8.22					
72EF8N		D171	61.33	-19.21	8.35	1.07	0.15	-0.19	1.10	AS
		D172	62.40	-19.06	8.16					
7W8MGY		D171	61.35	-18.94	8.41	1.17	0.20	-0.26	1.21	MM
		D172	62.52	-18.73	8.15					
7Y7ALM	X	D171	63.49	-19.54	7.77	1.06	0.11	-0.30	1.11	MM
		D172	64.55	-19.43	7.47					
84NMAG		D171	61.85	-19.06	8.32	0.95	0.08	-0.17	0.96	AO
		D172	62.80	-18.98	8.16					
8D9U6Y	X	D171	61.62	-19.06	8.37	0.41	3.78	-0.54	3.84	AJ
		D172	62.03	-15.29	7.83					
8EGDKM		D171	61.33	-19.30	8.37	1.00	0.09	-0.28	1.04	XI
		D172	62.33	-19.21	8.10					
8HEWMK		D171	61.50	-19.20	8.37	1.13	0.15	-0.33	1.18	AQ
		D172	62.62	-19.05	8.05					
8RN2YB	X	D171	8.30	6.53	7.58	-0.30	0.09	0.19	0.36	MM
		D172	8.00	6.61	7.77					
96CEX7		D171	61.62	-19.00	8.23	1.04	0.19	-0.24	1.08	HF
		D172	62.66	-18.82	7.99					
9C6XQL		D171	61.63	-19.12	8.42	1.05	0.10	-0.26	1.08	AS
		D172	62.68	-19.02	8.17					
9LDHZA		D171	61.73	-19.31	8.30	1.01	0.17	-0.20	1.04	AO
		D172	62.74	-19.14	8.10					
9LEBVV		D171	61.55	-19.22	8.22	1.01	0.16	-0.15	1.03	AM
		D172	62.56	-19.07	8.07					

			CIE L* a* b* Color Values			Color Difference Values				
WebCode	Flag	Samples	L*	a*	b*	ΔL*	Δa*	Δb*	ΔE*	InstrCode
9XPU7C		D171	61.57	-19.26	8.48	1.16	0.14	-0.30	1.21	AJ
		D172	62.73	-19.12	8.18					
AC73RF		D171	61.56	-19.21	8.36	1.10	0.13	-0.33	1.15	AE
		D172	62.66	-19.08	8.04					
AQLBGL	X	D171	59.17	-21.44	9.80	1.07	0.20	-0.32	1.13	HP
		D172	60.24	-21.24	9.48					
AWBJBR		D171	61.09	-19.17	8.39	1.03	0.09	-0.27	1.06	XH
		D172	62.12	-19.08	8.13					
B47Z3A		D171	61.64	-19.17	8.29	1.10	0.17	-0.24	1.14	AO
		D172	62.74	-19.00	8.05					
BKWT4A		D171	61.28	-19.21	8.32	1.11	0.13	-0.26	1.14	XI
		D172	62.39	-19.08	8.06					
BULLDL	X	D171	61.95	-19.12	9.23	1.54	0.09	-0.25	1.56	XZ
		D172	63.49	-19.04	8.99					
C9GELT		D171	61.11	-19.21	8.39	0.97	0.09	-0.16	0.99	MI
		D172	62.08	-19.12	8.23					
CAUUTF		D171	61.58	-19.17	8.46	1.18	0.14	-0.36	1.24	XX
		D172	62.75	-19.04	8.10					
CN9BL4		D171	61.53	-19.19	8.43	1.12	0.18	-0.27	1.17	AM
		D172	62.65	-19.01	8.16					
CNPGWM		D171	61.36	-19.05	8.53	1.07	0.13	-0.29	1.12	MM
		D172	62.43	-18.92	8.24					
D9W2B2		D171	61.47	-19.60	7.99	1.09	0.13	-0.31	1.14	XM
		D172	62.56	-19.47	7.68					
DBJT9P		D171	61.37	-19.30	8.54	1.02	0.11	-0.14	1.03	MU
		D172	62.39	-19.19	8.40					
DLZKRT		D171	61.74	-19.21	8.31	0.97	0.12	-0.20	1.00	AO
		D172	62.71	-19.09	8.11					
DQD4DG		D171	61.17	-19.38	8.42	0.97	0.13	-0.20	0.99	XH
		D172	62.13	-19.25	8.22					
DUAW2J		D171	61.46	-19.17	8.30	0.92	0.10	-0.23	0.95	HP
		D172	62.38	-19.07	8.07					

			CIE L* a* b* Color Values			Color Difference Values				
WebCode	Flag	Samples	L*	a*	b*	ΔL*	Δa*	Δb*	ΔE*	InstrCode
DZFRKJ		D171	61.26	-19.35	8.66	0.98	0.09	-0.25	1.02	MV
		D172	62.24	-19.26	8.41					
E2VYU8		D171	61.75	-19.48	8.42	1.07	0.17	-0.19	1.09	AS
		D172	62.82	-19.31	8.23					
E6TRGB		D171	61.65	-19.15	8.37	0.89	0.06	-0.23	0.91	XI
		D172	62.53	-19.10	8.15					
E9RY6U		D171	61.72	-19.22	8.28	1.13	0.14	-0.30	1.17	AJ
		D172	62.84	-19.09	7.98					
EUMDMJ		D171	61.74	-19.28	8.56	1.04	0.14	-0.31	1.09	AS
		D172	62.78	-19.14	8.25					
EZXPY6	X	D171	61.27	-19.66	8.19	1.30	0.26	-0.37	1.38	XC
		D172	62.57	-19.40	7.82					
FM7MV3		D171	61.13	-19.22	8.23	1.04	0.15	-0.20	1.06	XM
		D172	62.16	-19.08	8.03					
FNYBDY		D171	61.29	-19.19	8.26	1.05	0.17	-0.21	1.08	MI
		D172	62.34	-19.02	8.05					
FVJKG2		D171	61.60	-19.30	8.29	0.96	0.09	-0.25	0.99	AR
		D172	62.56	-19.21	8.05					
GPMDBX	X	D171	62.35	-22.12	8.01	1.03	0.16	-0.28	1.07	MU
		D172	63.37	-21.97	7.74					
GZKEN3		D171	61.54	-19.29	8.40	1.04	0.07	-0.28	1.08	PE
		D172	62.58	-19.22	8.12					
HHN2Y2		D171	61.08	-19.09	8.49	1.13	0.16	-0.29	1.18	XH
		D172	62.21	-18.93	8.21					
HNVPEN		D171	61.31	-19.29	8.45	1.07	0.12	-0.20	1.09	CA
		D172	62.38	-19.17	8.26					
HXZKV9		D171	61.38	-19.09	8.13	0.97	0.09	-0.22	1.00	XI
		D172	62.35	-19.00	7.91					
J4NMEX		D171	61.00	-19.25	7.89	1.09	0.17	-0.23	1.13	XM
		D172	62.09	-19.08	7.66					
J9D246		D171	61.65	-19.06	8.28	1.13	0.17	-0.22	1.16	AO
		D172	62.78	-18.89	8.06					

			CIE L* a* b* Color Values			Color Difference Values				
WebCode	Flag	Samples	L*	a*	b*	ΔL*	Δa*	Δb*	ΔE*	InstrCode
JHET2X		D171	61.40	-19.17	8.24	0.90	0.07	-0.21	0.92	XI
		D172	62.29	-19.11	8.03					
JT4FDN		D171	61.63	-19.26	8.34	1.02	0.09	-0.22	1.04	MV
		D172	62.65	-19.17	8.13					
JX9BWN		D171	61.19	-19.22	8.40	1.11	0.14	-0.29	1.15	XH
		D172	62.29	-19.08	8.12					
KQBNYW		D171	61.33	-19.02	8.45	1.11	0.14	-0.28	1.15	MM
		D172	62.43	-18.89	8.17					
L2KXNX		D171	61.39	-19.29	8.56	1.12	0.18	-0.23	1.15	MV
		D172	62.50	-19.11	8.33					
LU6XQA		D171	61.81	-19.08	8.66	1.06	0.12	-0.26	1.09	AJ
		D172	62.86	-18.96	8.40					
LX72HW		D171	61.19	-19.20	8.33	1.16	0.18	-0.28	1.21	XI
		D172	62.35	-19.03	8.05					
LZVGNX		D171	61.89	-19.61	8.46	0.97	0.10	-0.25	1.00	CA
		D172	62.85	-19.51	8.21					
M4PXCC		D171	61.51	-19.17	8.40	0.88	0.05	-0.16	0.90	HP
		D172	62.39	-19.12	8.24					
M9Y4XA		D171	61.45	-19.30	8.49	1.18	0.18	-0.26	1.22	AJ
		D172	62.63	-19.12	8.24					
N4MG2K		D171	61.45	-19.14	8.31	1.00	0.10	-0.15	1.02	XB
		D172	62.45	-19.04	8.17					
NGCFRM		D171	61.33	-18.84	8.40	1.04	0.11	-0.19	1.06	AJ
		D172	62.36	-18.73	8.21					
NQFEF3		D171	61.42	-19.09	8.64	1.03	0.13	-0.29	1.07	AJ
		D172	62.45	-18.97	8.35					
NW66NJ		D171	61.69	-19.21	8.52	1.11	0.14	-0.26	1.15	AJ
		D172	62.80	-19.07	8.26					
NXZQEP	X	D171	60.36	-19.92	7.59	1.02	0.27	-0.09	1.06	XO
		D172	61.38	-19.65	7.50					
NZKPK7		D171	61.39	-19.22	8.43	1.02	0.11	-0.25	1.06	MS
		D172	62.41	-19.11	8.18					

			CIE L* a* b* Color Values			Color Difference Values				
WebCode	Flag	Samples	L*	a*	b*	ΔL*	Δa*	Δb*	ΔE*	InstrCode
PA4HA9	X	D171	95.53	1.21	-9.11	-32.86	-20.28	17.23	42.28	MM
		D172	62.67	-19.07	8.13					
PD3YL3		D171	61.56	-19.22	8.49	1.21	0.14	-0.38	1.27	AJ
		D172	62.76	-19.08	8.11					
PNRHB9		D171	61.59	-19.02	8.31	0.89	0.07	-0.20	0.91	MM
		D172	62.48	-18.95	8.12					
PPMWZM		D171	61.34	-19.55	8.61	0.99	0.10	-0.28	1.03	GD
		D172	62.32	-19.45	8.33					
PQVB68		D171	61.07	-19.28	8.26	1.04	0.14	-0.23	1.07	XI
		D172	62.11	-19.14	8.04					
PUATFW		D171	61.39	-18.78	8.32	0.98	0.10	-0.27	1.01	AO
		D172	62.37	-18.69	8.05					
PZY97P		D171	61.59	-19.00	7.94	0.95	0.12	-0.24	0.98	HH
		D172	62.54	-18.88	7.70					
QBJWMA		D171	61.28	-19.28	8.39	1.13	0.13	-0.31	1.17	XH
		D172	62.40	-19.16	8.09					
QPDJQG		D171	61.45	-19.34	8.34	1.17	0.15	-0.34	1.22	AM
		D172	62.61	-19.19	8.00					
QQ9Z8K		D171	61.31	-19.13	8.29	1.08	0.16	-0.22	1.11	AO
		D172	62.39	-18.97	8.07					
R8WUWF		D171	61.51	-19.13	8.18	0.95	0.11	-0.22	0.98	XI
		D172	62.46	-19.02	7.97					
R98HT9		D171	61.36	-19.03	8.28	1.11	0.12	-0.34	1.16	XI
		D172	62.47	-18.91	7.94					
RCN2FN		D171	61.42	-19.03	8.29	1.11	0.15	-0.22	1.14	MM
		D172	62.53	-18.88	8.07					
RG4CQ8		D171	61.41	-19.18	8.38	1.02	0.12	-0.31	1.07	XI
		D172	62.42	-19.06	8.07					
RX4LA4		D171	61.51	-19.33	8.62	1.19	0.16	-0.35	1.25	MV
		D172	62.70	-19.17	8.27					
TGZAGT		D171	61.30	-19.04	8.22	1.17	0.15	-0.27	1.21	XI
		D172	62.47	-18.89	7.95					

			CIE L* a* b* Color Values			Color Difference Values				
WebCode	Flag	Samples	L*	a*	b*	ΔL*	Δa*	Δb*	ΔE*	InstrCode
TMNUK9		D171	61.79	-19.41	8.53	0.90	0.11	-0.19	0.92	AJ
		D172	62.69	-19.31	8.34					
TUNAAG		D171	61.29	-19.19	8.32	1.02	0.11	-0.18	1.04	XO
		D172	62.31	-19.08	8.14					
TZCYR6		D171	61.28	-19.03	8.26	1.06	0.05	-0.25	1.09	GD
		D172	62.33	-18.98	8.01					
U6YDMP		D171	61.37	-19.44	8.66	0.96	0.08	-0.27	1.00	GD
		D172	62.32	-19.37	8.39					
UGC7JC		D171	61.79	-19.06	7.96	0.98	0.09	-0.21	1.00	HH
		D172	62.77	-18.97	7.76					
UQGDYC		D171	61.52	-19.26	8.37	1.10	0.12	-0.28	1.14	MK
		D172	62.61	-19.14	8.09					
URCUFF		D171	61.61	-19.26	8.52	1.06	0.12	-0.21	1.09	AJ
		D172	62.67	-19.15	8.32					
VBJNKR		D171	61.69	-19.42	8.44	1.08	0.18	-0.21	1.11	AJ
		D172	62.76	-19.24	8.23					
VNPLKK		D171	61.56	-19.21	8.30	1.05	0.11	-0.31	1.10	AQ
		D172	62.61	-19.10	7.99					
W67A8K		D171	61.60	-19.14	8.46	1.05	0.12	-0.32	1.10	MM
		D172	62.65	-19.03	8.14					
WHYMRB		D171	61.33	-19.19	8.12	1.03	0.13	-0.16	1.05	XI
		D172	62.36	-19.07	7.96					
WJT8JG		D171	61.43	-19.23	8.19	1.20	0.18	-0.27	1.24	XI
		D172	62.63	-19.05	7.92					
XTC4Z9		D171	61.14	-19.33	8.49	1.01	0.12	-0.19	1.03	XH
		D172	62.15	-19.21	8.30					
XU64QR		D171	61.73	-19.22	8.53	1.08	0.11	-0.30	1.13	AS
		D172	62.81	-19.11	8.23					
Y96HBL		D171	61.29	-19.20	8.43	1.25	0.47	-0.32	1.37	MM
		D172	62.53	-18.74	8.11					
YFMNAD		D171	61.38	-19.37	8.65	1.14	0.15	-0.25	1.18	MV
		D172	62.52	-19.22	8.40					

			CIE L* a* b* Color Values			Color Difference Values				
WebCode	Flag	Samples	L*	a*	b*	ΔL*	Δa*	Δb*	ΔE*	InstrCode
YQH28P		D171	61.18	-18.96	8.32	1.06	0.11	-0.28	1.10	XI
		D172	62.23	-18.86	8.05					
ZGRMXR		D171	61.61	-19.16	8.44	1.10	0.13	-0.23	1.13	AJ
		D172	62.71	-19.03	8.21					
ZJZQUN		D171	61.29	-19.12	8.21	0.92	0.06	-0.19	0.94	MK
		D172	62.21	-19.07	8.02					

Summary Statistics

Samples	L*	a*	b*	ΔL*	Δa*	Δb*	ΔE*
Grand Means							
D171	61.46	-19.21	8.36	1.05	0.13	-0.24	1.09
D172	62.51	-19.08	8.12				
Stnd Dev Btwn Labs							
D171	0.20	0.14	0.16	0.08	0.05	0.05	0.09
D172	0.20	0.14	0.16				

Statistics based on 103 of 115 reporting participants

Comments Assigned on Data Flags for Test #409

4VYXYV(X) - Low "L*" values. Large replication difference for "L*" & "a*" values on Sample D171.

662HTB(X) - Low "L*" values. Large replication difference for "L*" values on Sample D172.

66JLAN(X) - Extreme Data.

7Y7ALM(X) - Very high "L*" values. Low "b*" values.

8D9U6Y(X) - Very high "a*" values for Sample D172.

8RN2YB(X) - Extreme "L*" & "a*" values.

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

BULLDL(X) - High "b*" values. High "L*" values for Sample D172. Large replication difference for "L*" & "b*" values on Sample D172.

EZXPY6(X) - Low "a*" values on Sample D171.

GPMDBX(X) - High "L*" values and very low "a*" values.

NXZQEP(X) - All values are low.

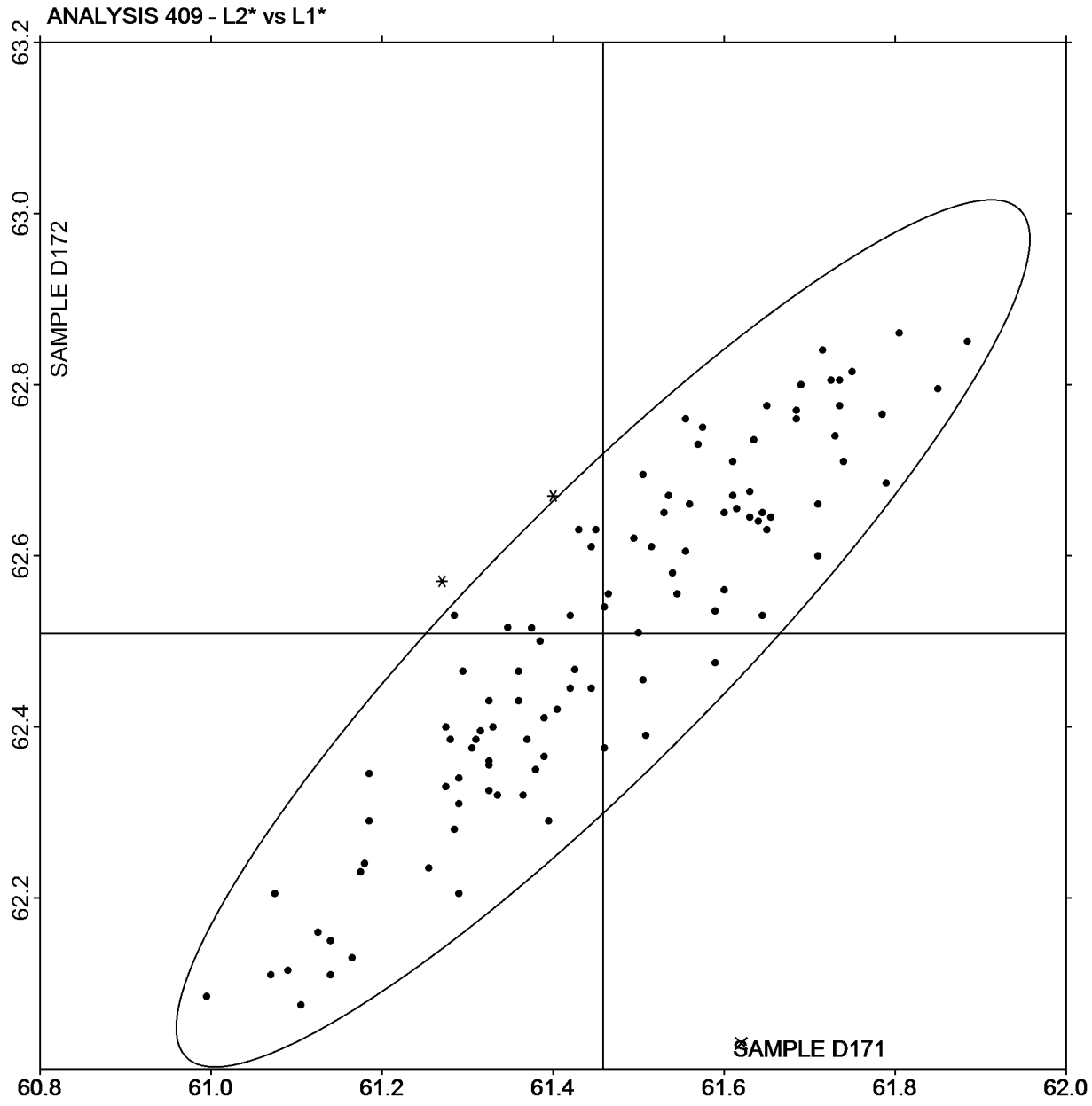
PA4HA9(X) - Apparently measured back of Sample D171.

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	MK	Macbeth Color-Eye 7000
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
SH	SIMADZU UV 3101PC	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		

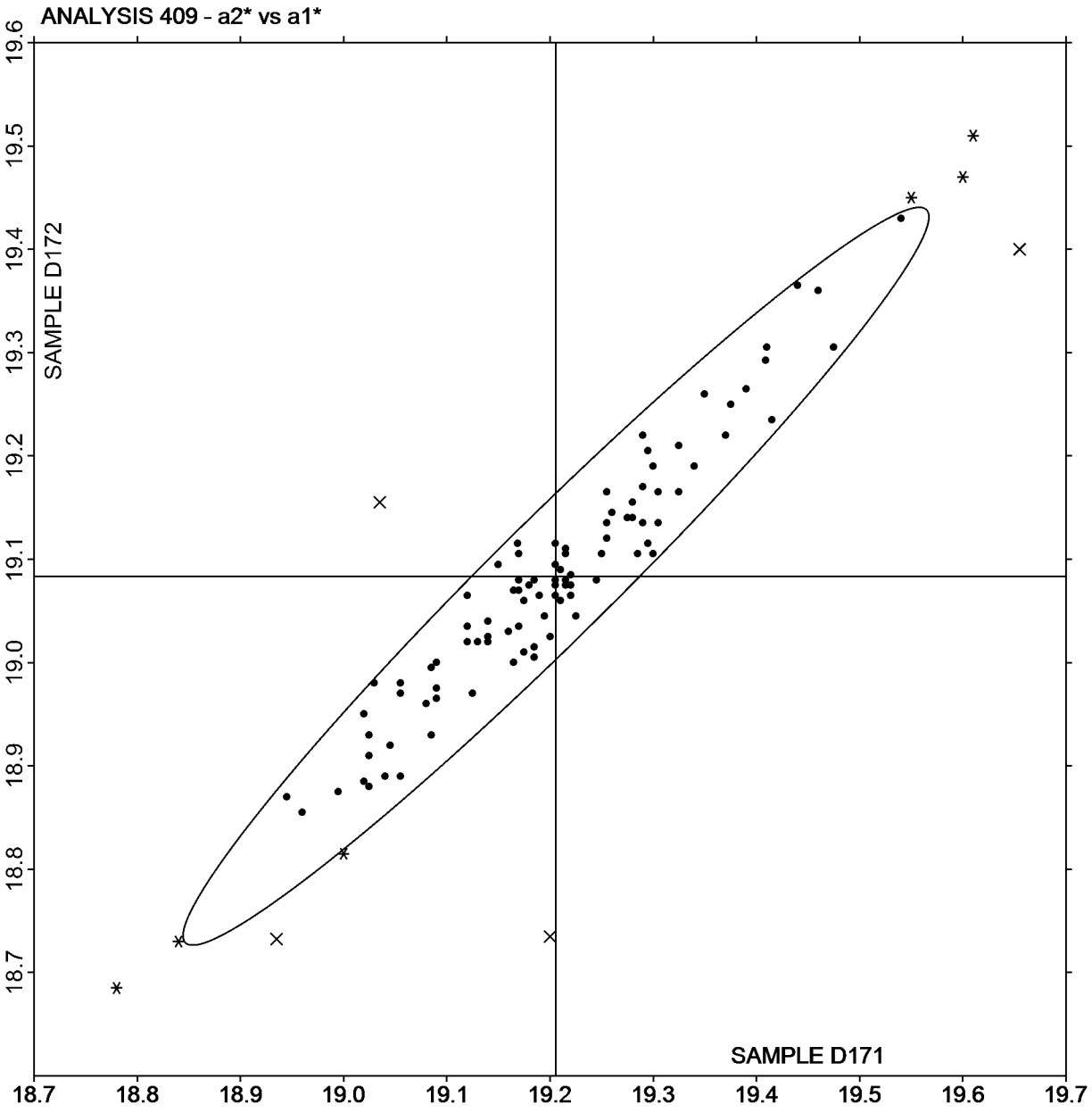
L2* vs L1*

SAMPLE D171 = 61.46 SAMPLE D172 = 62.51



a2* vs a1*

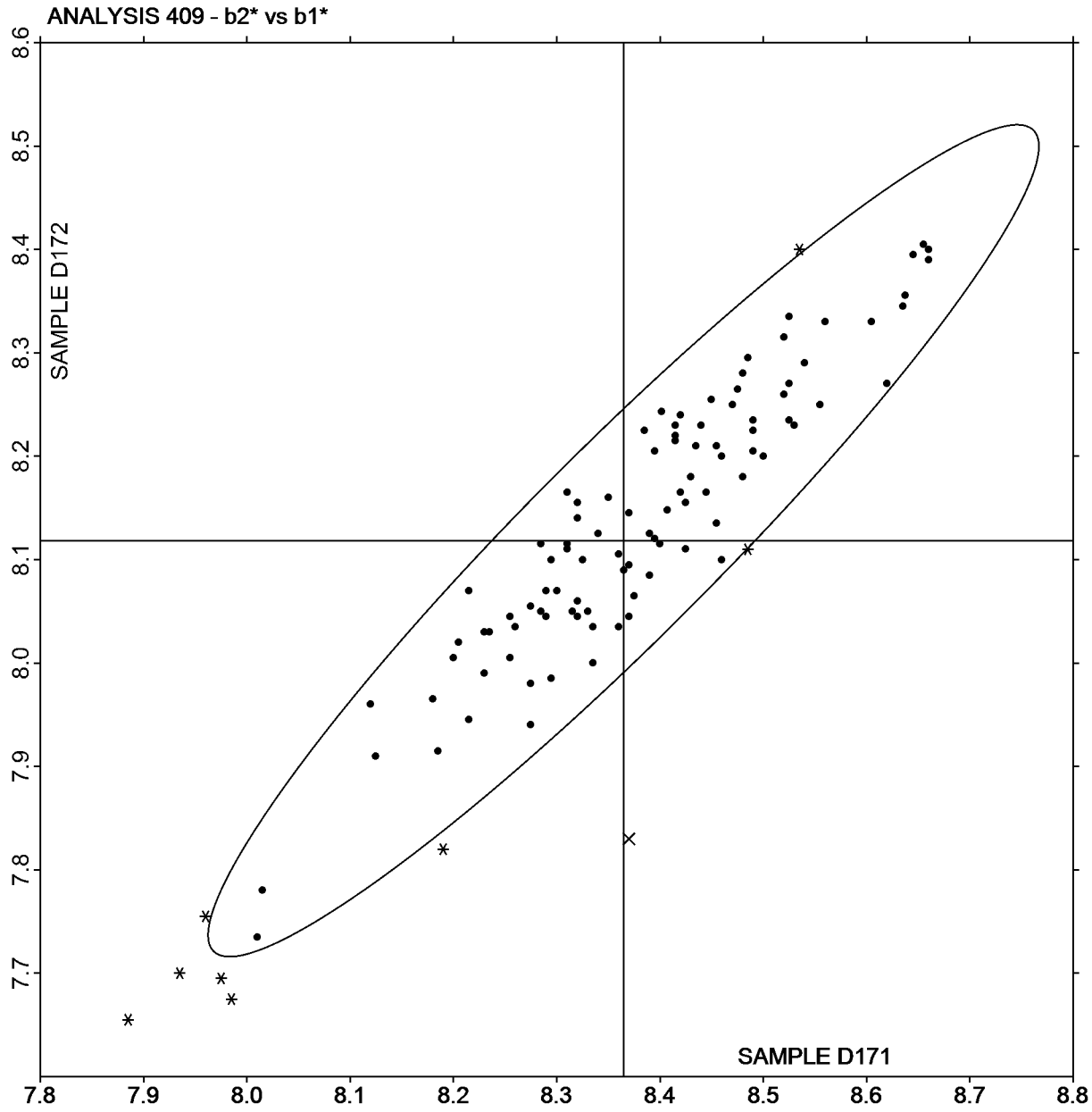
SAMPLE D171 = -19.21 SAMPLE D172 = -19.08



Plot created using absolute values.

b2* vs b1*

SAMPLE D171 = 8.36 SAMPLE D172 = 8.12



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 D171																		
2GLP2M		17.37*	19.40	23.36	26.24	27.29	30.35	36.13	39.20	32.59	25.16	21.48	19.61	19.41	20.70	20.39	18.43	AQ
3G2CBN		16.28	19.23	23.29	25.93	26.94	30.16	35.86	39.17	32.22	24.74	21.19	19.39	19.16	20.47	20.31	18.39	SH
3PX79M		15.87	18.89	22.99	25.85	26.85	30.00	35.87	39.25	32.20	24.66	21.05	19.24	18.99	20.36	20.14	18.11	CA
3TGEJ8		15.70	19.10	23.10	26.00	26.90	30.00	35.90	39.20	32.25	24.70	21.10	19.30	19.10	20.40	20.25	18.30	MV
3V43TM		15.47	18.90	22.75	25.64	26.72	29.77	35.33	38.35	31.97	24.68	20.97	19.22	19.10	20.30	19.86	17.89	XH
44WNHK		16.15	19.36	23.34	26.15	27.21	30.42	36.19	39.36	32.41	24.96	21.25	19.44	19.16	20.43	20.09	17.89	XB
4EFZX4		16.02	19.29	23.33	26.15	27.20	30.32	36.05	39.19	32.56	25.04	21.32	19.45	19.34	20.62	20.19	17.98	AS
4VYXYV		15.67	18.80	22.63*	25.23X	26.40X	29.45*	35.13*	37.62X	30.82X	23.75X	20.27X	18.59*	18.51X	19.56*	19.15X	17.28X	XO
4X7BJH		16.02	19.26	23.15	25.91	26.98	30.15	35.64	38.57	31.95	24.67	20.99	19.26	19.11	20.32	19.81	17.94	XI
4YHZXN		16.16	19.47	23.47	26.24	27.32	30.35	36.15	39.28	32.56	25.04	21.34	19.48	19.35	20.51	20.25	18.30	AO
662HTB		15.54	18.63*	22.53*	25.23X	26.27X	29.46*	35.06*	37.60X	30.81X	23.78X	20.31X	18.66*	18.58*	19.79	19.50*	17.51*	XF
66JLAN		17.13	19.34	23.47	26.22	27.27	30.36	36.17	39.18	32.33	24.97	21.28	19.46	19.32	20.44	20.12	18.21	AQ
6ATPCJ		15.99	19.40	23.28	26.16	27.24	30.26	35.99	39.25	32.62	25.12	21.42	19.57	19.41	20.59	20.32	18.28	AM
6EQ2FW		16.16	19.35	23.35	26.24	27.26	30.37	36.13	39.00	32.69	25.15	21.47	19.59	19.48	20.66	20.30	18.16	AS
6FXNMA		15.98	19.30	23.34	26.20	27.22	30.37	36.16	39.23	32.58	25.07	21.37	19.55	19.34	20.60	20.41	18.41	MT
6L4C73		15.97	19.25	23.12	26.05	27.07	30.09	35.78	39.06	32.48	24.96	21.24	19.40	19.19	20.31	20.18	18.32	AJ
6PTG72		16.29	19.32	23.44	26.32	27.27	30.46	36.32	39.64	32.52	24.96	21.31	19.51	19.27	20.61	20.38	18.36	CA
6U23UY		16.01	19.25	23.24	26.08	27.13	30.17	35.89	38.89	32.44	24.95	21.28	19.42	19.26	20.52	20.16	17.88	AS
72EF8N		16.22	19.14	23.09	25.90	26.91	30.02	35.67	38.69	32.14	24.65	21.13	19.22	19.12	20.37	19.95	18.08	AS
7W8MGY		15.94	19.17	23.07	25.87	26.96	30.10	35.61	38.61	32.17	24.92	21.14	19.36	19.18	20.32	20.12	18.26	MM
7Y7ALM		16.18	19.38	23.35	26.12	27.16	30.35	35.96	38.97	32.23	24.90	21.14	19.43	19.26	20.50	20.22	18.22	MM
84NMAG		16.40	19.66	23.63	26.41	27.52	30.64	36.33	39.40	32.83	25.28	21.57	19.70	19.59	20.92	20.55	18.19	AO
8D9U6Y		16.15	19.40	23.34	26.16	27.22	30.33	36.07	39.14	32.51	25.03	21.40	19.54	19.34	20.62	20.20	18.08	AJ
8HEWMK		15.93	19.21	23.24	26.05	27.10	30.17	35.91	38.91	32.29	24.91	21.21	19.39	19.20	20.40	20.15	18.18	AQ
8RN2YB	X	19.45X	23.32X	26.08X	27.15X	30.30X	35.84X	38.74X	32.36X	25.10X	21.30X	19.55X	19.33	20.48X	20.27	18.43X	18.27	MM

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 D171																		
96CEX7		15.78	19.81*	23.62	26.33	27.16	30.42	36.36	38.68	32.70	24.95	21.53	19.40	19.16	21.04	20.20	19.04X	HF
9C6XQL		16.25	19.31	23.38	26.12	27.26	30.29	36.04	38.86	32.64	25.05	21.39	19.52	19.38	20.60	20.34	18.02	AS
9LDHZA		16.25	19.51	23.49	26.32	27.41	30.56	36.29	39.22	32.60	25.11	21.38	19.55	19.40	20.60	20.27	18.09	AO
9LEBVV		15.96	19.52	23.40	26.16	27.21	30.36	36.13	38.93	32.23	24.95	21.26	19.41	19.25	20.32	20.10	18.28	AM
9XPU7C		16.05	19.28	23.23	26.09	27.10	30.26	36.03	38.96	32.44	24.95	21.30	19.43	19.31	20.63	20.36	17.97	AJ
AC73RF		16.13	19.34	23.37	26.09	27.07	30.19	35.99	39.02	32.41	24.89	21.28	19.49	19.29	20.52	20.11	17.63	AE
AWBJBR		15.69	19.03	22.77	25.62	26.69	29.84	35.37	38.36	31.68	24.51	20.80	19.16	19.02	20.23	19.73	17.77	XH
B47Z3A		16.20	19.43	23.36	26.29	27.29	30.25	36.01	39.16	32.56	25.07	21.36	19.50	19.31	20.46	20.21	18.37	AO
BKWT4A		15.90	19.15	23.04	25.86	26.92	30.07	35.61	38.58	32.05	24.69	20.96	19.22	19.11	20.26	19.94	18.02	XI
BULLDL		14.76*	19.11	23.33	26.25	27.21	30.55	36.35	39.59	32.78	25.26	21.51	19.66	19.43	20.70	20.55	18.58	XI
C9GELT		15.62	18.95	22.84	25.61	26.72	29.92	35.34	38.33	31.83	24.54	20.82	19.12	18.91	20.10	19.84	17.86	MI
CAUUTF		16.02	19.29	23.21	26.12	27.11	30.16	35.93	39.10	32.53	25.00	21.35	19.44	19.28	20.39	20.17	18.27	AH
CN9BL4		16.10	19.33	23.29	26.01	27.10	30.16	35.96	38.86	32.32	24.97	21.26	19.43	19.23	20.37	20.08	18.24	AM
CNPGWM		15.79	19.09	22.99	25.84	26.86	29.98	35.58	38.70	32.18	24.88	21.13	19.37	19.20	20.42	20.15	18.18	MM
D9W2B2		16.03	19.39	23.40	26.20	27.34	30.65	36.41	38.98	31.89	24.63	20.98	19.22	19.09	20.30	20.00	18.03	XF
DBJT9P		15.70	19.11	22.93	25.95	26.84	29.92	35.93	38.94	32.24	24.64	21.04	19.26	19.08	20.34	20.24	18.19	MV
DLZKRT		16.24	19.52	23.42	26.41	27.39	30.46	36.19	39.28	32.62	25.17	21.42	19.59	19.42	20.57	20.44	18.37	AO
DQD4DG		15.58	18.98	22.81	25.70	26.80	29.96	35.60	38.44	31.81	24.61	20.80	19.07	18.91	20.10	19.87	17.90	XH
DUAW2J		16.35	19.17	23.35	26.02	27.04	30.26	35.95	38.92	32.20	24.91	21.25	19.33	19.05	20.40	20.00	18.21	HP
E2VYU8		16.50	19.37	23.47	26.31	27.39	30.56	36.34	39.39	32.56	25.01	21.37	19.52	19.38	20.60	20.27	18.21	AS
E6TRGB		16.00	19.39	23.39	26.20	27.32	30.47	36.10	39.03	32.49	25.10	21.35	19.57	19.49	20.71	20.33	18.45	XI
E9RY6U		16.19	19.51	23.58	26.30	27.39	30.45	36.18	39.32	32.56	25.10	21.41	19.56	19.39	20.57	20.25	18.19	AJ
EUMDMJ		15.96	19.31	23.36	26.20	27.30	30.41	36.20	39.33	32.65	25.12	21.46	19.58	19.47	20.82	20.25	17.97	AS
EZXPY6		15.87	19.08	23.15	25.83	26.94	30.32	36.06	38.67	31.72	24.49	20.77	19.04	18.95	20.18	19.98	18.07	XC
FM7MV3		16.54	19.37	23.52	26.15	27.25	30.48	36.23	38.73	31.87	24.74	21.14	19.46	19.12	20.71	20.52	18.75	HW

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 D171																		
FNYBDY		15.86	19.21	23.08	25.85	26.96	30.11	35.59	38.57	31.88	24.68	21.01	19.30	19.03	20.26	19.95	18.00	MI
FVJKG2		16.29	19.37	23.43	26.16	27.28	30.39	36.15	39.07	32.36	24.96	21.28	19.44	19.30	20.44	20.22	18.19	AR
GPMDBX		16.20	19.75*	23.81*	26.91X	27.73*	31.17X	37.20X	40.32X	32.83	25.29	21.62	19.91	19.82*	21.19*	20.91*	18.79*	MU
GZKEN3		16.19	19.25	23.33	26.11	27.01	30.31	36.00	39.26	32.25	24.81	21.19	19.40	19.19	20.48	20.23	18.19	PE
HHN2Y2		15.67	18.88	22.70	25.58	26.62	29.74	35.36	38.16	31.86	24.57	20.87	19.13	19.04	20.13	19.88	17.58	XH
HNVPEN		15.91	18.95	22.96	25.84	26.83	29.93	35.68	39.05	32.01	24.60	21.02	19.23	18.98	20.31	20.04	18.08	CA
HXZKV9		16.08	19.41	23.28	26.09	27.12	30.31	35.86	38.75	32.06	24.80	21.09	19.37	19.19	20.41	20.00	18.10	XI
J4NMEX		16.26	19.15	23.06	27.33X	26.84	29.95	35.63	38.28	31.44	24.28	20.65	18.88	18.79	19.88	19.72	17.85	XM
J9D246		16.13	19.42	23.51	26.28	27.30	30.41	36.12	39.07	32.63	25.07	21.39	19.53	19.40	20.63	20.29	18.04	AO
JHET2X		16.10	19.35	23.22	26.00	27.08	30.26	35.88	38.69	32.06	24.78	21.08	19.40	19.29	20.45	20.00	18.08	XI
JT4FDN		16.12	19.43	23.44	26.29	27.14	30.32	36.20	39.40	32.44	24.89	21.24	19.49	19.27	20.62	20.42	18.44	MV
JX9BWN		15.61	18.99	22.88	25.73	26.79	29.92	35.54	38.44	31.88	24.59	20.90	19.17	19.07	20.21	19.92	17.96	XH
KQBNYW		15.98	19.13	23.01	25.85	26.88	30.02	35.57	38.72	32.18	24.83	21.05	19.30	19.13	20.33	20.08	18.12	MM
L2KXNX		16.19	19.01	22.98	25.94	26.87	29.93	35.93	38.92	32.27	24.70	21.05	19.27	19.10	20.34	20.22	18.22	MV
LX72HW		15.70	19.05	22.91	25.78	26.82	29.97	35.53	38.42	31.86	24.59	20.89	19.20	19.03	20.19	19.86	17.98	XI
LZVGNX		16.38	19.46	23.55	26.46	27.38	30.56	36.41	39.82*	32.70	25.08	21.40	19.57	19.34	20.70	20.46	18.42	CA
M4PXCC		16.54	19.26	23.26	26.07	27.05	30.22	35.89	39.05	32.41	25.01	21.22	19.35	19.02	20.30	20.05	18.22	HP
M9Y4XA		16.01	19.23	23.14	25.87	26.97	30.12	35.87	38.92	32.27	24.83	21.14	19.35	19.19	20.36	19.94	17.96	AJ
N4MG2K		16.21	19.36	23.22	25.99	27.09	30.20	35.78	38.84	32.19	24.87	21.18	19.39	19.17	20.40	20.09	18.13	XB
NGCFRM		15.81	19.21	23.05	25.83	27.03	30.17	35.68	38.31	32.12	24.95	21.23	19.40	19.30	20.22	20.03	18.27	AJ
NW66NJ		16.08	19.32	23.30	26.15	27.28	30.39	36.15	38.97	32.63	25.12	21.42	19.56	19.45	20.61	20.27	18.11	AJ
NXZQEP		15.58	18.68*	22.63*	25.36*	26.36X	29.45*	35.25*	37.71X	30.44X	23.31X	19.76X	18.06X	17.94X	18.94X	18.72X	16.90X	XO
NZKPK7		16.04	19.16	23.08	25.94	26.96	30.07	35.93	38.91	32.12	24.78	21.06	19.30	19.11	20.38	20.15	18.20	MS
PA4HA9	X	26.29X	91.39X	112.30X	102.56X	97.58X	93.23X	89.49X	87.37X	87.53X	86.19X	85.75X	85.63X	86.57X	87.23X	86.67X	86.59X	MM
PD3YL3		16.00	19.20	23.21	26.06	27.08	30.23	35.97	38.91	32.46	24.95	21.29	19.46	19.30	20.49	20.15	18.03	AJ

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 D171																		
PNRHB9		16.28	19.45	23.39	26.18	27.23	30.40	36.01	39.06	32.41	25.07	21.30	19.54	19.38	20.60	20.31	18.35	MM
PPMWZM		12.13X	19.44	22.87	25.88	26.94	30.34	36.30	38.80	32.29	25.05	21.20	18.26X	19.06	20.14	20.17	18.70	GD
PQVB68		15.84	18.98	22.81	25.73	26.76	29.83	35.43	38.25	31.79	24.50	20.73	18.99	18.82	19.41X	19.71	17.74	XI
PUATFW		15.89	19.31	23.21	25.96	27.04	30.14	35.68	38.59	32.18	24.93	21.28	19.51	19.41	20.59	20.06	17.76	AO
PZY97P		16.62	19.63	23.86*	26.35	27.29	30.34	36.10	39.12	32.40	25.00	21.20	19.53	19.20	21.09	20.79*	18.89*	HH
QPDJQG		15.63	19.30	23.16	26.02	27.17	30.33	35.94	38.71	32.22	24.89	21.14	19.28	19.10	20.20	19.88	18.17	AM
QQ9Z8K		15.94	19.31	23.04	25.91	27.00	30.12	35.77	38.71	31.96	24.71	21.05	19.19	19.21	20.35	19.97	18.10	XI
R8WUWF		16.36	19.49	23.39	26.14	27.18	30.30	35.91	38.93	32.27	24.90	21.17	19.43	19.34	20.49	20.15	18.18	XI
R98HT9		15.91	19.26	23.10	25.99	27.03	30.10	35.67	38.66	32.07	24.77	21.18	19.41	19.27	20.45	20.17	18.36	XI
RCN2FN		16.04	19.32	23.22	26.03	27.10	30.23	35.78	38.71	32.29	24.93	21.14	19.38	19.18	20.29	20.13	18.22	MM
RG4CQ8		15.97	19.21	23.14	25.97	27.00	30.22	35.82	38.71	32.14	24.86	21.19	19.35	19.15	20.33	20.11	18.28	XI
RX4LA4		15.76	19.12	23.07	26.03	26.94	30.10	36.07	39.11	32.44	24.81	21.17	19.35	19.21	20.45	20.35	18.24	MV
T29CGJ		16.22	19.55	23.48	26.30	27.42	30.57	36.17	39.10	32.47	25.16	21.38	19.63	19.48	20.57	20.36	18.43	MM
TGZAGT		15.92	19.20	23.16	25.95	27.00	30.16	35.71	38.61	31.95	24.70	21.04	19.34	19.22	20.32	19.85	17.98	XI
TMNUK9		16.25	19.38	23.40	26.24	27.39	30.54	36.31	39.46	32.71	25.14	21.42	19.58	19.40	20.57	20.34	18.35	AJ
TUNAAG		15.95	19.11	23.01	25.96	26.95	30.08	35.91	38.75	31.70	24.64	20.98	19.24	19.18	20.31	20.06	18.08	XO
TZCYR6		16.82	19.00	22.88	26.25	27.35	30.52	35.68	37.99*	32.16	24.98	20.81	19.12	19.04	19.98	20.20	18.57	GD
U6YDMP		18.78X	17.96X	22.48*	25.93	26.85	29.07X	36.16	39.64	32.38	25.06	21.05	17.86X	19.19	20.15	20.17	18.67	GD
UGC7JC		16.67	19.76*	24.08X	26.48	27.50	30.63	36.42	39.37	32.57	25.20	21.40	19.61	19.32	21.24*	20.92X	18.98*	HH
UQGDYC		16.06	19.29	23.27	26.07	27.11	30.34	35.96	38.98	32.26	24.95	21.15	19.41	19.23	20.46	20.22	18.23	MK
VBJNKR		17.36*	19.32	23.39	26.14	27.30	30.41	36.23	39.34	32.55	24.99	21.32	19.48	19.34	22.49X	20.21	18.43	AJ
VNPLKK		16.23	19.33	23.40	26.16	27.20	30.26	36.00	39.01	32.34	24.97	21.29	19.44	19.28	20.43	20.32	18.27	AQ
W67A8K		16.07	19.37	23.30	26.11	27.19	30.31	35.90	39.09	32.48	25.11	21.28	19.53	19.36	20.56	20.30	18.34	MM
WHYMRB		16.10	19.40	23.30	25.90	27.20	30.40	35.90	38.60	31.90	24.70	21.00	19.20	19.20	20.30	19.85	17.90	XI
WJT8JG		16.02	19.40	23.24	26.10	27.15	30.27	35.88	38.77	32.14	24.84	21.12	19.28	19.17	20.38	20.00	18.08	XI

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 D171																		
XTC4Z9		15.61	18.94	22.73	25.65	26.74	29.89	35.52	38.39	31.85	24.55	20.78	19.10	19.00	20.12	19.82	17.90	XH
XU64QR		16.25	19.29	23.35	26.15	27.25	30.34	36.09	39.25	32.65	25.12	21.44	19.59	19.45	20.66	20.35	18.08	AS
Y96HBL		15.86	19.07	23.01	25.82	26.86	30.02	35.63	38.67	32.04	24.74	20.98	19.26	19.09	20.29	20.01	18.05	MM
YFMNAD		15.22	18.79	22.89	25.96	26.90	29.97	35.75	39.11	32.22	24.66	21.03	19.24	19.02	20.35	20.16	18.14	MV
YQH28P		15.78	19.11	22.93	25.73	26.82	29.88	35.40	38.38	31.83	24.66	21.02	19.30	19.21	20.33	19.93	18.01	XI
ZGRMXR		16.06	19.32	23.25	26.11	27.18	30.23	35.95	39.06	32.56	25.05	21.36	19.47	19.35	20.46	20.08	18.02	AJ
ZJZQUN		16.02	19.20	23.16	25.94	27.02	30.25	35.72	38.63	31.89	24.69	21.02	19.30	19.17	20.30	19.92	17.94	MK

Summary Statistics

	400	420	440	460	480	500	520	540	560	580	600	620	640	660	680	700
Grand Means	16.04	19.24	23.20	26.05	27.07	30.21	35.92	38.90	32.23	24.85	21.15	19.33	19.20	20.43	20.13	18.16
SD Btwn Labs	0.59	0.25	0.27	0.28	0.24	0.28	0.32	0.43	0.40	0.29	0.27	0.29	0.23	0.37	0.29	0.31

Comments Assigned on Data Flags for Test #411

8RN2YB (X) - High % reflectance data for most wavelengths.

PA4HA9 (X) - High % reflectance data at all 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	SH	SIMADZU UV 3101PC	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	XM	X-Rite SP62	XO	X-Rite SP64

WebCode	Data Flag	Sample H171 Lab Mean	Sample H171 Diff from Grand Mean	Sample H171 CPV	Sample H172 Lab Mean	Sample H172 Diff from Grand Mean	Sample H172 CPV	Instr Code
38Z4D4		60.13	-0.28	-0.35	71.23	0.15	0.24	GK
3R6GAW		60.00	-0.41	-0.51	71.03	-0.05	-0.07	GK
3V43TM		61.13	0.72	0.90	71.55	0.48	0.74	GL
44WNHK	X	61.28	0.87	1.09	73.25	2.18	3.39	GL
4VYXYV		60.78	0.37	0.46	71.58	0.50	0.78	GL
4W9ZMF		59.30	-1.11	-1.38	70.75	-0.32	-0.50	GL
4YHZXN	*	61.00	0.59	0.74	70.65	-0.42	-0.66	GQ
662HTB	X	62.65	2.24	2.80	74.55	3.48	5.42	GK
66JLAN		59.95	-0.46	-0.57	70.20	-0.87	-1.36	GK
6EQ2FW		61.95	1.54	1.93	72.05	0.98	1.52	GN
6ML2WA		60.38	-0.03	-0.04	71.18	0.10	0.16	GL
6RUW7C		60.20	-0.21	-0.26	71.35	0.28	0.43	GL
7E4AL3		60.80	0.39	0.49	71.28	0.20	0.32	GL
7W8MGY		60.18	-0.23	-0.29	70.80	-0.27	-0.42	GL
83T67U		59.73	-0.68	-0.85	70.80	-0.27	-0.42	GB
8D9U6Y		59.83	-0.58	-0.73	70.58	-0.50	-0.77	GL
9ALWUE		61.25	0.84	1.05	72.00	0.93	1.45	GL
A3FKBL		60.48	0.07	0.09	70.90	-0.17	-0.27	RA
AC73RF		59.60	-0.81	-1.01	70.18	-0.90	-1.40	GL
AWBJBR		60.38	-0.03	-0.03	71.12	0.05	0.08	GL
C9GELT		60.20	-0.21	-0.26	70.78	-0.30	-0.46	GL
CWM7FC		61.93	1.52	1.90	72.45	1.38	2.15	IW
DBG44T		59.38	-1.03	-1.29	70.45	-0.62	-0.97	GL
DBJT9P		60.33	-0.08	-0.10	71.00	-0.07	-0.11	GL
DJDNK3	X	37.60	-22.81	-28.48	38.78	-32.30	-50.31	MW
DZFRKJ		61.45	1.04	1.30	72.33	1.25	1.95	GN
EUMDMJ		60.20	-0.21	-0.26	71.25	0.18	0.28	ST
EXBCVT		61.93	1.52	1.90	72.08	1.00	1.56	GK
FM7MV3		60.05	-0.36	-0.44	70.73	-0.35	-0.54	GK
FNYBDY		59.80	-0.61	-0.76	70.18	-0.90	-1.40	GL

WebCode	Data Flag	Sample H171 Lab Mean	Sample H171 Diff from Grand Mean	Sample H171 CPV	Sample H172 Lab Mean	Sample H172 Diff from Grand Mean	Sample H172 CPV	Instr Code
G3UEVU		60.60	0.19	0.24	71.30	0.23	0.36	GL
H6G36A		59.50	-0.91	-1.13	70.85	-0.22	-0.35	GK
HH66M2		59.00	-1.41	-1.76	70.20	-0.87	-1.36	TP
HHN2Y2		59.85	-0.56	-0.69	70.88	-0.20	-0.31	GL
HNVPEN	*	59.93	-0.48	-0.60	69.85	-1.22	-1.90	GL
JHET2X		59.50	-0.91	-1.13	70.40	-0.67	-1.05	GL
JUYWUQ		61.73	1.32	1.65	71.93	0.85	1.33	GL
JX9BWN		59.75	-0.66	-0.82	70.83	-0.25	-0.38	GK
KG3D6C		59.38	-1.03	-1.29	70.20	-0.87	-1.36	GK
KQBNYW		60.40	-0.01	-0.01	71.08	0.00	0.00	GL
L2KXNX		61.45	1.04	1.30	71.63	0.55	0.86	GL
LX72HW		60.22	-0.19	-0.23	70.67	-0.40	-0.63	GL
NNTQ7M		59.83	-0.58	-0.73	71.43	0.35	0.55	GK
NQFEF3		61.18	0.77	0.96	71.60	0.53	0.82	GL
NW66NJ		60.80	0.39	0.49	71.50	0.43	0.67	GL
NXZQEP		60.50	0.09	0.12	70.85	-0.22	-0.35	MW
NZKPK7		61.70	1.29	1.62	71.78	0.70	1.10	GK
PD3YL3		60.53	0.12	0.15	70.58	-0.50	-0.77	MW
PH4VF4		60.20	-0.21	-0.26	70.73	-0.35	-0.54	GL
PPMWZM		61.15	0.74	0.93	71.05	-0.02	-0.03	GN
PQVB68		60.50	0.09	0.12	71.38	0.30	0.47	MH
PZFPYW		60.95	0.54	0.68	71.40	0.33	0.51	GX
R98HT9		59.33	-1.08	-1.35	70.93	-0.15	-0.23	GL
RG4CQ8		59.48	-0.93	-1.16	70.30	-0.77	-1.20	GL
RLA9B8		60.10	-0.31	-0.38	70.58	-0.50	-0.77	GK
RMLRDP		60.65	0.24	0.30	71.33	0.25	0.39	GL
RPTAAZ		60.33	-0.08	-0.10	71.08	0.00	0.00	GL
TUNAAG		60.98	0.57	0.71	71.25	0.18	0.28	GN
TZCYR6		61.35	0.94	1.18	71.83	0.75	1.17	GB
UGC7JC	X	57.30	-3.11	-3.88	68.28	-2.80	-4.36	RA

Interlaboratory Testing Program for Color & Appearance

Analysis 440

60 Degree Gloss - Paint Chips

ASTM Method D 523

WebCode	Data Flag	Sample H171 Lab Mean	Sample H171 Diff from Grand Mean	Sample H171 CPV	Sample H172 Lab Mean	Sample H172 Diff from Grand Mean	Sample H172 CPV	Instr Code
UJWDLK	X	37.43	-22.98	-28.70	37.85	-33.22	-51.75	GL
URCUFF		59.40	-1.01	-1.26	70.50	-0.57	-0.89	MW
V9D28M		60.28	-0.13	-0.16	71.58	0.50	0.78	GK
VNPLKK		61.78	1.37	1.71	71.88	0.80	1.25	PC
WHYMRB		61.38	0.97	1.21	72.43	1.35	2.11	GK
XTET46		60.80	0.39	0.49	71.65	0.58	0.90	GN
Y96HBL		59.73	-0.68	-0.85	70.68	-0.40	-0.62	RA
YQH28P		61.75	1.34	1.68	71.53	0.45	0.71	GL
Z83Y3P		60.65	0.24	0.30	71.10	0.03	0.04	GK
ZE9LYY		59.60	-0.81	-1.01	70.60	-0.47	-0.73	GL
ZGRMXR	*	58.35	-2.06	-2.57	69.05	-2.02	-3.15	GK

Summary Statistics

	Sample H171	Sample H172
Grand Means	60.41 Gloss Units	71.07 Gloss Units
Stnd Dev Btwn Labs	0.80 Gloss Units	0.64 Gloss Units

Statistics based on 66 of 71 reporting participants

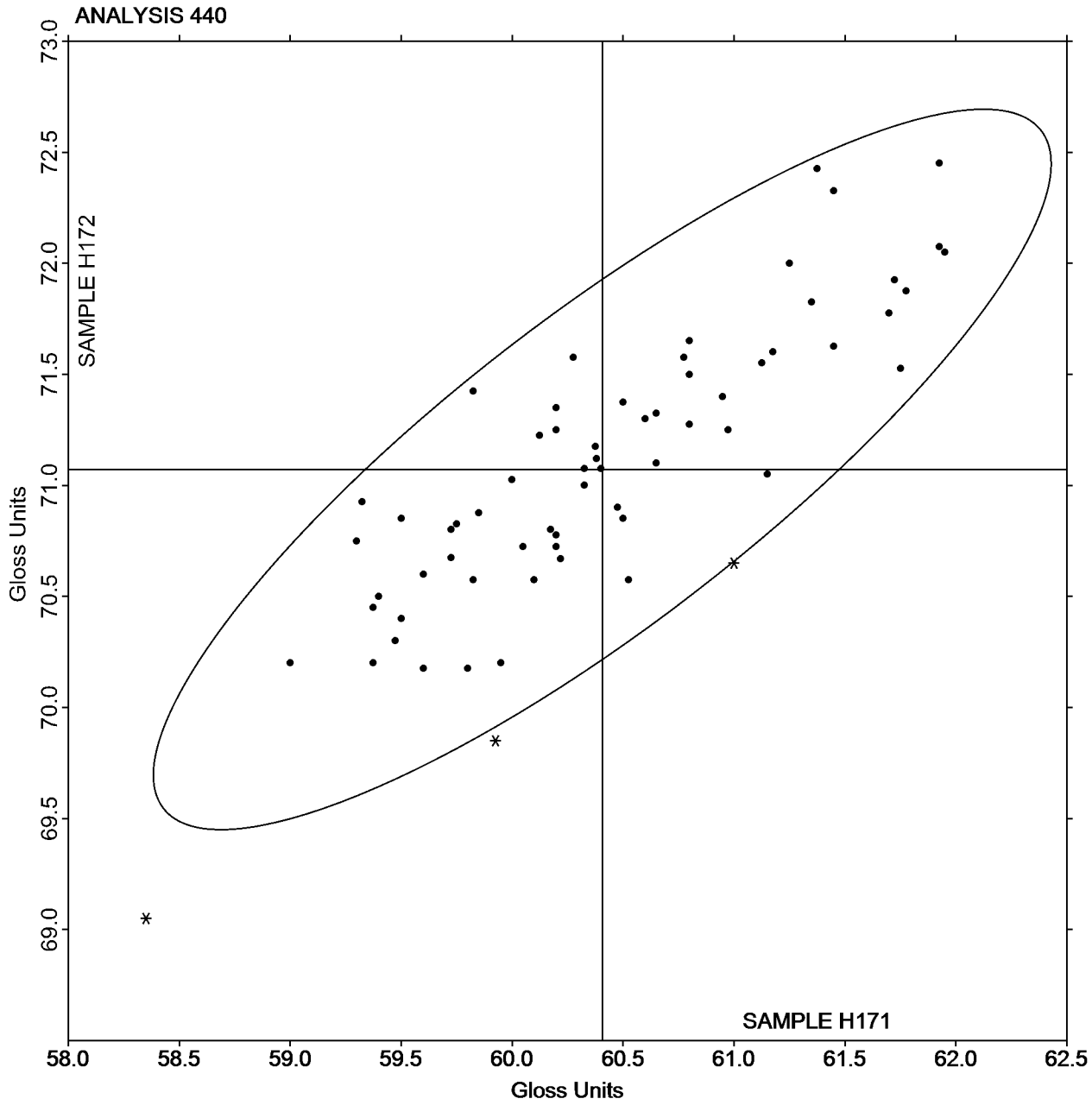
Comments on Assigned Data Flags for Test #440

44WNHK(X) - High data for Sample H172.
662HTB(X) - Data for both samples are high.
DJDNK3(X) - Data for both samples are extremely low.
UGC7JC(X) - Data for both samples are low.
UJWDLK(X) - Data for both samples are extremely low.

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)
IW	iWave WG68	MH	X-Rite/Macbeth Color-Eye XTH
MW	Minolta Multi-Gloss 268	PC	Picogloss 503 Erichson
RA	Rhopoint Novo-Gloss Glossmeter	ST	Sheen Tri-Glossmaster
TP	TQC Polygloss		

SAMPLE H171 = 60.41 Gloss Units SAMPLE H172 = 71.07 Gloss Units



Interlaboratory Testing Program for Color & Appearance

Report #182
4th Qtr 2017

Analysis 442

85 Degree Gloss - Paint Chips

ASTM Method D 523

WebCode	Data Flag	Sample M171 Lab Mean	Sample M171 Diff from Grand Mean	Sample M171 CPV	Sample M172 Lab Mean	Sample M172 Diff from Grand Mean	Sample M172 CPV	Instr Code
7W8MGY		4.88	0.20	0.38	9.33	0.30	0.24	GN
AWBJBR		4.83	0.15	0.29	9.50	0.48	0.38	GL
CWM7FC		5.00	0.32	0.62	9.00	-0.02	-0.02	WG
DBJT9P		4.90	0.22	0.43	9.85	0.83	0.66	GL
HNVPEN		4.35	-0.33	-0.63	8.28	-0.75	-0.60	GL
JHET2X		4.83	0.15	0.28	9.58	0.55	0.44	GL
KQBNYW		4.90	0.22	0.43	9.45	0.43	0.34	GL
L2KXNX		3.25	-1.43	-2.75	5.50	-3.52	-2.82	GL
PPMWZM		5.00	0.32	0.62	9.93	0.90	0.72	GN
TUNAAG		5.03	0.35	0.67	9.53	0.50	0.40	GN
XTET46		4.50	-0.18	-0.34	9.33	0.30	0.24	XX
YQH28P	X	61.33	56.65	109.27	72.10	63.08	50.47	GL

Summary Statistics

	Sample M171	Sample M172
Grand Means	4.68 Gloss Units	9.02 Gloss Units
Stnd Dev Btwn Labs	0.52 Gloss Units	1.25 Gloss Units

Statistics based on 11 of 12 reporting participants

Comments on Assigned Data Flags for Test #442

YQH28P(X) - Data for both samples are extremely high.

Key to Instrument Codes Reported by Participants

GL	BYK-Gardner micro-TRI-gloss	GN	BYK-Gardner new micro-TRI-gloss
WG	iWave WG68	XX	Instrument make/model not specified by lab

SAMPLE M171 = 4.68 Gloss Units SAMPLE M172 = 9.02 Gloss Units