Collaborative Testing Services, Inc.

Color & Appearance Testing Program

Summary Report #185 - 3rd Qtr 2018

About the Color Program, About CTS

Key to Tables and Graphs (Color Tests)

Key to Tables and Graphs (Spectro Test)

Key to Tables and Graphs (Gloss Tests)

Analysis	Analysis Name
408	Color & Color Difference (Paint Chips) - 45-0
409	Color & Color Difference (Paint Chips) Sphere
411	Spectrophotometric (Paint Chips) - Sphere
440	Gloss 60 Degree (Paint Chips)
442	Gloss 85 Degree (Paint Chips)

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
28AE3C		C181	49.04	-7.98	-5.79	1.07	-0.02	-0.17	1.08	XM
		C182	50.11	-8.00	-5.96					
2LPFY3		C181	49.35	-7.91	-5.97	1.07	-0.03	-0.13	1.07	XZ
		C182	50.41	-7.94	-6.09					
2RUBJ3		C181	48.87	-7.74	-6.31	1.16	-0.02	-0.08	1.16	HW
		C182	50.03	-7.76	-6.39					
3PH4QT	X	C181	48.66	8.11	6.10	1.15	0.03	0.12	1.16	XN
		C182	49.81	8.13	6.22					
42VKYQ		C181	49.02	-7.94	-6.04	1.11	-0.02	-0.14	1.12	XU
		C182	50.13	-7.96	-6.18					
4MDPMZ		C181	48.89	-7.84	-6.25	1.03	-0.01	-0.15	1.04	HW
		C182	49.92	-7.85	-6.40					
4MDUZN		C181	49.18	-7.92	-5.98	0.97	-0.02	-0.15	0.98	XO
		C182	50.15	-7.94	-6.12					
6CAYEX		C181	48.53	-8.16	-6.00	1.11	-0.02	-0.07	1.11	XZ
		C182	49.63	-8.18	-6.07					
6LTBTV		C181	49.30	-7.92	-6.20	1.03	-0.02	-0.14	1.04	MU
		C182	50.33	-7.94	-6.34					
7H9NRV	X	C181	48.96	-8.91	-7.17	1.00	-0.05	-0.07	1.00	XO
		C182	49.96	-8.96	-7.24					
7JNZD8		C181	48.99	-7.90	-6.25	1.09	-0.04	-0.13	1.10	HW
		C182	50.08	-7.94	-6.38					
8NVNTU		C181	48.31	-7.98	-5.96	1.14	-0.02	-0.09	1.14	HY
		C182	49.44	-8.00	-6.05					
96V8XV		C181	49.13	-7.84	-6.23	1.20	-0.05	-0.06	1.20	HW
		C182	50.33	-7.89	-6.29					
A7PCRV		C181	49.20	-7.86	-6.14	1.19	-0.02	-0.09	1.19	HW
		C182	50.39	-7.88	-6.23					
AMDJ82		C181	49.18	-8.31	-5.88	1.12	-0.03	-0.10	1.12	FA
		C182	50.30	-8.34	-5.97					
APHDJR		C181	49.05	-7.91	-6.06	1.14	-0.04	-0.09	1.14	HW
		C182	50.19	-7.94	-6.15					

			CIE L* a* b* Color Values			Color Difference Values				
WebCode	Flag	Samples	L*	a*	b*	ΔL*	Δa*	Δb*	ΔE*	InstrCode
B8VBLN		C181	48.79	-7.86	-6.02	1.23	0.06	-0.09	1.23	HK
		C182	50.02	-7.80	-6.10					
B8WX6M		C181	49.06	-8.00	-5.60	1.01	0.02	-0.15	1.02	GB
		C182	50.07	-7.99	-5.75					
BURPGD		C181	48.56	-7.75	-6.29	1.12	-0.06	-0.08	1.13	MG
		C182	49.68	-7.81	-6.37					
BXUMT7		C181	49.06	-7.90	-5.66	1.08	-0.02	-0.12	1.09	GE
		C182	50.14	-7.92	-5.78					
E9GV6P		C181	49.38	-7.97	-5.75	1.05	0.02	-0.13	1.05	XD
		C182	50.43	-7.95	-5.88					
G4XHDZ		C181	49.07	-7.91	-5.60	1.13	-0.05	-0.10	1.13	GE
		C182	50.20	-7.96	-5.69					
GWDJK8		C181	49.44	-8.01	-5.86	1.06	-0.02	-0.12	1.07	GH
		C182	50.50	-8.03	-5.98					
GWF9P4		C181	49.08	-8.00	-6.17	1.11	-0.05	-0.13	1.12	HW
		C182	50.19	-8.05	-6.30					
J8L4VD		C181	49.01	-7.93	-5.84	1.12	0.00	-0.13	1.12	XU
		C182	50.13	-7.93	-5.97					
JC7TJW		C181	48.86	-7.85	-6.15	1.15	-0.02	-0.11	1.15	HW
		C182	50.00	-7.87	-6.25					
JPQD26		C181	49.53	-7.99	-6.03	1.09	-0.03	-0.09	1.09	XZ
		C182	50.62	-8.02	-6.12					
KGVPME		C181	49.11	-7.88	-5.65	1.08	-0.01	-0.11	1.09	GE
		C182	50.19	-7.89	-5.75					
LQXGJL		C181	48.97	-8.32	-5.86	1.11	-0.04	-0.13	1.12	FA
		C182	50.08	-8.36	-5.99					
MAHVBF		C181	49.36	-7.99	-5.97	0.99	0.00	-0.06	0.99	XO
		C182	50.35	-7.99	-6.03					
MJA8TN		C181	48.79	-8.01	-6.00	1.17	-0.01	-0.19	1.19	TO
		C182	49.96	-8.01	-6.19					
MQ87XH		C181	48.97	-8.05	-5.97	1.09	-0.04	-0.10	1.09	MU
		C182	50.06	-8.09	-6.07					

Color and Color Difference - Paint Chips - 45-0 Geometry Instruments
CIE L*a*b* Color Space - Illuminant D65 - CIE 1964 (10 Degree) Observer

			CIE L* a* b* Color Values			Color Difference Values				
WebCode	Flag	Samples	L*	a*	b*	ΔL*	Δa*	Δb*	ΔE*	InstrCode
NK2P7A		C181	48.69	-7.66	-6.68	1.08	-0.02	-0.12	1.09	HW
		C182	49.77	-7.68	-6.79					
PYBT8U		C181	48.95	-7.75	-6.16	1.13	-0.06	-0.05	1.13	HW
		C182	50.07	-7.81	-6.21					
QW4UBR		C181	48.79	-8.05	-5.86	0.93	0.00	-0.16	0.94	MQ
		C182	49.71	-8.05	-6.01					
TDN6BZ		C181	49.05	-8.00	-5.82	1.02	-0.02	-0.14	1.02	XU
		C182	50.07	-8.02	-5.96					
VQK36A		C181	49.19	-8.03	-5.91	1.06	-0.02	-0.06	1.06	XE
		C182	50.25	-8.05	-5.97					
XGQRRK		C181	49.01	-8.05	-5.90	1.02	-0.01	-0.18	1.04	XB
		C182	50.03	-8.06	-6.07					

Summary Statistics

Samples	L*	a*	b*	ΔL*	Δa*	Δb*	ΔE*
Grand Means							
C181	49.01	-7.95	-5.99	1.09	-0.02	-0.11	1.10
C182	50.10	-7.97	-6.10				
Stnd Dev Btwn Labs							
C181	0.26	0.14	0.23	0.06	0.02	0.03	0.06
C182	0.25	0.13	0.22				

Statistics based on 36 of 38 reporting participants

Comments Assigned on Data Flags for Test #408

3PH4QT(X) - Extreme data for "a*" and "b*" values. May have forgotten to include the negative sign for "a*" and "b*" values.

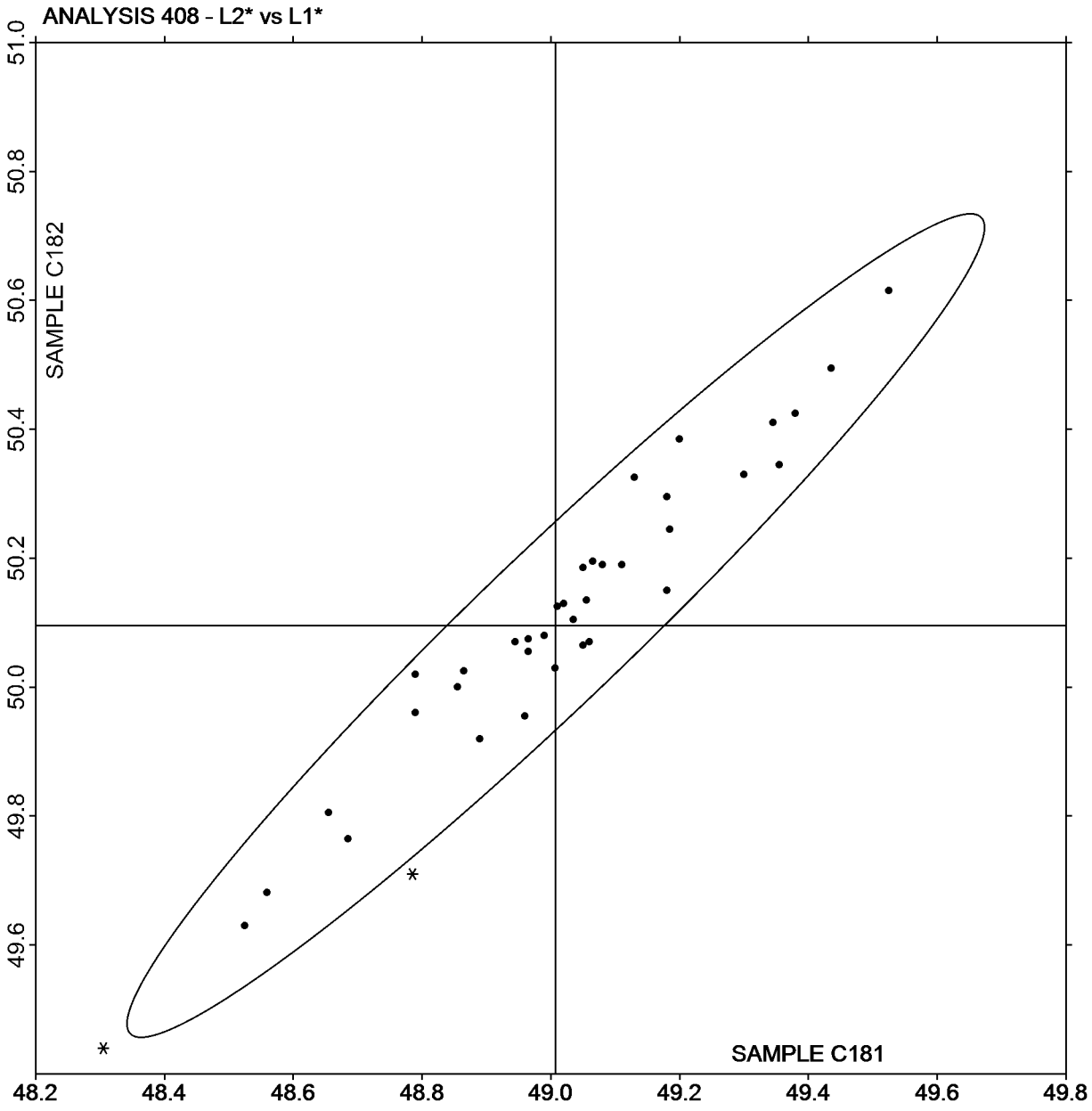
7H9NRV(X) - Very low data for "a*" and "b*" values.

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
HK	Hunter MiniScan XE (45/0)	HW	Hunter LabScan XE
HY	Hunter Color Flex 45/0	MG	Macbeth 1500/PLUS or 2025+ Color Eye
MQ	Minolta CM-503c Spectrophotometer	MU	Minolta
TO	Topcon SR-3 Spectroradiometer	XB	X-Rite i1Basic Pro 2
XD	X-Rite 500 Series SpectroDensitometer	XE	X-Rite eXact Portable Spectrophotometer
XM	X-Rite MA58 Multi-Angle Spectrophotometer	XN	X-Rite MA68 Multi-Angle Spectrophotometer
XO	X-Rite MA68 II Multi-Angle Spectrophotometer	XU	X-Rite 964 Portable Spectrophotometer
XZ	X-Rite		

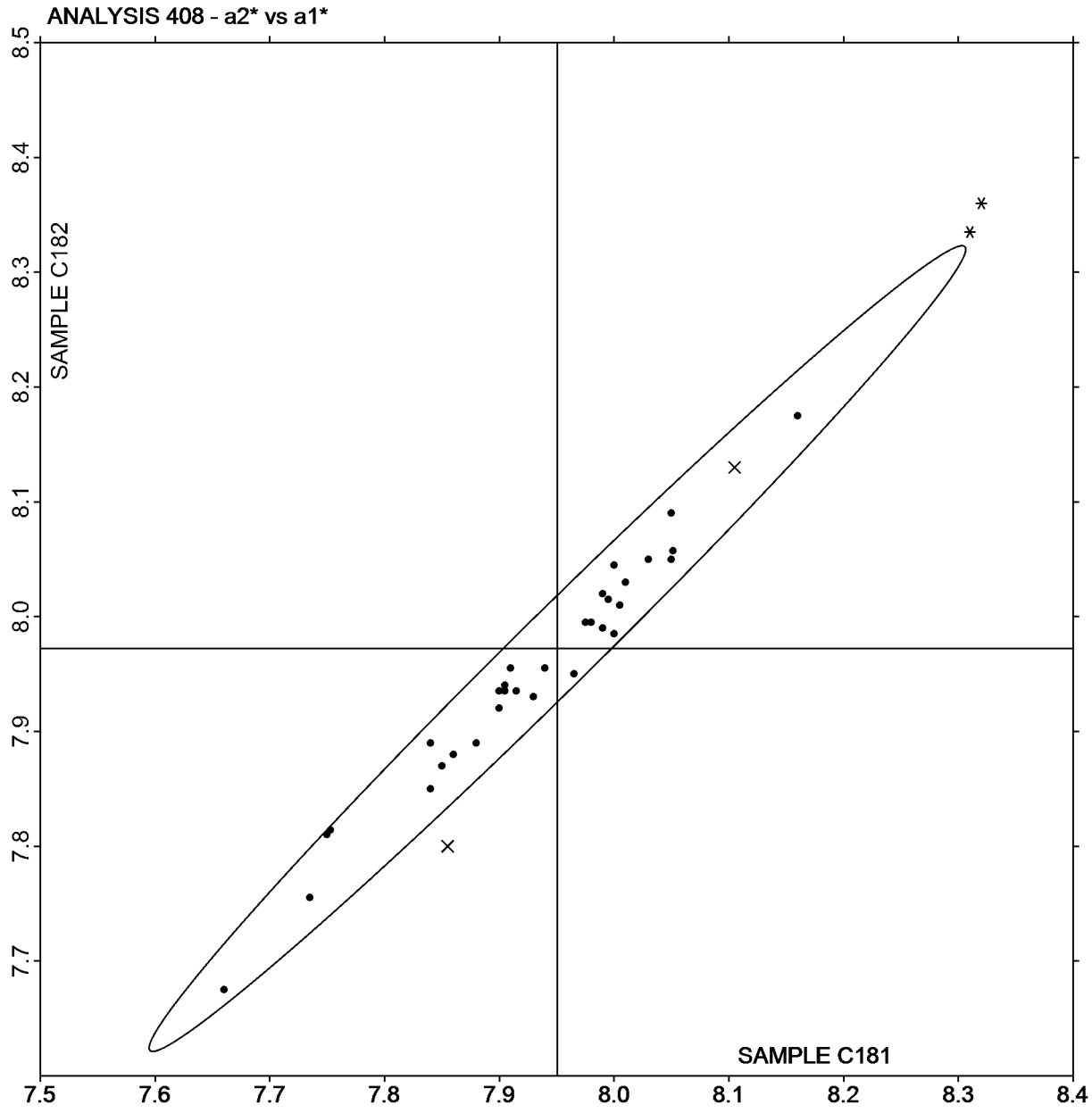
L2* vs L1*

SAMPLE C181 = 49.01 SAMPLE C182 = 50.10



a2* vs a1*

SAMPLE C181 = -7.95 SAMPLE C182 = -7.97

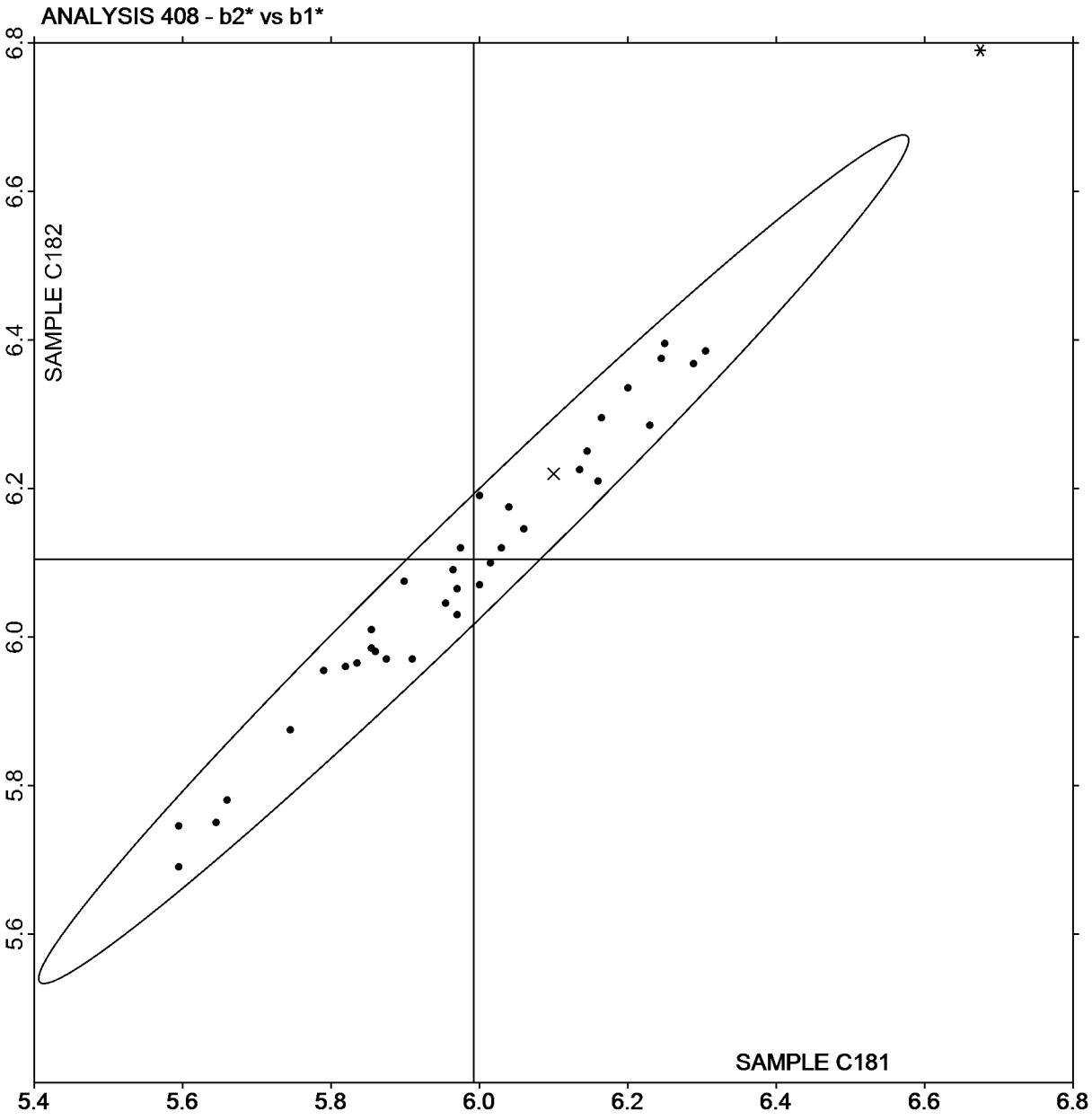


Plot created using absolute values.

b2* vs b1*

SAMPLE C181 = -5.99

SAMPLE C182 = -6.10



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
289L8P		C181	49.12	-7.81	-6.19	1.07	-0.02	-0.13	1.07	XI
		C182	50.18	-7.83	-6.32					
2B73GX		C181	49.55	-8.03	-6.17	1.01	-0.03	-0.16	1.02	XB
		C182	50.56	-8.06	-6.33					
2CHHBY		C181	49.23	-7.87	-6.25	1.03	-0.02	-0.14	1.04	XI
		C182	50.26	-7.89	-6.39					
2E4LJW		C181	49.41	-7.93	-6.24	1.10	-0.01	-0.14	1.10	AM
		C182	50.50	-7.94	-6.38					
2GHQJF		C181	49.31	-7.74	-5.99	1.07	-0.03	-0.14	1.08	AJ
		C182	50.38	-7.77	-6.13					
2RDZ3H		C181	49.71	-7.90	-6.04	0.96	0.02	-0.21	0.98	AM
		C182	50.67	-7.88	-6.25					
3MV7J3		C181	49.54	-7.92	-6.09	1.13	-0.06	-0.06	1.13	MM
		C182	50.67	-7.97	-6.15					
3PH4QT	X	C181	48.47	8.12	6.08	1.31	0.02	0.15	1.32	XO
		C182	49.78	8.14	6.23					
3YT3PB		C181	49.28	-7.83	-5.93	1.05	-0.03	-0.15	1.06	XH
		C182	50.32	-7.86	-6.08					
42VKYQ		C181	49.59	-7.87	-5.95	1.05	-0.01	-0.16	1.06	XI
		C182	50.63	-7.88	-6.11					
477929		C181	49.36	-7.93	-6.17	1.21	-0.05	-0.09	1.21	AO
		C182	50.57	-7.98	-6.26					
486G6L		C181	49.63	-7.87	-6.25	1.09	0.00	-0.16	1.10	AO
		C182	50.72	-7.87	-6.41					
4MDUZN		C181	49.37	-7.93	-6.18	1.01	-0.02	-0.17	1.02	MI
		C182	50.38	-7.95	-6.34					
4NA2PV		C181	49.11	-7.81	-6.07	1.07	-0.02	-0.15	1.08	XH
		C182	50.18	-7.83	-6.22					
676UAT		C181	49.55	-7.90	-6.10	1.01	0.01	-0.17	1.02	XI
		C182	50.55	-7.90	-6.26					
6BCNJV		C181	49.89	-7.76	-6.33	1.00	-0.03	-0.13	1.00	HH
		C182	50.89	-7.79	-6.46					

			CIE L* a* b* Color Values			Color Difference Values				
WebCode	Flag	Samples	L*	a*	b*	ΔL*	Δa*	Δb*	ΔE*	InstrCode
6BWAAZ		C181	49.06	-7.95	-6.03	1.18	-0.01	-0.08	1.18	GD
		C182	50.23	-7.96	-6.11					
6JR83U		C181	49.49	-7.91	-6.21	1.26	-0.04	-0.04	1.26	AO
		C182	50.75	-7.95	-6.25					
6M7PF6		C181	49.78	-7.90	-6.23	0.84	-0.06	-0.17	0.86	AM
		C182	50.62	-7.96	-6.39					
6QAHCP		C181	49.31	-7.87	-6.06	0.94	-0.03	-0.19	0.95	AM
		C182	50.25	-7.90	-6.25					
7BVRTG		C181	49.42	-7.85	-6.02	1.01	-0.04	-0.19	1.02	XI
		C182	50.43	-7.89	-6.21					
7ECZEV		C181	49.55	-7.91	-6.17	1.16	0.08	-0.07	1.16	AJ
		C182	50.71	-7.83	-6.24					
8F4DGD		C181	49.39	-7.90	-6.07	1.11	-0.05	-0.10	1.12	XI
		C182	50.50	-7.95	-6.17					
8H3TLV		C181	49.62	-7.91	-6.08	1.13	-0.08	-0.09	1.14	AJ
		C182	50.75	-7.98	-6.17					
8NU3VT	X	C181	49.00	-7.94	-3.42	1.08	-0.03	-2.92	3.12	XM
		C182	50.08	-7.97	-6.34					
8UYYET		C181	49.52	-7.92	-6.01	1.00	-0.01	-0.18	1.01	MM
		C182	50.52	-7.93	-6.19					
9C3R62		C181	49.51	-7.87	-6.13	1.08	-0.01	-0.14	1.09	MM
		C182	50.59	-7.88	-6.26					
9DA4L3		C181	49.23	-7.88	-6.00	1.12	-0.04	-0.09	1.12	XM
		C182	50.35	-7.91	-6.09					
9UEKNV		C181	49.28	-7.93	-6.17	1.17	-0.02	-0.08	1.17	MS
		C182	50.44	-7.94	-6.25					
9WJ94K		C181	49.36	-7.87	-6.15	1.13	-0.03	-0.10	1.13	XB
		C182	50.48	-7.89	-6.24					
A4EKKY		C181	49.58	-7.84	-6.34	1.14	-0.03	-0.11	1.15	AM
		C182	50.72	-7.87	-6.45					
AKPZ9P		C181	49.46	-7.96	-6.07	0.97	0.03	-0.20	0.99	AJ
		C182	50.43	-7.93	-6.27					

			CIE L* a* b* Color Values			Color Difference Values				
WebCode	Flag	Samples	L*	a*	b*	ΔL*	Δa*	Δb*	ΔE*	InstrCode
BAKG6Y		C181	50.02	-8.00	-6.05	0.98	0.00	-0.21	1.00	CA
		C182	51.00	-8.00	-6.26					
BM8T9W		C181	49.59	-7.96	-6.23	1.15	-0.04	-0.10	1.15	MT
		C182	50.74	-8.00	-6.33					
CBXBHE		C181	49.51	-7.96	-6.01	1.03	-0.02	-0.15	1.04	AS
		C182	50.54	-7.98	-6.16					
CF8QPH		C181	49.38	-7.92	-6.21	1.05	0.00	-0.14	1.05	AJ
		C182	50.43	-7.92	-6.34					
CKWDEV		C181	49.13	-7.92	-6.14	1.16	-0.03	-0.09	1.16	XM
		C182	50.29	-7.95	-6.23					
D3DPQL		C181	49.30	-7.87	-6.16	1.34	-0.04	-0.03	1.34	AO
		C182	50.63	-7.90	-6.19					
D9ZGXF		C181	49.26	-7.79	-5.98	1.05	-0.06	-0.12	1.06	XI
		C182	50.31	-7.85	-6.10					
DHAT9R		C181	49.58	-7.98	-6.03	1.02	-0.03	-0.17	1.03	HP
		C182	50.59	-8.01	-6.20					
DX69ED	X	C181	49.90	7.95	5.95	1.01	0.02	0.11	1.01	HW
		C182	50.91	7.96	6.05					
DXJUNE		C181	49.19	-7.97	-5.92	1.02	0.02	-0.19	1.03	XO
		C182	50.20	-7.96	-6.10					
EAMKZL		C181	49.59	-7.93	-6.18	1.05	-0.03	-0.14	1.05	AQ
		C182	50.63	-7.96	-6.32					
EL6ZBZ		C181	49.55	-7.86	-6.07	1.07	-0.04	-0.14	1.08	AJ
		C182	50.62	-7.89	-6.21					
F8HCCM		C181	49.57	-7.94	-6.16	1.10	-0.02	-0.09	1.10	MV
		C182	50.66	-7.96	-6.25					
FBFQZC		C181	49.32	-7.91	-6.10	0.92	0.02	-0.13	0.92	XO
		C182	50.24	-7.89	-6.23					
FLXC3L		C181	49.28	-7.84	-6.18	1.18	-0.05	-0.09	1.18	XI
		C182	50.45	-7.88	-6.27					
FRNMJB		C181	49.46	-7.92	-6.08	1.18	-0.05	-0.08	1.18	AJ
		C182	50.64	-7.97	-6.16					

			CIE L* a* b* Color Values			Color Difference Values				
WebCode	Flag	Samples	L*	a*	b*	ΔL*	Δa*	Δb*	ΔE*	InstrCode
FWJER8		C181	49.45	-7.95	-6.02	0.93	-0.01	-0.21	0.95	AJ
		C182	50.37	-7.96	-6.23					
G28F9D		C181	49.80	-7.97	-6.02	0.86	-0.02	-0.22	0.89	AM
		C182	50.66	-7.99	-6.24					
G4XHDZ		C181	49.10	-7.99	-6.05	1.15	-0.04	-0.06	1.15	GD
		C182	50.25	-8.03	-6.11					
G8CEJ3		C181	49.56	-7.87	-6.02	1.11	-0.03	-0.10	1.11	MM
		C182	50.67	-7.89	-6.12					
GF9C9Q		C181	49.96	-7.98	-6.34	1.14	-0.02	-0.09	1.14	XI
		C182	51.10	-8.00	-6.42					
GWDJK8		C181	49.46	-7.95	-6.02	1.06	-0.03	-0.13	1.06	MV
		C182	50.51	-7.98	-6.15					
HDZG2T	X	C181	96.56	1.22	-9.99	-46.02	-9.14	3.73	47.07	XI
		C182	50.54	-7.92	-6.26					
HKFXWM		C181	49.43	-7.92	-6.12	1.03	-0.03	-0.15	1.04	HP
		C182	50.46	-7.95	-6.27					
HMALEJ		C181	49.52	-7.88	-6.08	1.13	-0.04	-0.11	1.13	AJ
		C182	50.64	-7.92	-6.19					
J2MG6Y	X	C181	49.31	-8.12	-5.90	0.98	-0.01	-0.17	0.99	MV
		C182	50.28	-8.13	-6.07					
J8L4VD		C181	49.41	-7.90	-6.22	1.11	0.00	-0.13	1.11	XI
		C182	50.51	-7.90	-6.35					
JDE9NH		C181	49.46	-7.89	-6.09	1.10	-0.04	-0.12	1.11	MK
		C182	50.56	-7.92	-6.21					
JVW7TF		C181	49.21	-7.86	-6.08	1.10	-0.04	-0.10	1.10	XI
		C182	50.31	-7.90	-6.18					
JZQY7J		C181	49.48	-7.95	-6.12	1.06	-0.01	-0.16	1.07	AS
		C182	50.54	-7.96	-6.27					
KZ6RGD		C181	49.16	-7.90	-6.08	1.06	0.00	-0.17	1.07	XH
		C182	50.22	-7.90	-6.25					
L7PABE		C181	49.22	-7.89	-6.20	1.11	-0.02	-0.11	1.11	XI
		C182	50.32	-7.91	-6.31					

			CIE L* a* b* Color Values			Color Difference Values				
WebCode	Flag	Samples	L*	a*	b*	ΔL*	Δa*	Δb*	ΔE*	InstrCode
LCWV3H		C181	49.24	-7.84	-6.14	1.21	-0.04	-0.09	1.21	HP
		C182	50.45	-7.88	-6.23					
LFFQ4P		C181	49.05	-7.91	-6.06	1.12	-0.04	-0.13	1.13	XH
		C182	50.17	-7.95	-6.18					
M9PZUY		C181	49.55	-7.94	-6.19	1.05	-0.03	-0.10	1.05	AQ
		C182	50.60	-7.96	-6.28					
MJA8TN		C181	49.29	-7.91	-6.10	1.10	-0.03	-0.13	1.10	CA
		C182	50.38	-7.93	-6.23					
NZVAPH		C181	48.90	-7.81	-6.09	1.14	-0.06	-0.10	1.14	XH
		C182	50.03	-7.87	-6.19					
P8MTKH		C181	49.56	-7.92	-6.13	1.13	-0.02	-0.11	1.14	AQ
		C182	50.69	-7.94	-6.23					
PBRFFV		C181	49.40	-7.91	-6.11	1.16	-0.04	-0.08	1.16	XZ
		C182	50.56	-7.95	-6.18					
Q3RDTA		C181	49.54	-7.91	-6.13	1.29	-0.04	-0.04	1.29	AJ
		C182	50.83	-7.95	-6.17					
Q3VY7G		C181	49.52	-7.86	-5.99	1.04	-0.01	-0.16	1.05	AJ
		C182	50.56	-7.86	-6.15					
Q6K9FH		C181	49.56	-7.95	-5.97	0.98	-0.02	-0.17	0.99	MU
		C182	50.53	-7.97	-6.14					
QHHGVC		C181	49.40	-7.90	-5.99	1.09	-0.04	-0.11	1.09	XB
		C182	50.49	-7.94	-6.10					
QYRBJE		C181	49.51	-7.94	-6.02	1.12	-0.01	-0.11	1.12	AJ
		C182	50.63	-7.94	-6.13					
QZNPAD		C181	49.46	-7.93	-6.08	1.04	0.00	-0.15	1.05	AJ
		C182	50.50	-7.93	-6.23					
R2RU6D		C181	49.26	-8.05	-6.07	1.10	0.00	-0.13	1.10	CA
		C182	50.36	-8.05	-6.20					
R4LHMA		C181	49.32	-7.95	-6.16	1.10	-0.03	-0.10	1.10	AQ
		C182	50.42	-7.98	-6.26					
R8H9RZ		C181	49.40	-8.00	-6.21	1.12	-0.02	-0.12	1.13	XI
		C182	50.52	-8.02	-6.33					

			CIE L* a* b* Color Values			Color Difference Values				
WebCode	Flag	Samples	L*	a*	b*	ΔL*	Δa*	Δb*	ΔE*	InstrCode
RE2JY9		C181	49.27	-7.90	-6.07	1.05	-0.03	-0.17	1.06	MM
		C182	50.32	-7.93	-6.24					
RMVKG8		C181	49.46	-7.82	-6.18	1.13	-0.03	-0.11	1.13	AO
		C182	50.59	-7.85	-6.29					
RZLEU2		C181	49.55	-7.90	-5.98	1.16	0.03	-0.15	1.17	HF
		C182	50.71	-7.87	-6.13					
TG268Q	X	C181	48.97	-7.87	-6.43	1.15	-0.04	-0.09	1.15	XM
		C182	50.11	-7.91	-6.51					
UGYURE		C181	49.60	-7.95	-6.07	1.00	-0.03	-0.15	1.01	AS
		C182	50.59	-7.98	-6.21					
UKJNQZ		C181	49.30	-7.89	-6.09	1.13	-0.02	-0.12	1.14	MM
		C182	50.43	-7.91	-6.20					
UTB6E4		C181	49.56	-7.95	-6.02	0.99	-0.01	-0.18	1.01	AS
		C182	50.55	-7.96	-6.20					
UWXJ8K		C181	49.11	-7.88	-6.01	1.05	-0.03	-0.14	1.06	XO
		C182	50.16	-7.91	-6.14					
UZRFT6		C181	49.49	-7.90	-6.13	1.07	-0.03	-0.10	1.07	XI
		C182	50.56	-7.93	-6.23					
UZU9NR		C181	48.96	-7.90	-6.06	1.11	-0.03	-0.16	1.12	XH
		C182	50.07	-7.92	-6.22					
VEBKGD		C181	49.39	-7.84	-6.15	1.06	0.04	-0.06	1.06	SH
		C182	50.45	-7.81	-6.20					
VQZHJB		C181	48.85	-7.92	-6.22	1.19	-0.04	-0.09	1.19	XO
		C182	50.04	-7.96	-6.31					
VRWV74		C181	49.44	-7.89	-6.26	1.09	0.00	-0.13	1.10	XX
		C182	50.53	-7.89	-6.38					
VTU727	X	C181	51.35	-7.96	-7.06	1.21	-0.04	-0.09	1.21	MM
		C182	52.56	-8.00	-7.15					
W9G626		C181	49.64	-7.97	-6.20	1.04	-0.01	-0.12	1.05	AO
		C182	50.68	-7.97	-6.31					
WARRXX		C181	49.23	-7.89	-6.09	1.10	-0.04	-0.17	1.11	AM
		C182	50.32	-7.93	-6.26					

			CIE L* a* b* Color Values			Color Difference Values				
WebCode	Flag	Samples	L*	a*	b*	ΔL*	Δa*	Δb*	ΔE*	InstrCode
WG7TYT		C181	49.39	-7.93	-6.14	0.96	0.01	-0.19	0.97	XI
		C182	50.34	-7.92	-6.32					
WG9LUF		C181	49.13	-7.97	-6.25	1.11	-0.03	-0.13	1.12	XC
		C182	50.24	-8.00	-6.38					
WHJBC7	X	C181	49.54	-8.10	-6.09	1.23	-0.03	-0.07	1.23	CA
		C182	50.77	-8.12	-6.16					
WHPFVP		C181	49.46	-7.94	-6.13	1.09	-0.02	-0.09	1.09	GG
		C182	50.55	-7.96	-6.22					
WHZNFA		C181	49.47	-7.87	-6.07	1.14	-0.04	-0.09	1.14	MM
		C182	50.60	-7.91	-6.16					
XFV9R4		C181	49.40	-7.83	-6.05	1.15	-0.02	-0.11	1.15	XI
		C182	50.54	-7.85	-6.16					
XJBLQ7		C181	49.35	-7.83	-6.08	1.00	-0.03	-0.16	1.01	XH
		C182	50.35	-7.86	-6.23					
YEEEMN		C181	49.30	-7.99	-6.06	0.98	-0.02	-0.20	1.00	AS
		C182	50.28	-8.01	-6.25					
YJ8KY6		C181	49.59	-7.89	-6.09	1.18	-0.02	-0.09	1.18	AR
		C182	50.77	-7.91	-6.18					
Z6KNH8		C181	49.34	-7.95	-6.05	1.11	-0.03	-0.17	1.12	AS
		C182	50.45	-7.98	-6.22					
Z6MDL4		C181	49.22	-7.99	-5.96	1.08	-0.02	-0.14	1.08	MV
		C182	50.29	-8.00	-6.10					
ZAYB86		C181	49.30	-7.92	-6.06	1.09	-0.03	-0.14	1.10	XI
		C182	50.39	-7.94	-6.19					
ZRYFGZ		C181	49.43	-7.96	-6.12	1.10	-0.02	-0.10	1.10	AD
		C182	50.53	-7.98	-6.22					

Summary Statistics

Samples	L*	a*	b*	ΔL*	Δa*	Δb*	ΔE*
Grand Means							
C181	49.40	-7.91	-6.10	1.08	-0.02	-0.13	1.09
C182	50.48	-7.93	-6.23				
Stnd Dev Btwn Labs							
C181	0.21	0.05	0.09	0.08	0.02	0.04	0.08
C182	0.21	0.05	0.09				

Statistics based on 101 of 109 reporting participants

Comments Assigned on Data Flags for Test #409

3PH4QT(X) - Low "L*" values. Large replication difference for "L*" value on Sample C181. Extreme data for "a*" and "b*" values. May have forgotten to include the negative sign for "a*" and "b*" values.

8NU3VT(X) - Extreme data for "b*" value of Sample C181. Possible typo when entering data.

DX69ED(X) - Extreme data for "a*" and "b*" values. May have forgotten to include the negative sign for "a*" and "b*" values.

HDZG2T(X) - Extreme data for all values for Sample C181. Apparently measured back of the samples.

J2MG6Y(X) - Low "a*" values.

TG268Q(X) - Low "b*" values.

VTU727(X) - Very high "L*" values and very low "b*" values.

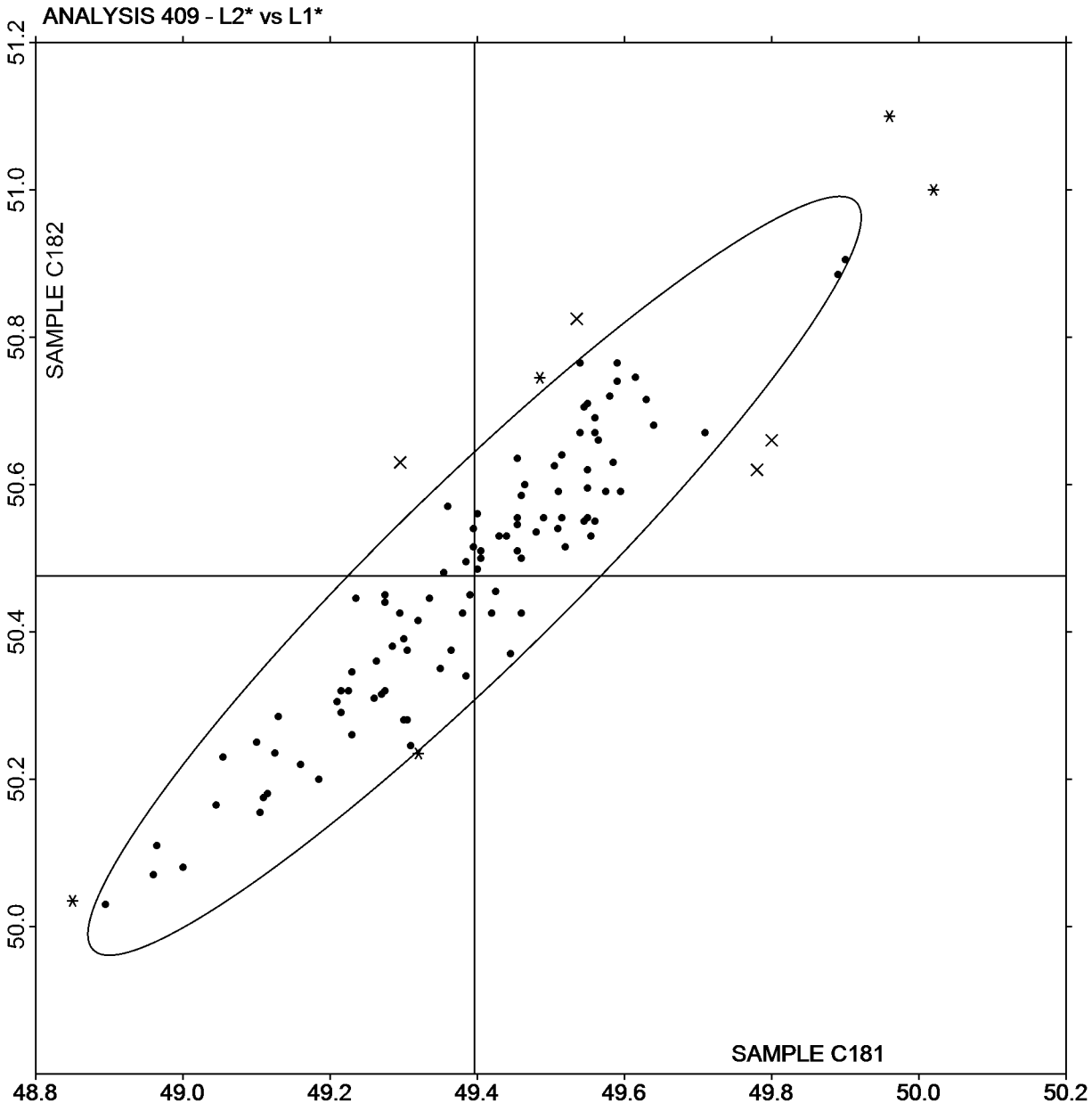
WHJBC7(X) - Low "a*" values.

Key to Instrument Codes Reported by Participants

AD	Datacolor 100	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	GG	BYK-Gardner TCS II
HF	Hunter ColorFlex Diffuse	HH	Hunter ColorQUEST XE
HP	Hunter UltraScan PRO	HW	Hunter UltraScan XE
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	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

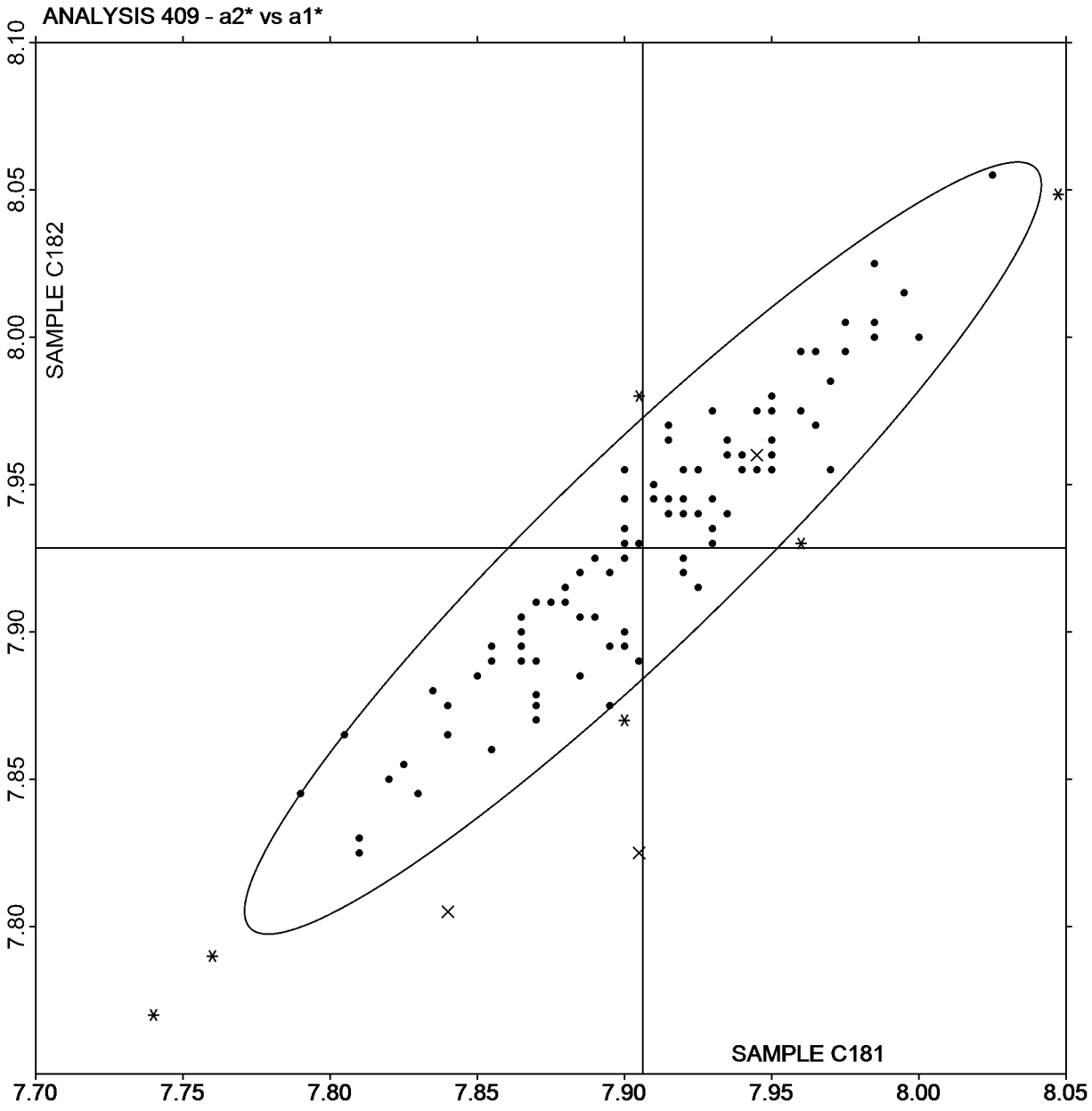
L2* vs L1*

SAMPLE C181 = 49.40 SAMPLE C182 = 50.48



a2* vs a1*

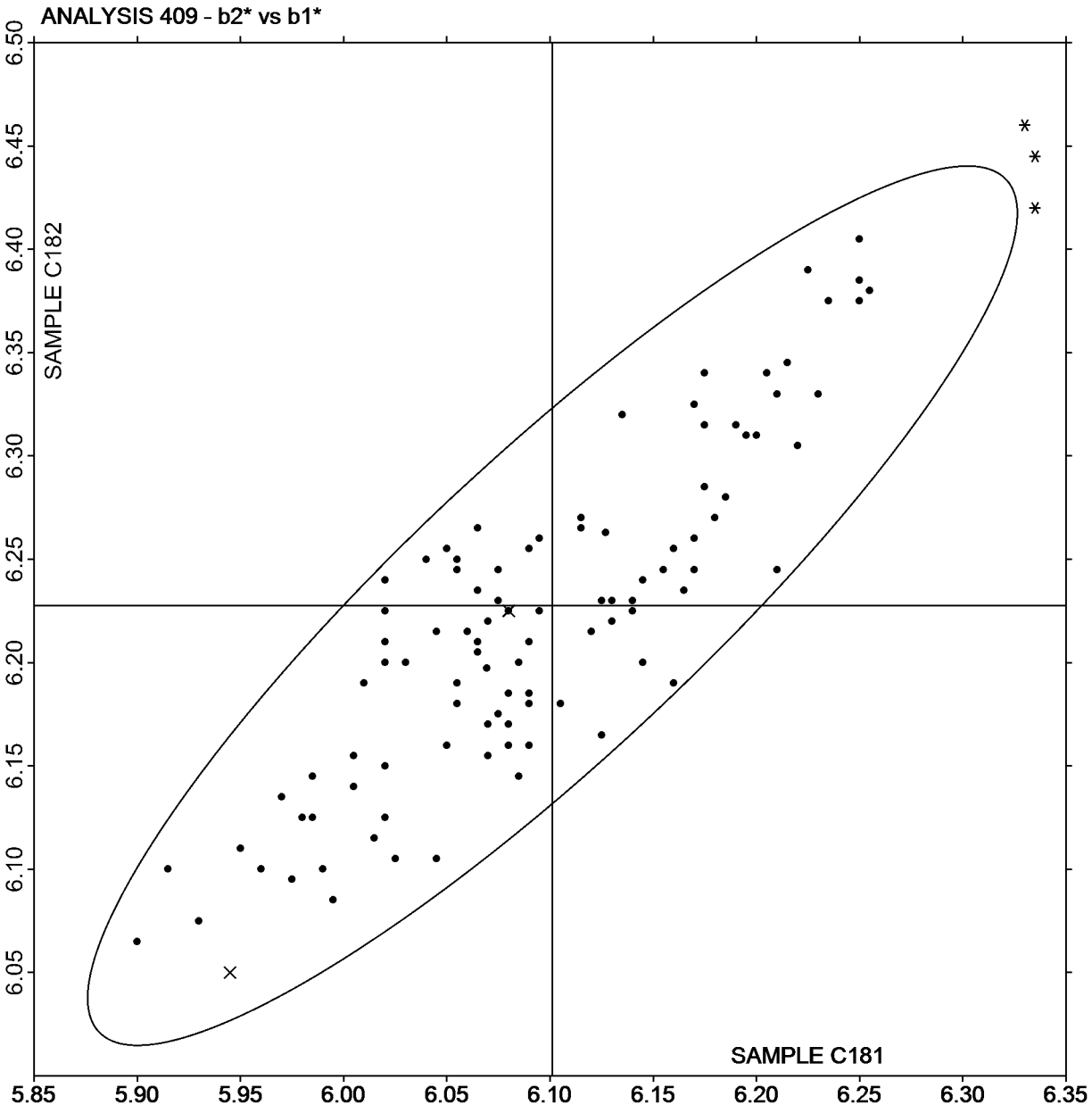
SAMPLE C181 = -7.91 SAMPLE C182 = -7.93



Plot created using absolute values.

b2* vs b1*

SAMPLE C181 = -6.10 SAMPLE C182 = -6.23



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 C181																		
289L8P		17.72	20.19	20.89	21.00	20.81	20.64	20.32	19.41	17.44	15.30	13.90	13.10	12.98	13.37	13.02	12.23	XI
2B73GX		17.98	20.61	21.26	21.37	21.22	21.06	20.75	19.87	17.84	15.58	14.12	13.31	13.06	13.50	13.21	12.25	XB
2CHHBY		17.45	20.38	20.98	21.17	20.97	20.77	20.47	19.52	17.58	15.33	13.97	13.16	13.01	13.43	13.15	12.31	XI
2E4LJW		17.70	20.54	21.17	21.28	21.10	20.92	20.62	19.66	17.72	15.51	14.04	13.24	13.02	13.44	13.26	12.48	AM
2GHQJF		17.39	20.27	20.92	21.10	20.93	20.76	20.42	19.59	17.66	15.48	14.06	13.28	13.17	13.38	13.20	12.52	AJ
2RDZ3H		18.25	20.67	21.33	21.47	21.28	21.14	20.84	19.99	17.96	15.75	14.30	13.52	13.32	13.65	13.45	12.65	AM
3MV7J3		17.77	20.52	21.19	21.37	21.15	20.99	20.72	19.83	17.85	15.62	14.14	13.36	13.18	13.60	13.42	12.54	MM
3PH4QT		18.07	20.68	21.53*	21.61	21.54*	21.28*	21.08*	20.10*	17.95	15.67	14.24	13.42	13.27	13.59	13.27	12.40	XO
3YT3PB		17.58	20.16	20.84	21.06	20.85	20.74	20.45	19.55	17.63	15.44	14.03	13.26	13.17	13.47	13.26	12.44	XH
42VKYQ		17.72	20.46	21.13	21.35	21.15	21.00	20.71	19.85	17.87	15.70	14.30	13.43	13.18	13.56	13.35	12.60	XI
477929		17.81	20.40	21.08	21.22	21.07	20.89	20.55	19.65	17.72	15.45	14.05	13.23	13.07	13.38	13.22	12.24	AO
486G6L		18.12	20.71	21.32	21.54	21.31	21.08	20.80	19.92	17.95	15.65	14.24	13.40	13.22	13.51	13.40	12.62	AO
4MDUZN		17.62	20.40	21.11	21.24	21.06	20.90	20.59	19.65	17.68	15.45	14.00	13.32	13.09	13.48	13.27	12.49	MI
4NA2PV		17.32	20.20	20.78	20.96	20.72	20.63	20.28	19.42	17.48	15.31	13.89	13.13	13.02	13.40	13.07	12.20	XH
676UAT		17.73	20.50	21.19	21.39	21.17	21.02	20.69	19.83	17.83	15.61	14.16	13.37	13.24	13.59	13.34	12.47	XI
6BCNJV		18.35	21.00X	21.80X	21.74*	21.53*	21.35*	21.04*	20.13*	18.14*	15.85*	14.40*	13.59*	13.46*	14.16X	13.89X	13.08X	HH
6BWAAZ		18.64	20.05	20.69	20.83*	20.59*	20.35X	20.18*	19.61	17.45	15.39	13.88	12.54X	12.90	13.27	13.20	12.46	GD
6JR83U		17.90	20.50	21.20	21.30	21.20	21.00	20.70	19.80	17.80	15.50	14.10	13.30	13.20	13.50	13.20	12.30	AO
6M7PF6	X	19.18X	21.69X	22.34X	22.52X	22.27X	22.06X	21.71X	20.75X	18.71X	16.38X	14.87X	14.00X	13.82X	14.12X	13.91X	13.03X	AM
7BVRTG		17.65	20.53	21.06	21.17	20.97	20.86	20.63	19.67	17.75	15.61	14.11	13.30	13.08	13.48	13.20	12.36	XI
7ECZEV		18.02	20.62	21.23	21.39	21.22	21.05	20.71	19.80	17.87	15.59	14.17	13.34	13.20	13.52	13.22	12.38	AJ
8F4DGD		17.57	20.37	21.03	21.22	21.01	20.88	20.60	19.66	17.71	15.50	14.03	13.30	13.19	13.54	13.28	12.45	XI
8H3TLV		19.83X	20.51	21.22	21.47	21.21	21.08	20.83	19.89	17.86	15.66	14.22	13.43	13.29	13.66	13.52	12.67	AJ
8NU3VT		17.34	20.12	20.78	20.89	20.70	20.60	20.28	19.36	17.29*	15.14*	13.76*	13.00	12.89	13.29	13.05	12.17	XF
8UYYET		17.79	20.45	21.13	21.31	21.15	20.98	20.67	19.80	17.83	15.62	14.14	13.35	13.20	13.61	13.40	12.55	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 C181										
9C3R62		17.87	20.57	21.20	21.35	21.16	21.01	20.70	19.79	17.83	15.59	14.13	13.34	13.18	13.54	13.38	12.54	MM
9DA4L3		18.50	20.60	21.30	21.40	21.25	21.10	20.80	19.90	17.80	15.60	14.20	13.45	13.20	13.90X	13.40	12.70	HW
9UEKNV		17.76	20.37	21.00	21.16	20.93	20.78	20.50	19.62	17.60	15.39	13.94	13.15	12.98	13.39	13.19	12.31	MS
9WJ94K		17.90	20.43	21.09	21.21	21.00	20.86	20.56	19.67	17.69	15.49	14.06	13.27	13.11	13.49	13.20	12.28	XB
A4EKKY		17.87	20.85*	21.38	21.47	21.24	21.11	20.80	19.84	17.80	15.62	14.20	13.38	13.23	13.55	13.35	12.52	AM
AKPZ9P		17.90	20.46	21.09	21.25	21.08	20.93	20.65	19.76	17.78	15.53	14.10	13.31	13.14	13.45	13.33	12.46	AJ
BAKG6Y	X	16.92*	18.16X	17.78X	17.17X	16.20X	14.40X	12.61X	11.76X	11.85X	12.84X	14.98X	14.30X	14.69X	17.22X	18.47X	18.67X	CA
BM8T9W		17.85	20.68	21.35	21.51	21.25	21.09	20.82	19.90	17.87	15.60	14.16	13.33	13.16	13.59	13.36	12.51	MT
CBXBHE		18.24	20.39	21.09	21.30	21.14	20.99	20.68	19.80	17.84	15.57	14.16	13.35	13.20	13.53	13.32	12.48	AS
CF8QPH		17.78	20.46	21.12	21.23	21.06	20.92	20.58	19.69	17.71	15.47	14.03	13.24	13.08	13.39	13.13	12.25	AJ
CKWDEV		17.40	20.18	20.84	20.95	20.78	20.66	20.38	19.45	17.42	15.24	13.85	13.08	12.97	13.38	13.17	12.33	XF
D3DPQL		17.87	20.39	21.01	21.15	20.97	20.79	20.47	19.58	17.71	15.44	14.00	13.20	13.04	13.37	13.10	12.24	AO
DXJUNE		17.30	19.99*	20.83	21.01	20.81	20.69	20.43	19.61	17.50	15.33	13.94	13.12	13.02	13.41	13.16	12.26	XO
EAMKZL		18.08	20.60	21.27	21.43	21.23	21.06	20.80	19.85	17.89	15.62	14.20	13.38	13.21	13.51	13.40	12.52	AQ
F8HCCM		17.85	20.68	21.29	21.41	21.18	21.05	20.77	19.90	17.87	15.57	14.16	13.36	13.17	13.63	13.45	12.61	MV
FBFQZC		17.57	20.19	20.99	21.04	20.96	20.71	20.54	19.63	17.61	15.40	13.96	13.18	13.08	13.48	13.27	12.44	XO
FLXC3L		17.70	20.39	20.99	21.16	20.96	20.79	20.51	19.55	17.60	15.42	13.98	13.22	13.14	13.48	13.12	12.32	XI
FRNMJB		18.88*	20.45	21.11	21.24	21.06	20.92	20.63	19.77	17.78	15.51	14.11	13.30	13.15	13.45	13.22	12.51	AJ
G28F9D		17.91	20.70	21.39	21.56	21.42	21.28*	21.02*	20.08*	18.10*	15.81*	14.37*	13.53	13.39*	13.73	13.60*	12.48	AM
G4XHDZ		19.06X	20.18	20.81	20.91	20.77	20.60	20.37	19.48	17.51	15.28	13.72*	13.00	12.90	13.34	13.20	12.47	GD
G8CEJ3		17.68	20.49	21.17	21.36	21.19	21.01	20.71	19.83	17.88	15.64	14.19	13.39	13.26	13.62	13.43	12.60	MM
GF9C9Q		18.36	21.12X	21.78X	21.81X	21.60X	21.46X	21.15X	20.26X	18.12*	15.85*	14.37*	13.61*	13.44*	13.86*	13.53	12.68	XI
GWDJK8		17.44	20.48	21.06	21.27	21.01	20.90	20.63	19.80	17.79	15.54	14.09	13.28	13.08	13.54	13.36	12.55	MV
HDZG2T	X	27.45X	94.30X	118.00X	106.75X	101.50X	96.60X	92.10X	89.50X	89.70X	88.15X	87.70X	87.70X	89.20X	95.60X	89.40X	89.70X	XI
HKFXWM		18.23	20.45	21.10	21.30	21.04	20.94	20.61	19.71	17.81	15.55	14.12	13.26	12.99	13.45	13.18	12.44	HP

WebCode	Data Flag	400	420	440	460	480	500	520	540	560	580	600	620	640	660	680	700	Instr Code
		Spectrophotometric Reflectance values (as %) at selected wavelengths																
		Sample C181																
HMALEJ		17.85	20.52	21.14	21.33	21.15	21.01	20.69	19.82	17.84	15.59	14.19	13.35	13.20	13.51	13.21	12.38	AJ
J2MG6Y		16.89*	20.09	20.84	21.12	20.95	20.84	20.53	19.67	17.65	15.39	13.96	13.17	12.98	13.43	13.23	12.39	MV
J8L4VD		17.75	20.51	21.11	21.29	21.08	20.97	20.59	19.70	17.66	15.48	14.06	13.29	13.16	13.56	13.30	12.58	XI
JDE9NH		17.76	20.43	21.13	21.28	21.07	20.94	20.63	19.72	17.77	15.56	14.09	13.32	13.15	13.55	13.34	12.48	MK
JVW7TF		17.49	20.22	20.88	21.05	20.84	20.70	20.41	19.53	17.53	15.35	13.98	13.17	13.01	13.39	13.13	12.30	XI
JZQY7J		17.82	20.46	21.15	21.31	21.12	21.00	20.67	19.78	17.83	15.57	14.12	13.30	13.16	13.52	13.27	12.36	AS
L7PABE		17.59	20.37	20.97	21.13	20.91	20.77	20.45	19.54	17.54	15.38	13.92	13.13	12.97	13.40	13.04	12.28	XI
LCWV3H		18.32	20.32	20.93	21.08	20.88	20.77	20.46	19.50	17.56	15.44	14.00	13.21	12.93	13.32	13.09	12.35	HP
LFFQ4P		17.28	20.09	20.71	20.88	20.70	20.59	20.30	19.39	17.39	15.25	13.81	13.06	12.95	13.33	13.04	12.25	XH
M9PZUY		18.59	20.59	21.23	21.42	21.22	21.04	20.77	19.85	17.83	15.59	14.15	13.36	13.20	13.48	13.28	12.46	AQ
MJA8TN		17.73	20.16	20.93	21.09	20.89	20.78	20.49	19.62	17.65	15.40	14.00	13.20	12.99	13.47	13.23	12.41	CA
NZVAPH		16.94*	19.96*	20.63*	20.80*	20.59*	20.40*	20.12*	19.21X	17.31*	15.16*	13.76*	12.95*	12.83*	13.18*	12.85X	12.04*	XH
P8MTKH		19.00*	20.58	21.20	21.39	21.18	21.06	20.78	19.82	17.87	15.61	14.18	13.36	13.24	13.54	13.32	12.52	AQ
PBRFFV		17.89	20.44	21.06	21.22	21.03	20.89	20.60	19.70	17.70	15.50	14.09	13.30	13.08	13.42	13.15	12.22	XZ
Q3RDTA		17.89	20.58	21.19	21.37	21.16	21.01	20.67	19.82	17.89	15.60	14.17	13.35	13.20	13.49	13.20	12.37	AJ
Q6K9FH		17.61	20.56	21.11	21.33	21.14	20.97	20.77	19.88	17.86	15.61	14.17	13.36	13.22	13.66	13.51	12.60	MV
QHHGVC		17.71	20.31	21.00	21.17	20.99	20.85	20.56	19.70	17.74	15.52	14.10	13.29	13.09	13.50	13.26	12.41	XB
QYRBJE		17.83	20.44	21.11	21.28	21.10	20.96	20.70	19.78	17.84	15.57	14.17	13.30	13.18	13.53	13.39	12.33	AJ
QZNPAD		17.71	20.48	21.09	21.29	21.13	20.96	20.65	19.77	17.81	15.53	14.10	13.29	13.11	13.43	13.23	12.24	AJ
R2RU6D		17.74	20.21	20.93	21.11	20.92	20.77	20.52	19.63	17.61	15.34	13.92	13.11	12.92	13.39	13.18	12.31	CA
R4LHMA		17.62	20.32	21.02	21.21	21.03	20.87	20.52	19.61	17.65	15.42	13.99	13.21	13.06	13.34	13.15	12.35	AQ
R8H9RZ		17.77	20.50	21.11	21.31	21.09	20.92	20.64	19.72	17.71	15.45	14.05	13.20	13.05	13.46	13.17	12.34	XI
RE2JY9		17.62	20.26	20.95	21.11	20.90	20.76	20.47	19.60	17.63	15.40	13.96	13.17	13.01	13.42	13.20	12.37	MM
RMVKG8		18.05	20.60	21.15	21.30	21.15	20.95	20.60	19.70	17.80	15.50	14.15	13.30	13.20	13.50	13.30	12.30	AO
RZLEU2		17.88	20.67	21.02	21.61	21.10	21.01	20.76	19.79	17.93	15.58	14.03	13.47	13.38*	13.70	13.48	12.62	HF

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 C181																		
TG268Q		17.98	20.29	20.88	21.03	20.74	20.59	20.27	19.34*	17.31*	15.15*	13.72*	12.95*	12.83*	13.13*	13.00	12.20	XM
UGYURE		17.87	20.52	21.24	21.37	21.22	21.07	20.78	19.88	17.96	15.63	14.20	13.38	13.22	13.55	13.26	12.38	AS
UKJNQZ		17.72	20.30	20.99	21.13	20.95	20.79	20.49	19.61	17.65	15.43	13.98	13.20	13.05	13.43	13.21	12.37	MM
UTB6E4		17.78	20.50	21.16	21.33	21.15	21.02	20.78	19.83	17.92	15.62	14.20	13.37	13.23	13.55	13.30	12.39	AS
UWXJ8K		17.49	20.10	20.70	20.87	20.72	20.54	20.32	19.46	17.44	15.26	13.85	13.03	12.97	13.29	13.12	12.26	XO
UZRFT6		17.79	20.53	21.17	21.32	21.10	20.97	20.68	19.76	17.77	15.56	14.11	13.34	13.21	13.58	13.28	12.45	XI
UZU9NR		17.08	20.01*	20.62*	20.83*	20.63*	20.50*	20.18*	19.33*	17.35*	15.19*	13.76*	13.00	12.84*	13.26	13.03	12.19	XH
VEBKGD		17.92	20.43	21.17	21.22	20.99	20.85	20.56	19.69	17.72	15.47	14.09	13.27	13.08	13.50	13.35	12.55	SH
VRWV74		17.90	20.56	21.16	21.35	21.13	20.94	20.63	19.73	17.82	15.51	14.08	13.27	13.09	13.37	13.21	12.43	AH
VTU727		17.73	20.36	21.05	21.20	20.97	20.85	20.54	19.64	17.66	15.45	13.99	13.22	13.07	13.47	13.26	12.38	MM
W9G626		17.95	20.68	21.28	21.53	21.30	21.14	20.79	19.92	17.93	15.67	14.20	13.40	13.21	13.53	13.40	12.53	AO
WG7TYT		17.54	20.46	21.06	21.23	21.05	20.90	20.56	19.70	17.71	15.49	14.04	13.26	13.10	13.48	13.13	12.33	XI
WG9LUF		17.59	20.25	20.91	21.02	20.84	20.73	20.40	19.48	17.43	15.24	13.83	13.04	12.93	13.33	13.14	12.32	XC
WHJBC7		18.02	20.53	21.26	21.45	21.23	21.12	20.86	19.99	17.99	15.69	14.26	13.44	13.24	13.70	13.50	12.62	CA
WHPFVP		18.09	20.51	21.12	21.37	21.08	20.96	20.64	19.77	17.72	15.55	14.08	13.30	13.14	13.56	13.34	12.50	GG
WHZNFA		17.69	20.41	21.12	21.25	21.09	20.95	20.63	19.73	17.78	15.59	14.10	13.33	13.18	13.53	13.34	12.47	MM
XFV9R4		17.78	20.38	21.02	21.19	21.00	20.88	20.53	19.70	17.71	15.52	14.09	13.30	13.15	13.52	13.25	12.42	XI
XJBLQ7		17.54	20.35	21.01	21.19	20.99	20.83	20.53	19.61	17.68	15.50	14.07	13.27	13.13	13.54	13.24	12.39	XH
YEEEMN		18.08	20.30	20.93	21.11	20.97	20.85	20.53	19.63	17.66	15.38	14.03	13.17	13.03	13.36	13.15	12.38	AS
Z6KNH8		17.83	20.29	20.99	21.13	20.98	20.83	20.50	19.64	17.71	15.44	14.04	13.21	13.07	13.38	13.12	12.22	AS
ZAYB86		17.56	20.28	20.91	21.15	20.95	20.80	20.48	19.61	17.67	15.42	13.98	13.23	13.10	13.43	13.19	12.38	XI
ZRYFGZ		17.57	20.50	21.09	21.29	21.07	20.94	20.63	19.74	17.75	15.52	14.07	13.28	13.04	13.48	13.28	12.31	AE

Summary Statistics

	400	420	440	460	480	500	520	540	560	580	600	620	640	660	680	700
Grand Means	17.84	20.42	21.08	21.24	21.05	20.90	20.60	19.71	17.73	15.50	14.06	13.26	13.11	13.49	13.26	12.41
SD Btwn Labs	0.42	0.20	0.20	0.19	0.19	0.19	0.19	0.18	0.18	0.14	0.14	0.15	0.13	0.14	0.15	0.15

Comments Assigned on Data Flags for Test #411

6M7PF6 (X) - High % reflectance data at all wavelengths.

BAKG6Y (X) - High and low % reflectance data at various wavelengths.

HDZG2T (X) - High % reflectance data at all wavelengths. Apparently measured back of the sample.

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
AS ACS-Datacolor 800 Series
CA Cary 5000
GD BYK-Gardner spectro-guide sphere
GG BYK-Gardner TCS II
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
MV Minolta CM-3000d Series 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
XZ X-Rite

WebCode	Data Flag	Sample G181 Lab Mean	Sample G181 Diff from Grand Mean	Sample G181 CPV	Sample G182 Lab Mean	Sample G182 Diff from Grand Mean	Sample G182 CPV	Instr Code
28AE3C		50.25	0.30	0.63	60.35	-0.16	-0.32	GL
2B73GX		50.55	0.60	1.26	60.40	-0.11	-0.22	GL
2CHHBY		50.28	0.33	0.69	60.60	0.09	0.17	GL
2E4LJW		49.73	-0.22	-0.47	60.13	-0.39	-0.75	GQ
2HQ2CC		49.58	-0.37	-0.79	60.23	-0.29	-0.56	GL
383RZN		50.00	0.05	0.11	60.18	-0.34	-0.65	GN
3MV7J3	X	47.45	-2.50	-5.27	56.98	-3.54	-6.84	XX
3PH4QT		49.85	-0.10	-0.21	60.53	0.01	0.02	GL
3TMBC8		49.73	-0.22	-0.47	60.35	-0.16	-0.32	GX
3YT3PB		49.73	-0.22	-0.47	59.80	-0.71	-1.38	GL
42VKYQ		49.28	-0.67	-1.42	60.00	-0.51	-0.99	GL
4MDUZN		49.83	-0.12	-0.26	60.60	0.09	0.17	GL
4NA2PV		49.46	-0.49	-1.03	60.24	-0.28	-0.53	GL
6BCNJV	X	47.53	-2.42	-5.11	57.33	-3.19	-6.17	RA
6BWAAZ		50.05	0.10	0.21	59.78	-0.74	-1.43	GK
6CAYEX		50.75	0.80	1.69	61.03	0.51	0.99	GN
6LTBTV		50.25	0.30	0.63	61.05	0.54	1.04	GK
7ECZEV		49.45	-0.50	-1.05	59.88	-0.64	-1.23	GL
7H9NRV		50.18	0.23	0.47	59.90	-0.61	-1.19	GL
8F4DGD		49.86	-0.09	-0.20	60.83	0.31	0.61	GL
8H3TLV		49.55	-0.40	-0.84	60.33	-0.19	-0.36	GK
8NU3VT	X	48.15	-1.80	-3.79	57.95	-2.56	-4.96	GK
9C3R62		50.50	0.55	1.16	61.18	0.66	1.28	GL
9DA4L3		48.93	-1.02	-2.16	59.70	-0.81	-1.57	GK
9UEKNV		50.53	0.58	1.21	61.03	0.51	0.99	GK
9WJ94K		49.85	-0.10	-0.21	60.48	-0.04	-0.07	GL
A8YFJL		49.03	-0.92	-1.95	60.30	-0.21	-0.41	GK
AKMCPP		49.53	-0.42	-0.90	60.50	-0.01	-0.03	GL
AMDJ82		50.28	0.33	0.69	60.70	0.19	0.36	GL
B8VBLN		50.40	0.45	0.95	61.30	0.79	1.52	GL

Interlaboratory Testing Program for Color & Appearance

Analysis 440

60 Degree Gloss - Paint Chips

ASTM Method D 523

WebCode	Data Flag	Sample G181 Lab Mean	Sample G181 Diff from Grand Mean	Sample G181 CPV	Sample G182 Lab Mean	Sample G182 Diff from Grand Mean	Sample G182 CPV	Instr Code
B8WX6M		49.70	-0.25	-0.53	60.25	-0.26	-0.51	GB
BXUMT7		49.95	0.00	0.00	60.63	0.11	0.22	GN
D3DPQL		49.93	-0.02	-0.05	59.75	-0.76	-1.48	GK
D9ZGXF		50.45	0.50	1.05	61.13	0.61	1.18	GL
DX69ED		50.05	0.10	0.21	60.63	0.11	0.22	GL
DXJUNE		49.75	-0.20	-0.42	59.93	-0.59	-1.14	RA
E9UMRE		49.83	-0.12	-0.26	60.50	-0.01	-0.03	GL
EAMKZL		49.13	-0.82	-1.74	59.43	-1.09	-2.10	GL
EL6ZBZ	X	50.88	0.93	1.95	62.28	1.76	3.41	MW
EM2B74		50.00	0.05	0.11	60.90	0.39	0.75	GL
F6BYQE		49.28	-0.67	-1.42	60.28	-0.24	-0.46	GL
FBFQZC	*	48.48	-1.47	-3.11	59.55	-0.96	-1.86	MW
FLXC3L		50.18	0.23	0.47	61.13	0.61	1.18	GL
G4XHDZ		48.83	-1.12	-2.37	59.93	-0.59	-1.14	GN
HDZG2T	X	51.68	1.73	3.64	61.45	0.94	1.81	GK
HMALEJ		50.38	0.43	0.90	60.40	-0.11	-0.22	MW
J8L4VD		49.88	-0.07	-0.16	60.63	0.11	0.22	GL
JPQD26		49.90	-0.05	-0.10	60.40	-0.11	-0.22	RA
JVW7TF		49.85	-0.10	-0.21	60.63	0.11	0.22	MH
KGVPME		49.78	-0.17	-0.37	60.00	-0.51	-0.99	GK
L299ML		50.53	0.58	1.21	60.80	0.29	0.55	GL
LQXGJL		50.33	0.38	0.79	61.00	0.49	0.94	GL
M9PZUY	X	48.75	-1.20	-2.53	58.20	-2.31	-4.47	GK
MHFHBT		50.00	0.05	0.11	60.43	-0.09	-0.17	PA
MJA8TN	X	52.08	2.13	4.48	62.23	1.71	3.31	GL
NZVAPH		50.23	0.28	0.58	60.98	0.46	0.89	GL
Q2XNBE		50.20	0.25	0.53	61.20	0.69	1.33	GN
Q3RDTA		49.75	-0.20	-0.42	60.55	0.04	0.07	GK
Q3VY7G		49.63	-0.32	-0.68	60.53	0.01	0.02	GL
Q6K9FH		50.05	0.10	0.21	59.93	-0.59	-1.14	GL

Interlaboratory Testing Program for Color & Appearance

Analysis 440

60 Degree Gloss - Paint Chips

ASTM Method D 523

WebCode	Data Flag	Sample G181 Lab Mean	Sample G181 Diff from Grand Mean	Sample G181 CPV	Sample G182 Lab Mean	Sample G182 Diff from Grand Mean	Sample G182 CPV	Instr Code
QYRBJE		50.43	0.48	1.00	60.38	-0.14	-0.27	GL
R9C48G		50.12	0.17	0.35	60.63	0.12	0.23	GL
RE2JY9		50.37	0.42	0.89	60.74	0.23	0.44	GL
RKRPX6		49.50	-0.45	-0.95	60.13	-0.39	-0.75	GL
TEVHUM	X	47.55	-2.40	-5.06	58.10	-2.41	-4.67	GL
TQQVRX	X	51.00	1.05	2.21	60.00	-0.51	-0.99	GL
UTB6E4	*	50.48	0.53	1.11	61.78	1.26	2.44	GN
UTRZ2C		50.13	0.18	0.37	60.83	0.31	0.60	XX
UWXJ8K		50.45	0.50	1.05	60.15	-0.36	-0.70	GN
UZRFT6		50.33	0.38	0.79	60.80	0.29	0.55	GL
X3QWD6		50.38	0.43	0.90	60.53	0.01	0.02	GN
X9VPP9		50.43	0.48	1.00	61.10	0.59	1.13	GK
XCWWRX	X	76.58	26.63	56.11	60.80	0.29	0.55	GK
XJBLQ7		49.90	-0.05	-0.10	60.80	0.29	0.55	GK
YJ8KY6		50.05	0.10	0.21	61.50	0.99	1.91	GN
Z6ANLC		49.35	-0.60	-1.26	59.70	-0.81	-1.57	GN
Z6MDL4	*	50.98	1.03	2.16	61.83	1.31	2.54	GN
ZHVYA4		50.51	0.56	1.18	61.40	0.89	1.71	GK
ZRYFGZ		49.83	-0.12	-0.26	60.38	-0.14	-0.27	GL

Summary Statistics

	Sample G181	Sample G182
Grand Means	49.95 Gloss Units	60.51 Gloss Units
Stnd Dev Btwn Labs	0.47 Gloss Units	0.52 Gloss Units

Statistics based on 69 of 79 reporting participants

Comments on Assigned Data Flags for Test #440

3MV7J3(X) - Data for both samples are low. Possible systematic error.

6BCNJV(X) - Data for both samples are low. Possible systematic error.

8NU3VT(X) - Data for both samples are low. Possible systematic error.

EL6ZBZ(X) - High data for Sample G182.

HDZG2T(X) - High data for Sample G181.

M9PZUY(X) - Low data for Sample G182.

MJA8TN(X) - Data for both samples are high. Possible systematic error.

TEVHUM(X) - Data for both samples are low. Possible systematic error. Inconsistent within the determinations for Sample G181.

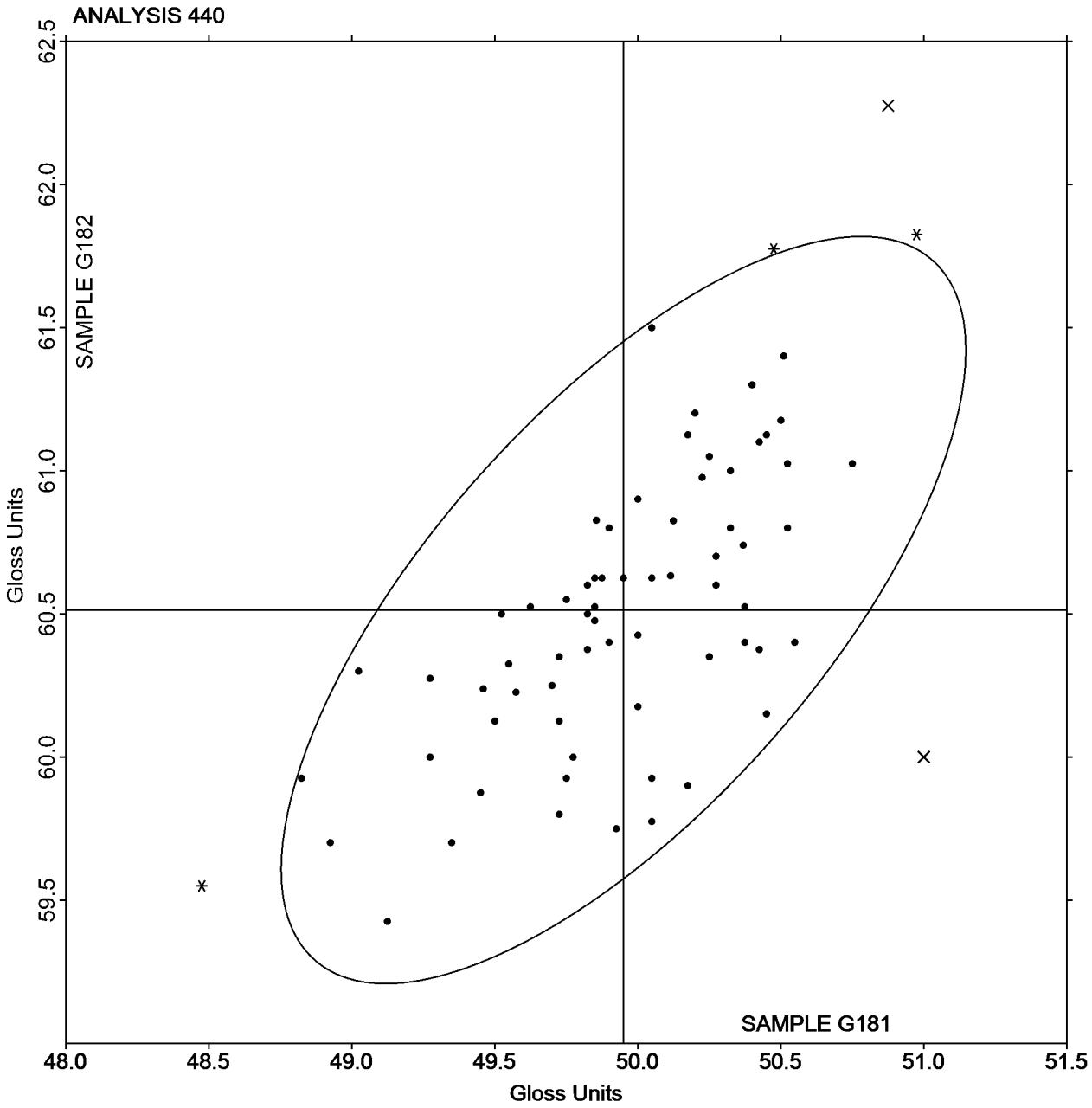
TQQVRX(X) - Inconsistent in testing between samples and inconsistent within the determinations for Sample G182.

XCWWRX(X) - Inconsistent in testing between samples, extreme data for Sample G181.

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
PA	Photovolt micto-TRI-gloss G3	RA	Rhopoint Novo-Gloss Glossmeter
XX	Instrument make/model not specified by lab		

SAMPLE G181 = 49.95 Gloss Units SAMPLE G182 = 60.51 Gloss Units



Interlaboratory Testing Program for Color & Appearance

Report #185
3rd Qtr 2018

Analysis 442

85 Degree Gloss - Paint Chips

ASTM Method D 523

WebCode	Data Flag	Sample L181 Lab Mean	Sample L181 Diff from Grand Mean	Sample L181 CPV	Sample L182 Lab Mean	Sample L182 Diff from Grand Mean	Sample L182 CPV	Instr Code
2CHHBY		10.00	0.11	0.49	13.10	-0.51	-1.84	GL
4NA2PV		9.96	0.07	0.32	13.66	0.05	0.18	GL
9C3R62		9.88	-0.01	-0.06	13.65	0.04	0.15	GN
FLXC3L		9.90	0.01	0.05	13.83	0.22	0.78	GL
G4XHDZ		9.55	-0.34	-1.48	13.53	-0.08	-0.30	GN
Q6K9FH		9.68	-0.21	-0.93	13.53	-0.08	-0.30	GL
RE2JY9		10.26	0.37	1.61	13.98	0.37	1.34	GL
UTRZ2C	X	5.83	-4.06	-17.75	7.85	-5.76	-20.76	XX

Summary Statistics

Grand Means

9.89 Gloss Units — 13.61 Gloss Units

Stnd Dev Btwn Labs

0.23 Gloss Units — 0.28 Gloss Units

Statistics based on 7 of 8 reporting participants

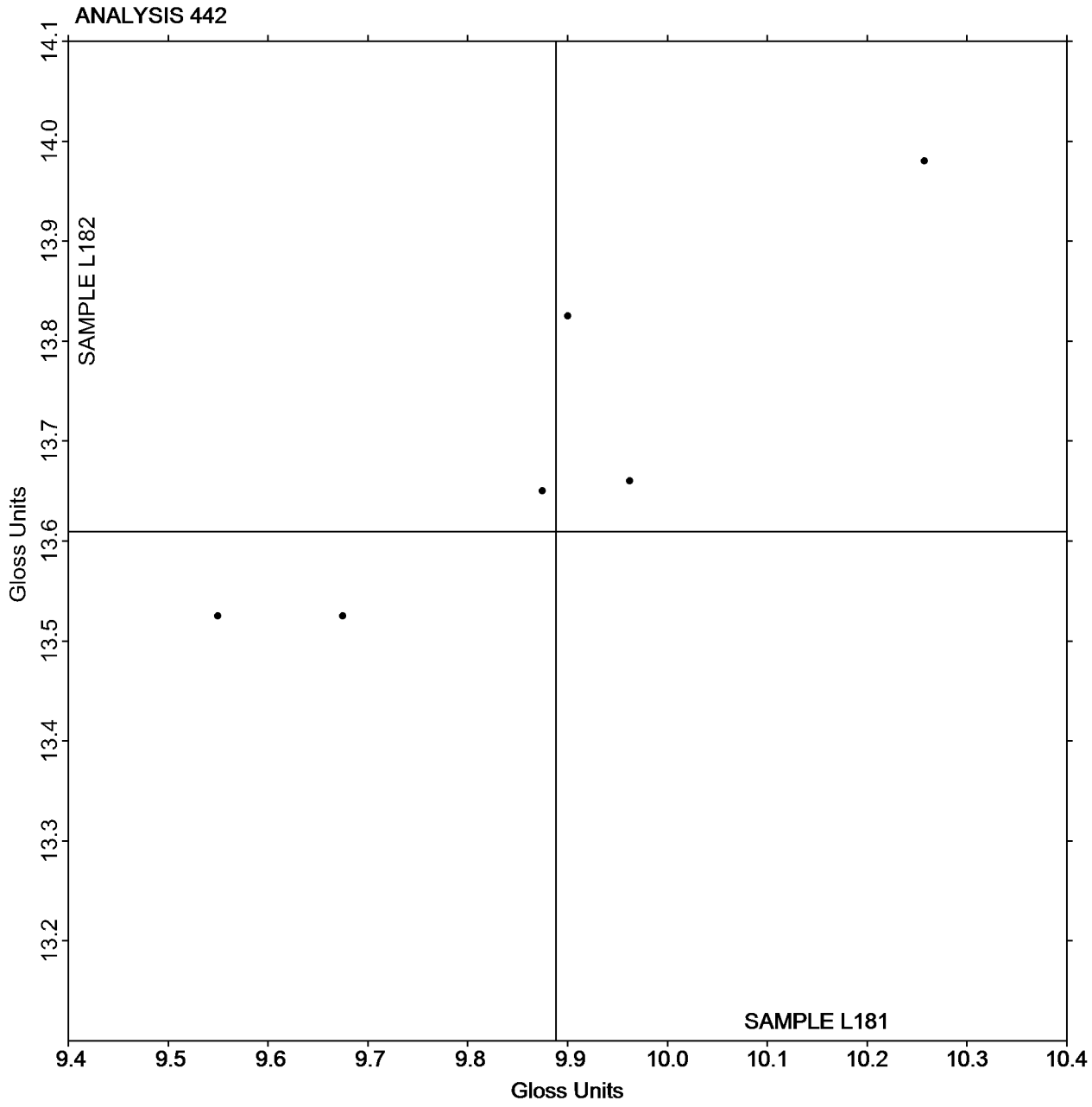
Comments on Assigned Data Flags for Test #442

UTRZ2C(X) - Extreme data for both samples.

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 L181 = 9.89 Gloss Units SAMPLE L182 = 13.61 Gloss Units



-End of Report-