Collaborative Testing Services, Inc.

Color & Appearance Testing Program

Summary Report #181 - 3rd Qtr 2017

About The Color & Appearance Program

The Collaborative Reference Program for Color & Appearance is operated and maintained by Collaborative Testing Services, Inc. (CTS), with technical guidance and advice provided by representatives from various instrument manufacturers. The program allows laboratories to compare periodically the performance of their testing with that of other laboratories.

Paint chip samples, which have been custom-made specifically for Collaborative Testing Services by Munsell Color, X-Rite Inc., Grand Rapids, MI, are distributed four times per year to participating laboratories. Gloss participants test two pairs of paint chip samples at different gloss levels, approximately 5-10 units apart. Color & Color Difference participants measure a set of two opaque color paint chips, selected from throughout the full color spectrum, consisting of a nonmetameric match with small color differences. These data are analyzed in two separate tables based on the conditions of measurement used. Laboratories that also participate in the Spectrophotometric analyses measure one of the opaque color chips for % reflectance at 16 wavelengths.

Please refer to each test's 'Key' for definitions of terms used in the tables and graphs and guidelines to interpreting the results. Also shown are notes concerning specific laboratory results, as well as significant findings related to instrument types or other testing variations.

ABOUT CTS

Founded in 1971, CTS is a privately-owned company that specializes in interlaboratory tests for a wide variety of industries, including rubber, plastics, fasteners and metals, containerboard, paper, color, and wine as well as proficiency tests for forensic laboratories. All of the tests are designed to assist organizations in achieving and maintaining quality control objectives. Labs from the U.S., as well as more than 80 countries, currently participate in the CTS programs.

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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
288T8W		C171	55.22	-15.09	-8.57	0.86	0.03	-0.04	0.86	MQ
		C172	56.08	-15.06	-8.61					
2JKPU9		C171	55.29	-15.01	-8.35	0.98	-0.02	-0.09	0.98	XZ
		C172	56.27	-15.03	-8.44					
3T6HJA		C171	55.39	-14.91	-8.59	1.10	-0.01	-0.09	1.10	XO
		C172	56.49	-14.91	-8.68					
6TF2GC		C171	55.78	-14.92	-8.77	1.17	0.09	-0.05	1.17	MU
		C172	56.94	-14.83	-8.82					
9FH7N2		C171	55.49	-14.66	-9.16	1.00	0.03	-0.07	1.00	HW
		C172	56.49	-14.64	-9.23					
ABK4ZR		C171	55.47	-14.83	-8.88	1.04	0.00	-0.08	1.04	HW
		C172	56.51	-14.83	-8.96					
AH4AWY		C171	54.85	-14.95	-8.52	1.18	0.05	-0.08	1.18	HY
		C172	56.03	-14.90	-8.59					
AJDCKH		C171	55.49	-14.66	-8.71	0.92	-0.04	-0.11	0.92	XK
		C172	56.41	-14.70	-8.82					
AKLME2		C171	55.57	-15.09	-8.53	0.98	0.07	-0.06	0.98	MU
		C172	56.54	-15.02	-8.59					
CAZ8KX		C171	55.24	-14.65	-8.94	1.02	-0.01	-0.09	1.02	HW
		C172	56.26	-14.66	-9.03					
CNJPFM	X	C171	55.42	-15.56	-8.51	1.00	0.06	-0.03	1.00	FA
		C172	56.42	-15.50	-8.54					
CPCL3V		C171	55.37	-14.91	-8.26	1.08	0.04	-0.09	1.08	GH
		C172	56.44	-14.87	-8.35					
CPPA3M		C171	55.48	-14.87	-8.86	1.01	-0.04	-0.14	1.01	TO
		C172	56.49	-14.91	-8.99					
DDFUWG		C171	54.94	-14.92	-8.59	1.06	-0.04	-0.06	1.06	HY
		C172	55.99	-14.96	-8.65					
EN78AJ		C171	55.55	-15.01	-8.61	1.02	-0.03	-0.09	1.02	XZ
		C172	56.57	-15.04	-8.70					
FP3ZN3		C171	55.61	-15.24	-8.55	1.08	0.08	-0.13	1.09	XZ
		C172	56.69	-15.16	-8.68					

			CIE L* a* b* Color Values			Color Difference Values				
WebCode	Flag	Samples	L*	a*	b*	ΔL*	Δa*	Δb*	ΔE*	InstrCode
G2NRNW		C171	55.32	-14.93	-8.49	1.04	0.01	-0.08	1.04	XU
		C172	56.36	-14.92	-8.57					
G4CBKN		C171	55.65	-14.75	-9.07	1.03	0.09	-0.05	1.03	HW
		C172	56.67	-14.66	-9.12					
GPGKBK		C171	55.22	-14.95	-8.62	1.24	0.12	-0.16	1.25	XN
		C172	56.46	-14.83	-8.77					
HZBMLT		C171	56.09	-14.94	-8.51	1.02	0.04	-0.07	1.02	XE
		C172	57.11	-14.90	-8.57					
JHQVK8		C171	55.49	-15.09	-8.23	1.23	0.10	-0.07	1.23	GE
		C172	56.72	-14.99	-8.30					
JT4FGA		C171	55.44	-14.97	-8.50	1.18	-0.01	-0.06	1.18	XU
		C172	56.62	-14.98	-8.56					
K3TJ7N		C171	55.85	-15.00	-8.39	0.92	0.00	-0.05	0.92	GH
		C172	56.77	-15.00	-8.44					
K6E8KA		C171	55.33	-14.97	-8.48	1.04	-0.01	-0.08	1.04	XM
		C172	56.37	-14.98	-8.56					
L7LPJ6	X	C171	54.75	55.98	53.65	0.62	1.11	1.11	1.68	MA
		C172	55.37	57.09	54.76					
LXDBHN		C171	55.26	-15.01	-8.38	0.97	0.00	-0.08	0.97	XU
		C172	56.22	-15.01	-8.46					
MEEG44		C171	55.14	-14.79	-8.96	1.14	0.07	-0.11	1.14	HW
		C172	56.28	-14.72	-9.07					
N2QUFN		C171	55.22	-14.87	-8.47	1.10	-0.06	-0.09	1.10	XR
		C172	56.31	-14.93	-8.55					
NJ773M	X	C171	88.01	-1.43	0.78	0.00	0.00	0.00	0.00	XZ
		C172	88.01	-1.43	0.78					
PDRVKC		C171	55.36	-14.71	-8.95	1.12	-0.01	-0.08	1.12	HW
		C172	56.47	-14.72	-9.02					
PWAMRN		C171	55.29	-14.61	-9.01	0.94	-0.06	-0.04	0.94	HW
		C172	56.23	-14.67	-9.05					
Q6K9FH		C171	55.03	-14.67	-9.12	0.97	0.02	-0.05	0.97	MG
		C172	56.00	-14.65	-9.17					

			CIE L* a* b* Color Values			Color Difference Values				
WebCode	Flag	Samples	L*	a*	b*	ΔL*	Δa*	Δb*	ΔE*	InstrCode
QBKWPA	X	C171	95.53	0.36	0.68	-0.01	-0.01	0.04	0.04	NH
		C172	95.52	0.36	0.71					
QDPK4Z		C171	55.40	-14.92	-8.36	1.02	-0.04	-0.06	1.02	GE
		C172	56.42	-14.96	-8.42					
R4HZPB		C171	55.45	-14.95	-8.47	1.03	0.11	-0.04	1.03	XU
		C172	56.48	-14.84	-8.51					
RF9WFB	X	C171	57.98	-14.14	-7.37	0.93	0.01	-0.09	0.93	FA
		C172	58.90	-14.14	-7.45					
T7MUXF		C171	55.70	-14.80	-9.09	0.93	-0.03	-0.04	0.93	HW
		C172	56.63	-14.83	-9.13					
TZDW42		C171	55.42	-14.83	-9.08	0.98	0.04	-0.06	0.98	HW
		C172	56.40	-14.79	-9.14					
XWZPRB		C171	55.69	-14.93	-8.69	1.16	0.04	-0.12	1.17	XO
		C172	56.85	-14.89	-8.81					
YBUKN2		C171	55.36	-14.97	-8.20	1.06	-0.01	-0.09	1.06	GB
		C172	56.41	-14.98	-8.28					
YY36FT		C171	55.23	-14.66	-8.71	1.03	-0.10	-0.10	1.03	HK
		C172	56.25	-14.76	-8.81					
ZBR2HQ		C171	55.56	-14.85	-8.44	1.05	-0.05	-0.08	1.05	XD
		C172	56.61	-14.90	-8.52					

Summary Statistics

Samples	L*	a*	b*	ΔL*	Δa*	Δb*	ΔE*
Grand Means							
C171	55.41	-14.89	-8.65	1.04	0.01	-0.08	1.05
C172	56.45	-14.87	-8.72				
Stnd Dev Btwn Labs							
C171	0.24	0.14	0.27	0.09	0.05	0.03	0.09
C172	0.25	0.13	0.27				

Statistics based on 37 of 42 reporting participants

Comments Assigned on Data Flags for Test #408

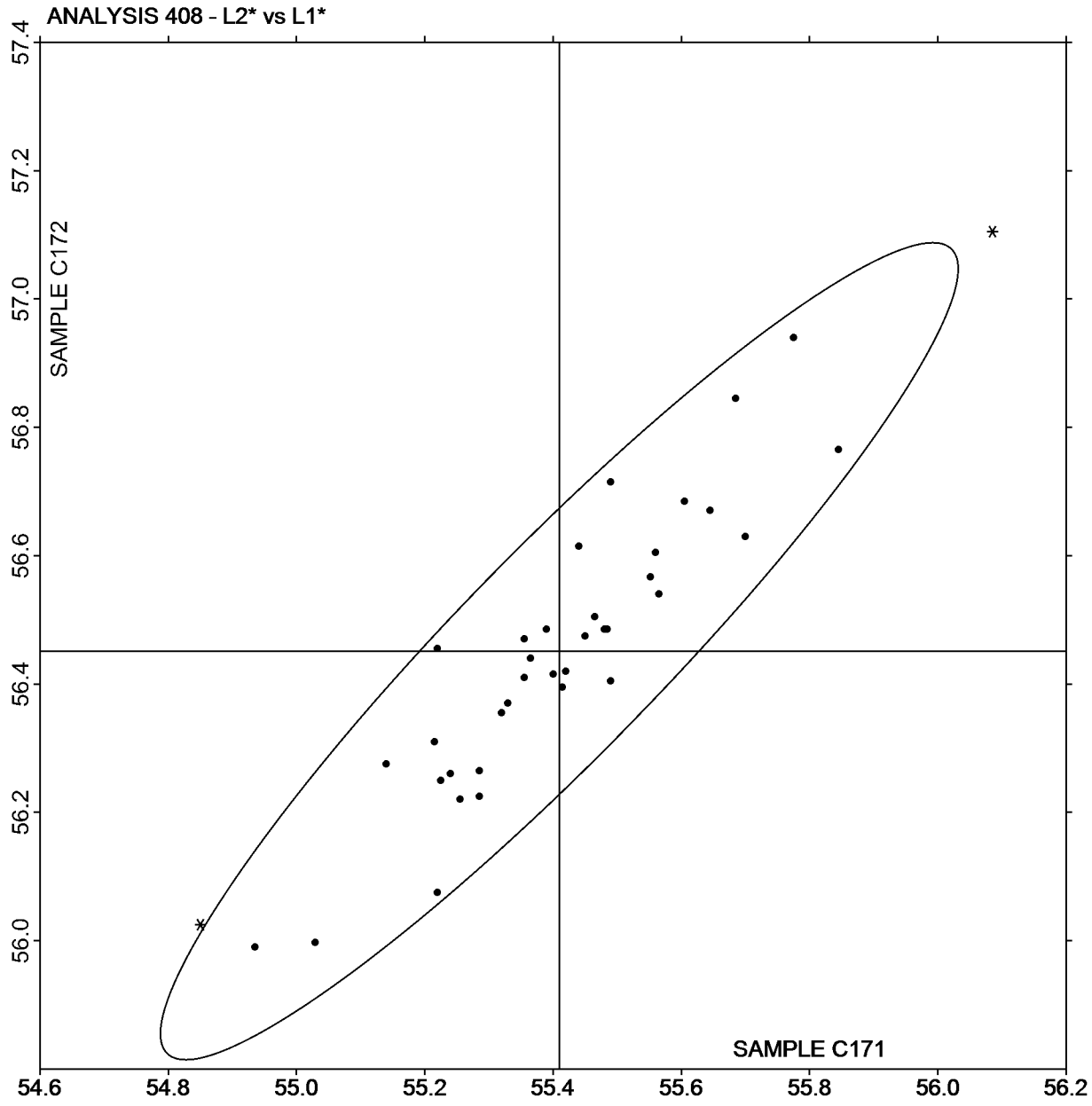
CNJPFM(X) - Low "a*" values.
L7LPJ6(X) - Extreme data.
NJ773M(X) - Apparently measured back of the samples.
QBKWPA(X) - Apparently measured back of the samples.
RF9WFB(X) - All values are high.

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	MQ	Minolta CM-503c Spectrophotometer
MU	Minolta	NH	3nh Precision Colorimeter
TO	Topcon SR-3 Spectroradiometer	XD	X-Rite 500 Series SpectroDensitometer
XE	X-Rite eXact Portable Spectrophotometer	XK	X-Rite MA100 Multi-Angle Spectrophotometer
XM	X-Rite MA58 Multi-Angle Spectrophotometer	XN	X-Rite MA68 Multi-Angle Spectrophotometer
XO	X-Rite MA68 II Multi-Angle Spectrophotometer	XR	X-Rite 968 Portable Spectrophotometer
XU	X-Rite 964 Portable Spectrophotometer	XZ	X-Rite

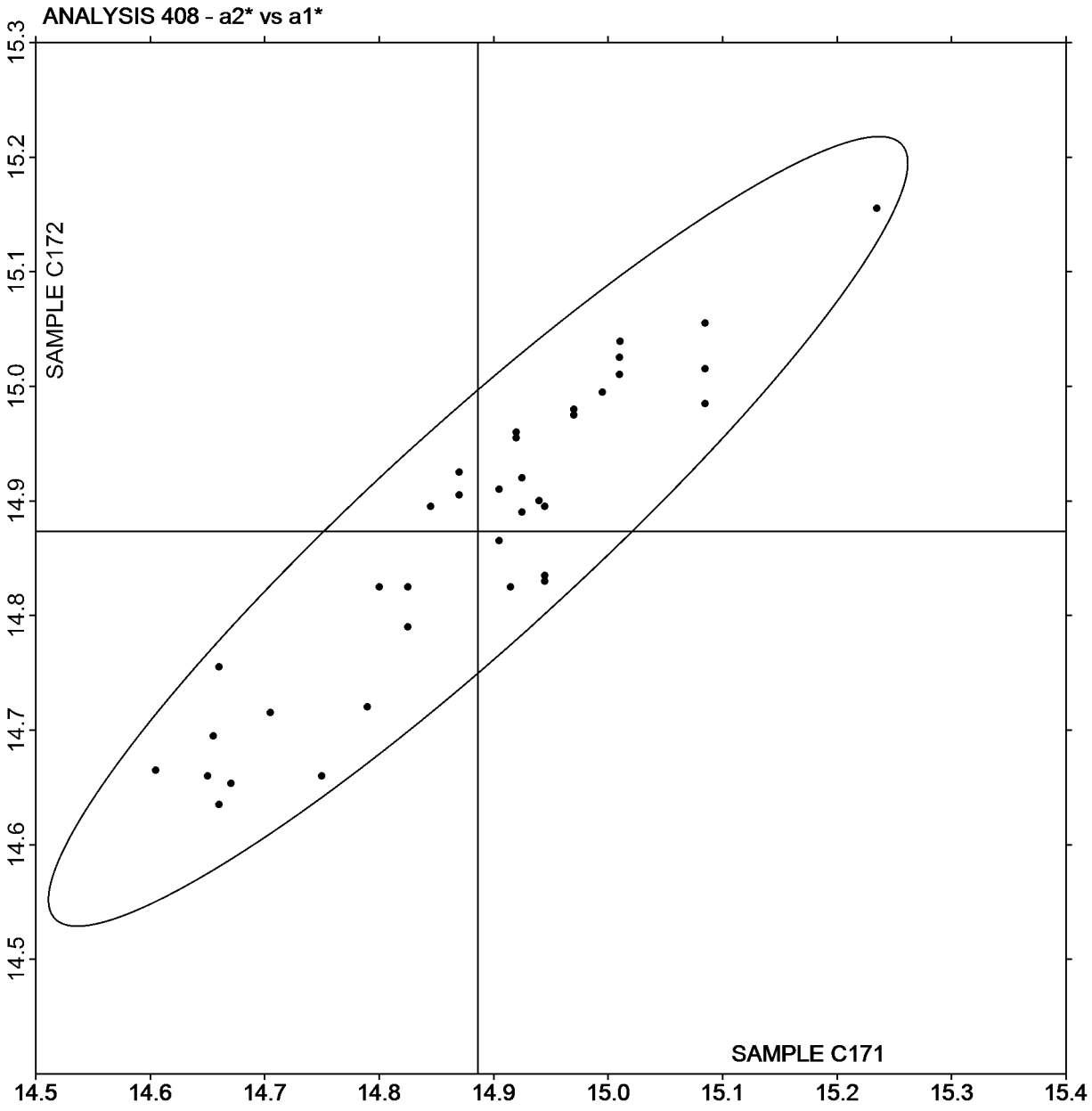
L2* vs L1*

SAMPLE C171 = 55.41 SAMPLE C172 = 56.45



a2* vs a1*

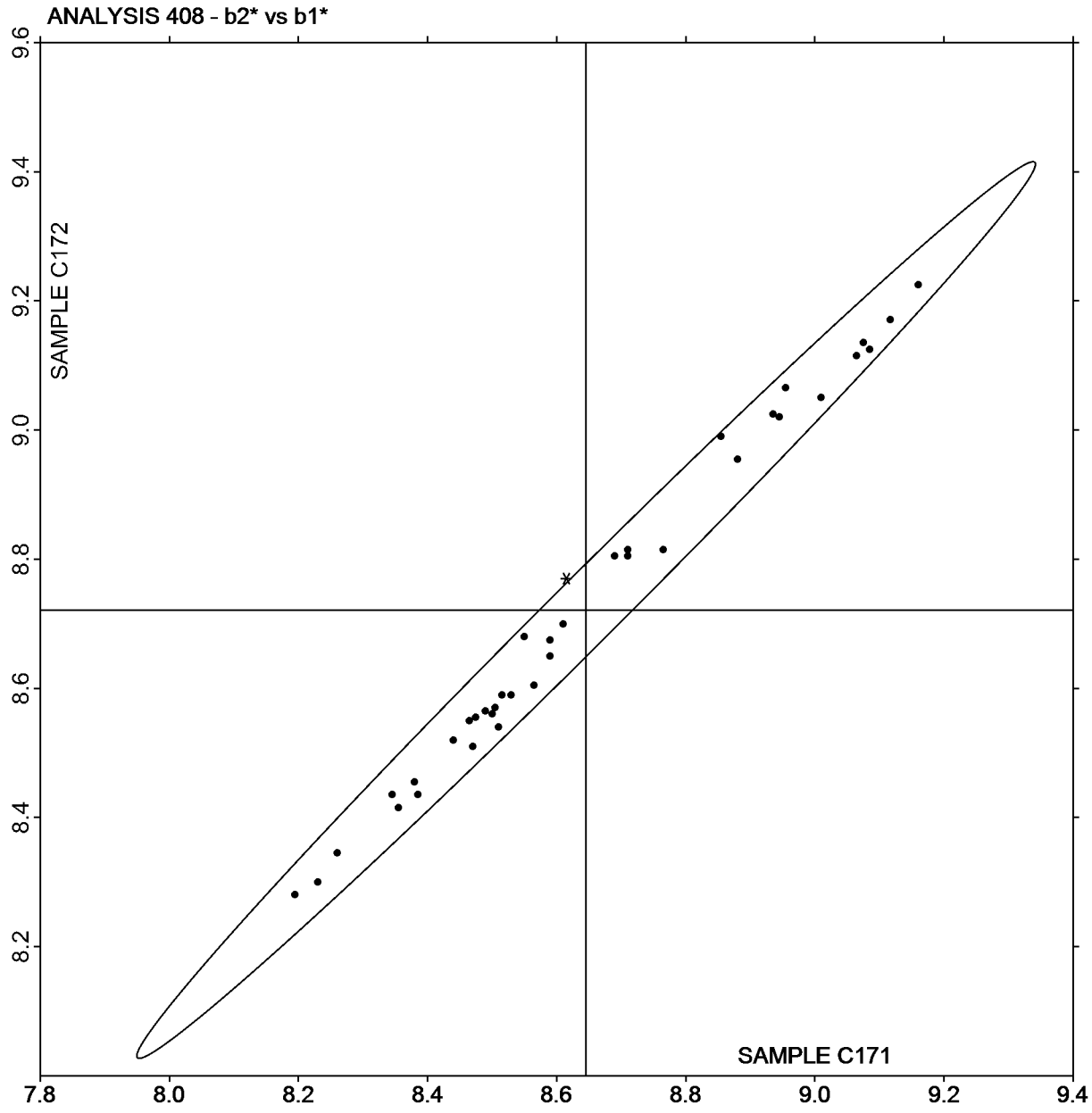
SAMPLE C171 = -14.89 SAMPLE C172 = -14.87



Plot created using absolute values.

b2* vs b1*

SAMPLE C171 = -8.65 SAMPLE C172 = -8.72



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
24PCDR		C171	56.02	-14.92	-8.76	0.90	0.05	-0.03	0.90	AJ
		C172	56.92	-14.88	-8.79					
26YJEY		C171	55.90	-14.81	-8.87	1.05	0.01	-0.09	1.05	AQ
		C172	56.95	-14.80	-8.95					
29L2UY		C171	55.59	-14.78	-8.64	0.98	-0.05	-0.09	0.98	XH
		C172	56.57	-14.83	-8.72					
29YRKU		C171	56.06	-14.91	-8.77	0.96	0.00	-0.04	0.96	AJ
		C172	57.02	-14.91	-8.81					
2DTLHV		C171	55.69	-14.93	-8.62	0.99	0.11	-0.08	1.00	MU
		C172	56.68	-14.83	-8.69					
2FZ4GR		C171	55.79	-14.74	-8.64	1.03	-0.08	-0.09	1.03	XI
		C172	56.82	-14.81	-8.72					
32JBQY		C171	55.61	-14.78	-8.73	1.13	0.00	-0.11	1.14	XI
		C172	56.74	-14.78	-8.84					
3D93FA		C171	55.49	-15.03	-8.56	1.00	0.04	-0.09	1.00	GD
		C172	56.48	-14.99	-8.65					
3HL9PN		C171	55.98	-14.89	-8.75	0.99	0.08	-0.05	0.99	AJ
		C172	56.97	-14.82	-8.80					
3QYYD2	X	C171	55.32	-14.40	-9.78	1.00	0.10	-0.02	1.00	MU
		C172	56.32	-14.30	-9.80					
3T6HJA		C171	55.50	-14.84	-8.78	1.09	0.06	-0.09	1.09	MI
		C172	56.59	-14.79	-8.87					
3W37R4		C171	55.65	-14.65	-8.71	1.00	-0.02	-0.02	1.00	SH
		C172	56.64	-14.66	-8.73					
6QLH8X		C171	55.59	-14.60	-8.63	1.00	-0.04	-0.06	1.00	AO
		C172	56.59	-14.64	-8.69					
762ZER		C171	55.48	-14.82	-8.66	1.05	0.05	-0.08	1.05	MI
		C172	56.53	-14.77	-8.74					
79MJJW		C171	56.01	-14.88	-8.66	1.01	0.01	-0.04	1.01	AQ
		C172	57.02	-14.87	-8.70					
7DYME6		C171	55.91	-14.73	-8.67	0.96	0.05	-0.11	0.97	HF
		C172	56.87	-14.68	-8.78					

			CIE L* a* b* Color Values			Color Difference Values				
WebCode	Flag	Samples	L*	a*	b*	ΔL*	Δa*	Δb*	ΔE*	InstrCode
82Z739		C171	55.92	-14.84	-8.73	0.95	-0.04	-0.04	0.95	MV
		C172	56.87	-14.87	-8.77					
89HHFA		C171	55.91	-14.77	-8.75	1.06	0.05	-0.08	1.06	AJ
		C172	56.97	-14.72	-8.82					
92EZCG		C171	55.57	-14.73	-8.68	1.11	-0.05	-0.05	1.11	XO
		C172	56.68	-14.77	-8.73					
9QJKVT		C171	55.95	-14.83	-8.73	1.08	-0.01	-0.07	1.08	AS
		C172	57.03	-14.83	-8.80					
AH4AWY		C171	55.80	-14.80	-8.70	1.15	0.03	-0.09	1.15	HP
		C172	56.95	-14.77	-8.79					
AJDCKH		C171	55.95	-14.93	-8.78	1.06	-0.01	-0.08	1.06	AO
		C172	57.01	-14.94	-8.86					
ALG84L		C171	55.62	-14.62	-8.75	0.96	0.01	-0.03	0.96	XM
		C172	56.57	-14.61	-8.78					
B4C3EN		C171	55.58	-14.75	-8.71	0.96	0.01	-0.04	0.96	XI
		C172	56.54	-14.74	-8.75					
BKL28R		C171	55.26	-14.77	-8.70	1.13	0.07	-0.11	1.14	XH
		C172	56.39	-14.70	-8.81					
C7JR2X		C171	55.99	-14.77	-8.82	1.03	-0.02	0.00	1.03	XZ
		C172	57.02	-14.79	-8.82					
CPPA3M	X	C171	62.33	-10.90	-6.05	0.75	-0.03	-0.08	0.75	CA
		C172	63.07	-10.93	-6.13					
CW9FZT		C171	55.42	-14.75	-8.58	1.02	0.03	-0.10	1.02	XH
		C172	56.44	-14.72	-8.67					
CYD4EJ		C171	56.00	-14.85	-8.60	1.05	0.05	-0.07	1.05	AJ
		C172	57.05	-14.80	-8.67					
CYHHQY		C171	55.95	-14.92	-8.64	1.05	0.13	-0.10	1.06	AJ
		C172	57.00	-14.80	-8.73					
DAE4CN		C171	55.58	-14.84	-8.71	1.08	0.05	-0.08	1.08	XH
		C172	56.66	-14.80	-8.78					
DRBDBJ		C171	55.61	-14.61	-8.77	1.04	-0.02	-0.05	1.04	XO
		C172	56.65	-14.63	-8.81					

			CIE L* a* b* Color Values			Color Difference Values				
WebCode	Flag	Samples	L*	a*	b*	ΔL*	Δa*	Δb*	ΔE*	InstrCode
E6D8HM		C171	55.15	-14.78	-8.94	1.12	0.06	-0.07	1.12	XZ
		C172	56.27	-14.72	-9.00					
EGEMCX		C171	55.83	-14.87	-8.87	0.97	0.01	-0.05	0.97	XI
		C172	56.80	-14.87	-8.92					
EJGNCV		C171	55.97	-14.86	-8.85	1.09	-0.01	-0.05	1.09	AQ
		C172	57.06	-14.87	-8.89					
EXYEBW		C171	55.68	-14.71	-8.52	1.17	-0.01	-0.12	1.17	XI
		C172	56.84	-14.71	-8.64					
F2CK4P	X	C171	55.92	-14.77	-8.73	0.04	-0.02	-0.05	0.07	AJ
		C172	55.96	-14.79	-8.78					
F8HAP4		C171	55.93	-14.89	-8.80	1.09	0.04	-0.09	1.09	AO
		C172	57.02	-14.86	-8.89					
FKQZLJ		C171	55.88	-14.77	-8.97	1.01	0.01	-0.07	1.01	AM
		C172	56.89	-14.76	-9.03					
FPFEAQ		C171	55.79	-14.82	-8.54	0.92	-0.01	-0.05	0.92	MM
		C172	56.71	-14.83	-8.59					
FVNX9J		C171	55.98	-15.05	-8.93	0.97	0.13	-0.06	0.98	PE
		C172	56.95	-14.92	-8.99					
FZHUXA		C171	55.85	-14.90	-8.68	1.12	0.05	-0.07	1.12	AJ
		C172	56.97	-14.85	-8.75					
G2NRNW		C171	55.62	-14.84	-8.62	1.03	0.01	-0.08	1.03	XI
		C172	56.64	-14.83	-8.69					
G986HP		C171	56.04	-14.75	-8.61	1.01	0.06	-0.10	1.01	XI
		C172	57.05	-14.69	-8.70					
GGLMLX	X	C171	55.38	-14.67	-9.08	0.99	-0.05	-0.07	0.99	XM
		C172	56.37	-14.71	-9.14					
GPGKBK	X	C171	54.85	-15.06	-8.81	1.16	0.10	-0.09	1.16	XO
		C172	56.00	-14.96	-8.90					
GR4BCP		C171	55.62	-14.72	-8.62	1.04	0.02	-0.07	1.04	XH
		C172	56.65	-14.70	-8.69					
GVLR8F		C171	56.00	-14.92	-8.65	0.96	0.04	-0.07	0.96	AS
		C172	56.96	-14.88	-8.72					

			CIE L* a* b* Color Values			Color Difference Values				
WebCode	Flag	Samples	L*	a*	b*	ΔL*	Δa*	Δb*	ΔE*	InstrCode
HK3BGU		C171	55.85	-14.80	-8.76	0.91	-0.12	-0.05	0.91	PE
		C172	56.75	-14.92	-8.80					
HVHHWU		C171	55.75	-14.73	-8.66	0.94	-0.03	-0.07	0.94	MM
		C172	56.69	-14.76	-8.72					
J4MUKC		C171	55.67	-14.85	-8.91	1.04	0.01	-0.07	1.04	XC
		C172	56.71	-14.85	-8.98					
J6GKQQ		C171	55.64	-14.76	-8.68	1.15	0.06	-0.09	1.16	XZ
		C172	56.79	-14.70	-8.77					
JAWTEP		C171	55.97	-14.92	-8.77	1.00	0.02	-0.08	1.00	AS
		C172	56.97	-14.90	-8.85					
JJKYVU		C171	55.78	-14.70	-8.66	0.98	-0.06	-0.07	0.98	MM
		C172	56.75	-14.76	-8.73					
JQ2DXZ		C171	55.89	-14.87	-8.75	1.05	0.07	-0.07	1.05	MV
		C172	56.93	-14.81	-8.82					
JT4FGA		C171	55.66	-14.77	-8.73	1.06	0.01	-0.06	1.06	MM
		C172	56.72	-14.76	-8.79					
K3TJ7N		C171	55.86	-14.92	-8.61	1.02	0.03	-0.07	1.02	MV
		C172	56.88	-14.89	-8.68					
KBP7EM		C171	55.59	-14.80	-8.59	1.08	-0.05	-0.16	1.09	MS
		C172	56.67	-14.85	-8.75					
KY8LWC		C171	56.01	-14.87	-8.73	0.93	-0.04	-0.05	0.93	AS
		C172	56.93	-14.91	-8.77					
L7LPJ6	X	C171	54.75	55.98	53.65	0.62	1.11	1.11	1.68	MM
		C172	55.37	57.09	54.76					
LL2T3E		C171	55.90	-14.81	-8.63	1.13	0.01	-0.08	1.13	MM
		C172	57.03	-14.80	-8.71					
LLHY9W		C171	55.45	-14.88	-8.67	1.14	0.12	-0.08	1.15	XH
		C172	56.59	-14.77	-8.74					
LXDBHN		C171	55.53	-14.69	-8.76	1.06	0.04	-0.08	1.06	XI
		C172	56.59	-14.65	-8.83					
LZYYWA		C171	55.53	-14.77	-8.80	1.05	-0.02	-0.11	1.06	XI
		C172	56.58	-14.78	-8.90					

			CIE L* a* b* Color Values			Color Difference Values				
WebCode	Flag	Samples	L*	a*	b*	ΔL*	Δa*	Δb*	ΔE*	InstrCode
MPV4D6		C171	55.56	-14.75	-8.66	1.14	0.06	-0.09	1.14	AJ
		C172	56.70	-14.69	-8.74					
MTBRUV		C171	55.72	-14.89	-8.67	1.12	0.10	-0.10	1.13	MK
		C172	56.84	-14.79	-8.77					
N7CRXJ		C171	55.53	-14.88	-8.67	1.10	0.05	-0.11	1.11	XI
		C172	56.63	-14.83	-8.77					
NAXC79		C171	55.78	-14.76	-8.72	0.90	-0.02	-0.04	0.90	XI
		C172	56.68	-14.78	-8.76					
NBENRK		C171	56.09	-14.84	-8.67	0.97	-0.02	-0.09	0.97	AJ
		C172	57.06	-14.86	-8.75					
NKHNJ8		C171	55.42	-14.73	-8.55	1.17	0.09	-0.10	1.17	XH
		C172	56.59	-14.64	-8.65					
NM86GL		C171	55.95	-14.99	-8.78	0.94	-0.01	-0.06	0.94	XB
		C172	56.89	-14.99	-8.84					
NTUXTL		C171	55.57	-14.77	-8.69	1.05	0.01	-0.08	1.05	XH
		C172	56.62	-14.76	-8.77					
NVWV2T		C171	55.96	-14.89	-8.65	1.00	0.01	-0.07	1.00	AL
		C172	56.96	-14.89	-8.72					
NXKEZ6		C171	55.85	-14.83	-8.77	1.04	-0.04	-0.08	1.04	XB
		C172	56.89	-14.87	-8.85					
P623JD		C171	55.87	-15.08	-8.67	1.16	0.12	-0.12	1.17	AJ
		C172	57.03	-14.96	-8.79					
P7XF4L		C171	56.04	-14.79	-8.74	1.11	-0.01	-0.09	1.11	AO
		C172	57.15	-14.80	-8.82					
PQGRLB		C171	55.84	-14.86	-8.87	1.12	0.02	-0.10	1.12	AR
		C172	56.95	-14.84	-8.97					
Q86FDK		C171	56.03	-14.84	-8.63	0.96	-0.02	-0.10	0.97	AM
		C172	56.99	-14.85	-8.73					
Q8KEVN		C171	55.93	-14.83	-8.75	1.14	0.01	-0.08	1.14	AJ
		C172	57.07	-14.83	-8.83					
QDPK4Z	X	C171	55.47	-15.04	-8.50	1.05	-0.05	-0.07	1.05	GD
		C172	56.52	-15.09	-8.56					

			CIE L* a* b* Color Values			Color Difference Values				
WebCode	Flag	Samples	L*	a*	b*	ΔL*	Δa*	Δb*	ΔE*	InstrCode
QNV8G7		C171	55.97	-14.88	-8.80	0.97	0.01	-0.05	0.97	AO
		C172	56.94	-14.87	-8.85					
QRTNRF		C171	55.88	-14.85	-8.73	1.04	0.11	-0.08	1.05	MM
		C172	56.92	-14.74	-8.81					
QU2W3K		C171	56.07	-14.76	-8.68	1.01	-0.05	-0.06	1.01	AO
		C172	57.08	-14.81	-8.74					
QXVV94		C171	55.78	-14.88	-8.80	1.12	0.02	-0.10	1.12	AQ
		C172	56.89	-14.87	-8.90					
R4HZPB		C171	55.58	-14.91	-8.84	1.04	0.14	-0.04	1.05	XI
		C172	56.61	-14.77	-8.88					
RUUBJA		C171	55.86	-14.63	-8.67	1.05	-0.04	-0.09	1.06	MM
		C172	56.91	-14.67	-8.76					
T28MAF		C171	55.65	-14.91	-8.62	1.22	0.18	-0.09	1.23	MV
		C172	56.86	-14.73	-8.70					
T7NR9B		C171	56.00	-14.87	-8.68	1.06	0.06	-0.09	1.06	MT
		C172	57.06	-14.81	-8.77					
T8XTDH		C171	55.45	-14.82	-8.79	0.97	-0.01	-0.08	0.97	XI
		C172	56.42	-14.83	-8.87					
TAYXLW		C171	55.66	-14.94	-8.62	1.17	0.09	-0.11	1.18	MV
		C172	56.83	-14.85	-8.72					
TEWJCE		C171	55.80	-14.85	-8.61	1.00	0.08	-0.09	1.01	AJ
		C172	56.80	-14.77	-8.69					
TGKVD6		C171	55.82	-15.07	-8.46	0.99	-0.01	-0.05	0.99	MV
		C172	56.80	-15.08	-8.51					
TPFVPC		C171	55.71	-14.85	-8.74	0.93	0.11	-0.04	0.94	HP
		C172	56.64	-14.74	-8.78					
U28YEN		C171	55.84	-14.89	-8.76	1.07	-0.02	-0.05	1.07	AM
		C172	56.91	-14.90	-8.81					
U3HL7A		C171	55.58	-14.69	-8.92	0.99	-0.03	-0.08	0.99	XM
		C172	56.57	-14.72	-9.00					
UFL32H		C171	55.60	-14.74	-8.73	1.05	-0.02	-0.08	1.05	XI
		C172	56.65	-14.75	-8.80					

			CIE L* a* b* Color Values			Color Difference Values				
WebCode	Flag	Samples	L*	a*	b*	ΔL*	Δa*	Δb*	ΔE*	InstrCode
UKE9BE		C171	55.75	-14.74	-8.78	1.01	0.07	-0.07	1.01	HP
		C172	56.76	-14.67	-8.85					
VC6X3M		C171	55.73	-14.90	-8.69	0.99	-0.01	-0.10	0.99	AJ
		C172	56.72	-14.91	-8.78					
VJZ3PW		C171	55.98	-14.82	-8.76	1.03	-0.03	-0.08	1.03	XX
		C172	57.01	-14.85	-8.84					
VRTEMB		C171	56.07	-14.87	-8.69	1.00	-0.01	-0.04	1.00	AS
		C172	57.07	-14.88	-8.72					
VRU3AG		C171	55.54	-14.73	-8.73	1.08	0.06	-0.09	1.09	XO
		C172	56.62	-14.67	-8.82					
W2FVQ7	X	C171	55.56	-14.58	-8.51	1.09	0.10	-0.05	1.09	MJ
		C172	56.64	-14.48	-8.56					
W4G28W		C171	55.80	-14.58	-8.67	1.09	-0.06	-0.12	1.10	XI
		C172	56.89	-14.64	-8.79					
WZ6U9D		C171	55.97	-14.84	-8.70	0.90	-0.02	-0.06	0.90	AS
		C172	56.87	-14.86	-8.75					
X6A6HJ		C171	55.74	-14.77	-8.72	0.93	-0.03	-0.06	0.93	XI
		C172	56.67	-14.80	-8.78					
X6RZ37		C171	55.88	-14.64	-8.90	1.01	0.04	-0.07	1.01	HH
		C172	56.89	-14.60	-8.96					
XD66WC		C171	55.74	-14.93	-8.71	1.11	0.11	-0.09	1.12	AS
		C172	56.85	-14.82	-8.80					
XFRTBW		C171	56.09	-14.87	-8.74	0.92	-0.05	-0.04	0.92	AO
		C172	57.01	-14.92	-8.77					
XGLJGC	X	C171	55.20	-14.74	-8.22	1.13	0.04	-0.13	1.13	XZ
		C172	56.32	-14.71	-8.35					
XL2R6B	X	C171	56.03	-15.12	-8.81	0.92	-0.05	-0.08	0.92	CA
		C172	56.95	-15.17	-8.89					
XWDET3		C171	55.90	-14.82	-8.67	0.99	0.08	-0.06	0.99	MM
		C172	56.88	-14.75	-8.73					
Y2T4WC		C171	56.03	-14.99	-8.81	0.97	0.05	-0.05	0.97	XI
		C172	57.00	-14.95	-8.86					

			CIE L* a* b* Color Values			Color Difference Values				
WebCode	Flag	Samples	L*	a*	b*	ΔL*	Δa*	Δb*	ΔE*	InstrCode
Y9PW9C		C171	55.81	-14.73	-8.74	1.05	-0.05	-0.05	1.05	AJ
		C172	56.86	-14.78	-8.79					
YBCKMX		C171	55.66	-14.85	-8.64	1.17	0.11	-0.09	1.18	MM
		C172	56.83	-14.74	-8.73					
ZNXB4E		C171	55.51	-14.67	-8.63	0.92	-0.06	-0.06	0.92	GD
		C172	56.43	-14.73	-8.68					
ZULWRT		C171	56.02	-14.81	-8.75	1.07	-0.04	-0.09	1.07	AS
		C172	57.09	-14.85	-8.84					
ZULYHX		C171	55.84	-14.63	-8.58	0.93	-0.02	-0.06	0.94	MM
		C172	56.77	-14.66	-8.64					

Summary Statistics

Samples	L*	a*	b*	ΔL*	Δa*	Δb*	ΔE*
Grand Means							
C171	55.76	-14.82	-8.71	1.03	0.02	-0.07	1.04
C172	56.79	-14.80	-8.78				
Stnd Dev Btwn Labs							
C171	0.21	0.10	0.10	0.07	0.05	0.02	0.07
C172	0.20	0.09	0.09				

Statistics based on 107 of 117 reporting participants

Comments Assigned on Data Flags for Test #409

3QYYD2(X) - High "a*" values and very low "b*" values.

CPPA3M(X) - All values are extremely high.

F2CK4P(X) - Inconsistent in determinations of "L*" values.

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

GPGKBK(X) - Low "L*" values.

L7LPJ6(X) - Extreme data.

QDPK4Z(X) - Low "a*" values.

W2FVQ7(X) - High "a*" values.

XGLJGC(X) - High "b*" values. Large replication difference for "L*" values for both samples and for "a*" values for Sample C172.

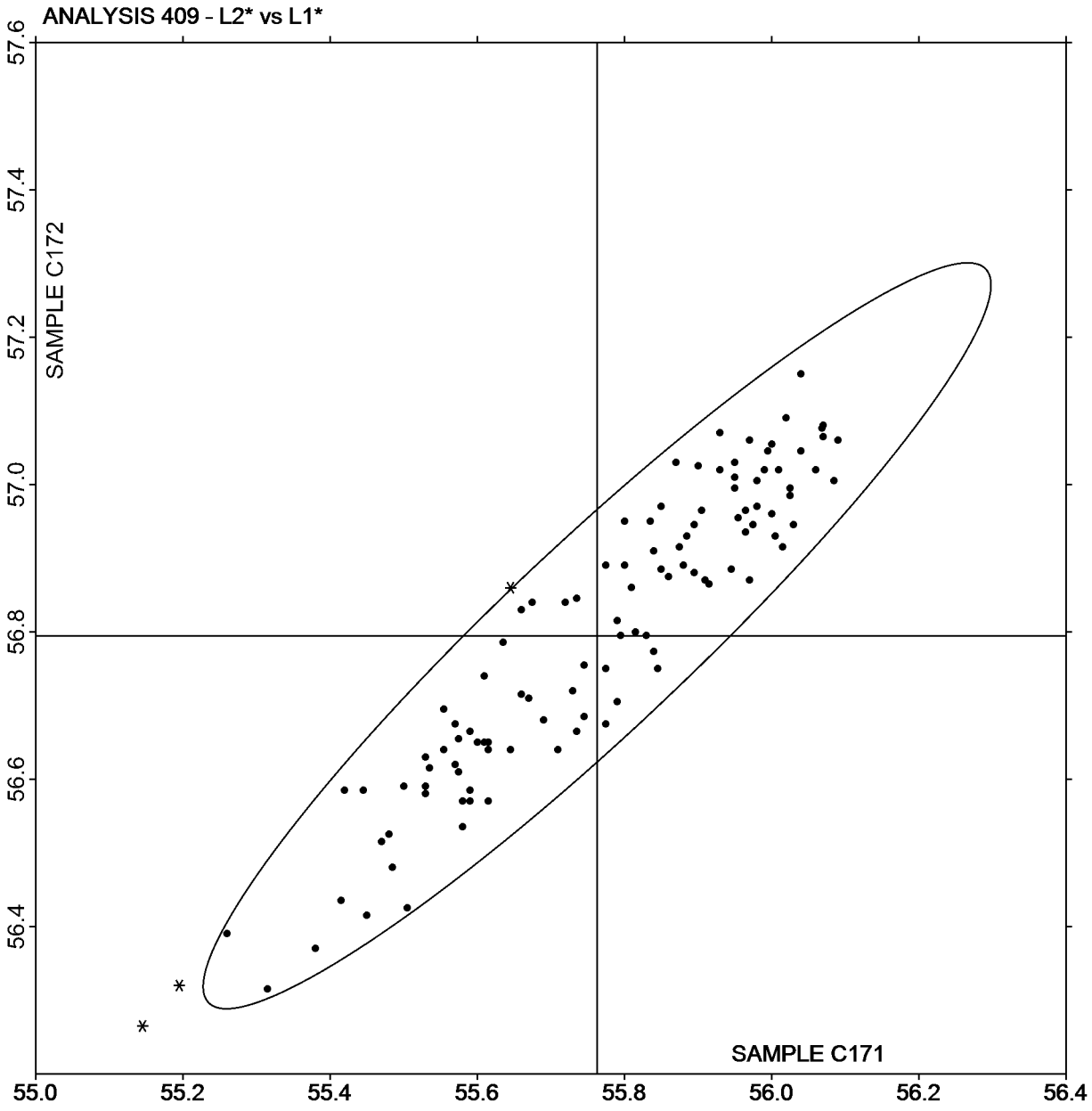
XL2R6B(X) - Low "a*" values.

Key to Instrument Codes Reported by Participants

AJ	ACS-Datacolor 600	AL	ACS-Datacolor Intl. Dataflash 100
AM	ACS-Datacolor 600 Plus	AO	ACS-Datacolor 650X
AQ	ACS-Datacolor 600X	AR	Datacolor 400
AS	ACS-Datacolor 800 Series	CA	Cary 5000
GD	BYK-Gardner spectro-guide sphere	HF	Hunter ColorFlex Diffuse
HH	Hunter ColorQUEST XE	HP	Hunter UltraScan PRO
MI	Macbeth Color i 5	MJ	Macbeth Color-Eye 3000
MK	Macbeth Color-Eye 7000	MM	Macbeth Color-Eye 7000a
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

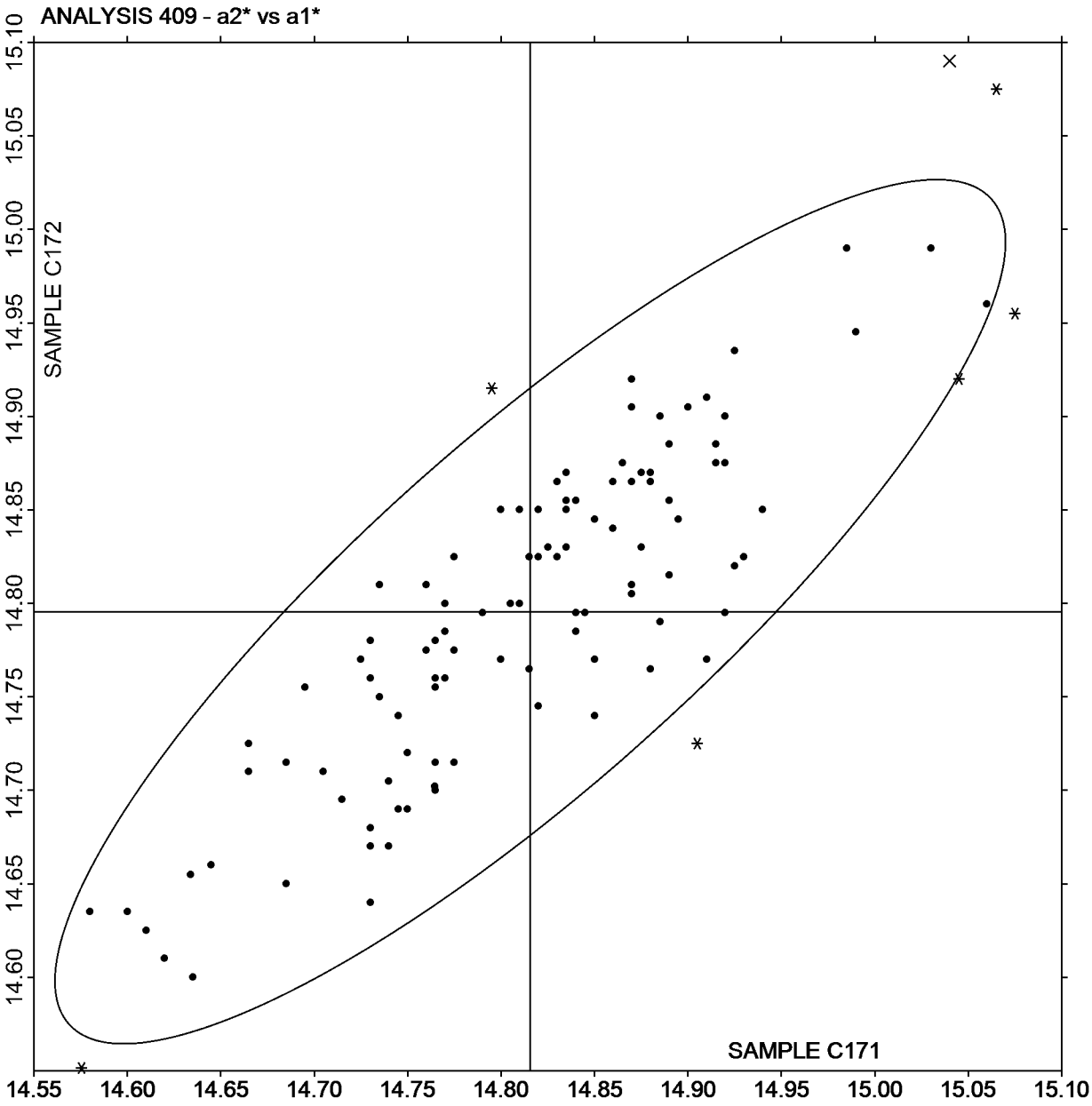
L2* vs L1*

SAMPLE C171 = 55.76 SAMPLE C172 = 56.79



a2* vs a1*

SAMPLE C171 = -14.82 SAMPLE C172 = -14.80

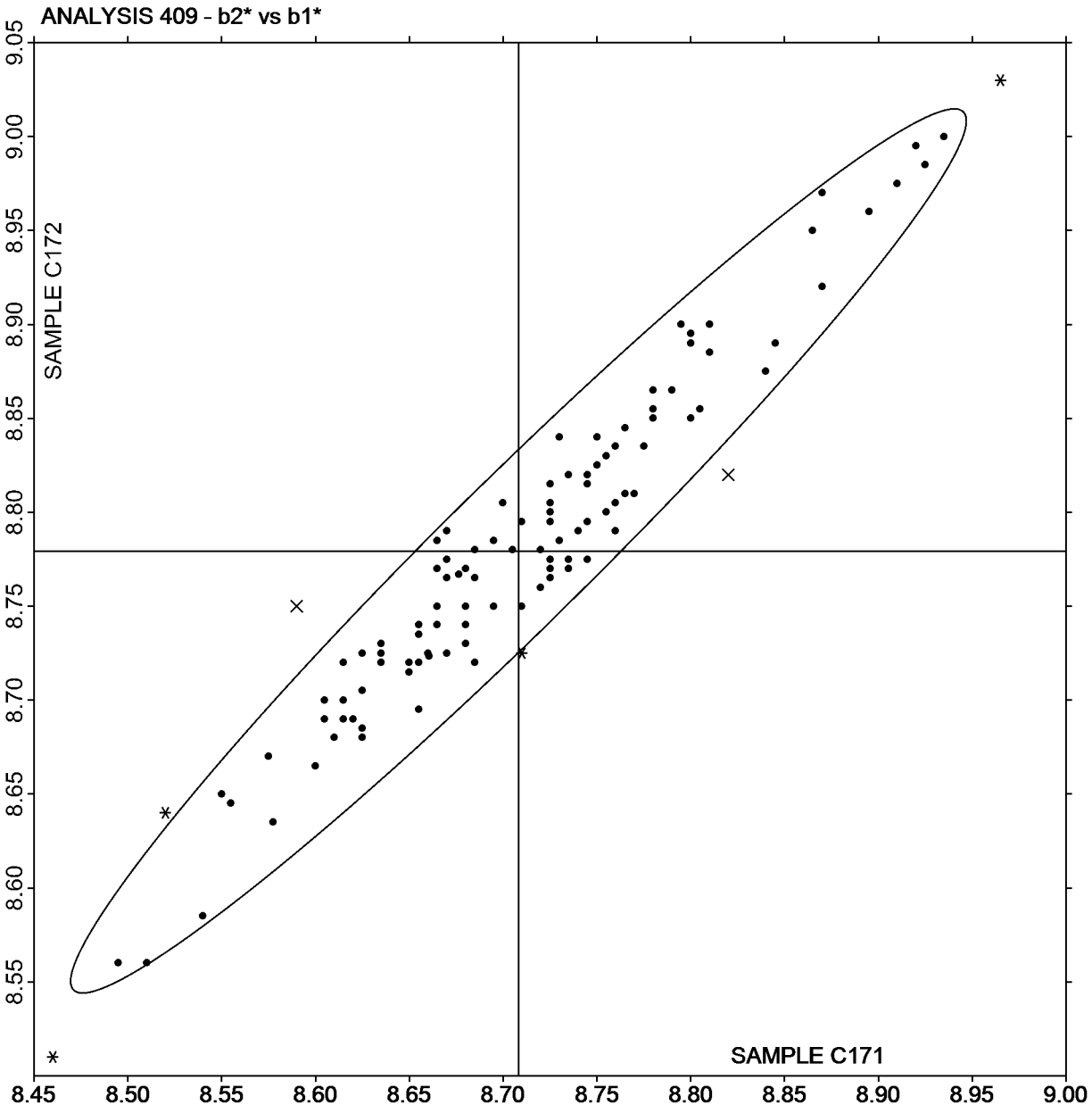


Plot created using absolute values.

b2* vs b1*

SAMPLE C171 = -8.71

SAMPLE C172 = -8.78



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 C171										
24PCDR		21.47	26.61	29.15	30.27	30.32	30.54	30.29	27.85	22.80	18.31	15.98	14.77	14.60	15.21	14.87	13.62	AJ
26YJEY		21.65	26.55	29.18	30.19	30.20	30.36	30.11	27.69	22.66	18.21	15.90	14.72	14.55	15.15	15.02	13.71	AQ
29L2UY		20.88	26.01	28.53	29.80	29.77	29.94	29.72	27.35	22.36	18.03	15.64	14.58	14.48	15.16	14.85	13.61	XH
29YRKU		23.06X	26.65	29.23	30.30	30.35	30.54	30.33	27.93	22.86	18.30	15.98	14.83	14.65	15.28	15.07	13.89	AJ
2DTLHV		20.88	26.29	28.62	29.90	29.87	30.09	29.92	27.54	22.48	17.99	15.69	14.52	14.39	15.16	15.01	13.63	MV
2FZ4GR		21.38	26.36	28.80	29.95	29.94	30.17	29.87	27.57	22.64	18.22	15.85	14.69	14.55	15.21	14.91	13.66	XI
32JBQY		21.07	26.19	28.66	29.82	29.83	30.01	29.74	27.34	22.41	18.03	15.68	14.55	14.43	15.12	14.73	13.48	XI
3D93FA		23.76X	25.87	28.41	29.92	29.87	29.66*	30.04	27.89	22.52	18.24	15.79	13.93X	14.40	15.07	15.02	13.93	GD
3HL9PN		21.37	26.58	29.11	30.22	30.26	30.43	30.20	27.82	22.82	17.78	15.95	14.75	14.58	15.19	14.89	13.58	AJ
3QYYD2		21.27	26.48	28.93	30.08	29.98	30.27	30.00	27.70	22.55	18.11	15.78	14.64	14.47	15.27	15.07	13.73	MU
3T6HJA		20.93	26.10	28.60	29.72	29.74	29.93	29.63	27.25	22.27	17.96	15.55	14.47	14.28	14.98	14.73	13.50	MI
3W37R4		21.41	26.18	28.82	29.32*	29.75	30.00	29.76	27.46	22.46	18.03	15.77	14.60	14.41	15.19	15.01	13.70	SH
6QLH8X		20.98	26.14	28.66	29.72	29.79	29.96	29.67	27.33	22.41	18.05	15.76	14.65	14.52	15.11	14.67	13.30*	AO
762ZER		20.70	25.98	28.44	29.63	29.68	29.87	29.56	27.22	22.34	17.90	15.57	14.45	14.36	15.00	14.76	13.47	MI
79MJJW		22.69*	26.57	29.06	30.24	30.25	30.47	30.25	27.81	22.82	18.32	16.00	14.80	14.65	15.33	15.06	13.80	AQ
7DYME6		21.41	26.63	28.97	30.06	30.17	30.37	30.10	27.68	22.79	18.17	15.93	14.77	14.45	15.40	15.04	14.26X	HF
82Z739	X	23.24X	27.72X	30.12X	31.33X	31.24X	31.47X	31.23X	28.92X	23.70X	18.98X	16.56X	15.36X	15.19X	16.04X	15.83X	14.44X	MV
89HHFA		21.49	26.54	29.08	30.14	30.21	30.39	30.13	27.70	22.73	18.23	15.91	14.76	14.59	15.26	14.92	13.59	AJ
92EZCG		21.20	26.11	28.58	29.79	29.78	29.92	29.74	27.37	22.30	17.95	15.68	14.49	14.45	15.09	14.89	13.60	XO
9QJKVT		21.40	26.52	29.04	30.18	30.19	30.39	30.11	27.77	22.81	18.26	15.97	14.74	14.61	15.20	14.99	13.63	AS
AJDCKH		21.41	26.53	29.11	30.23	30.24	30.42	30.18	27.82	22.77	18.22	15.90	14.71	14.54	15.15	14.99	13.71	AO
ALG84L		22.14	26.48	29.08	30.09	30.09	30.30	29.94	27.47	22.44	18.11	15.77	14.69	14.47	15.47	15.04	13.90	HW
B4C3EN		21.47	26.29	28.67	29.71	29.83	30.07	29.77	27.28	22.34	17.98	15.69	14.51	14.45	15.15	14.75	13.42	XI
BKL28R		20.63	25.87	28.18*	29.44*	29.42*	29.67*	29.31*	26.94*	22.05*	17.74*	15.43*	14.33	14.21	14.86	14.47X	13.21*	XH
C7JR2X		21.60	26.60	29.11	30.25	30.25	30.42	30.17	27.80	22.77	18.39	15.99	14.78	14.69	15.48	15.05	13.80	XI

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 C171																		
CPPA3M	X	27.76X	32.26X	34.81X	35.97X	36.04X	36.39X	36.28X	34.30X	29.95X	25.83X	23.86X	22.98X	22.79X	23.66X	23.64X	22.51X	CA
CW9FZT		20.45	25.84	28.35	29.57	29.59	29.76	29.50	27.13	22.23	17.92	15.55	14.41	14.31	15.03	14.63	13.38	XH
CYD4EJ		21.36	26.44	29.03	30.14	30.23	30.43	30.21	27.81	22.83	18.32	16.01	14.84	14.67	15.31	15.05	13.67	AJ
CYHHQY		21.27	26.48	29.01	30.14	30.20	30.41	30.20	27.78	22.77	18.25	15.95	14.73	14.59	15.27	15.06	13.56	AJ
DRBDBJ		21.36	26.23	28.68	29.88	29.87	29.86	29.76	27.44	22.35	17.96	15.77	14.61	14.50	15.17	14.83	13.67	XO
E6D8HM		20.68	25.77*	28.28	29.38*	29.38*	29.63*	29.27*	26.86X	21.84X	17.56X	15.33X	14.22*	14.14*	14.85	14.61	13.27*	XF
EGEMCX		21.43	26.59	29.02	30.16	30.15	30.28	30.04	27.61	22.61	18.18	15.81	14.59	14.46	15.23	14.91	13.66	XI
EJGNCV		22.46	26.57	29.17	30.26	30.26	30.42	30.21	27.81	22.73	18.25	15.91	14.79	14.57	15.15	14.94	13.72	AQ
F2CK4P		21.08	26.51	29.07	30.16	30.19	30.34	30.12	27.79	22.78	18.26	15.94	14.76	14.60	15.19	15.02	13.66	AM
F8HAP4		21.42	26.57	29.07	30.26	30.24	30.39	30.13	27.74	22.73	18.26	15.88	14.72	14.52	15.13	14.98	13.69	AO
FKQZLJ		21.33	26.79	29.16	30.22	30.21	30.42	30.10	27.65	22.59	18.21	15.88	14.69	14.55	15.16	14.94	13.73	AM
FPFEAQ		21.20	26.23	28.72	29.92	29.92	30.14	29.88	27.58	22.65	18.21	15.82	14.67	14.52	15.24	14.99	13.69	MM
FVNX9J		21.89	26.56	29.31	30.38	30.33	30.59	30.31	27.86	22.66	18.15	15.84	14.66	14.47	15.30	15.04	13.71	PE
G2NRNW		21.04	26.07	28.57	29.79	29.73	29.99	29.71	27.38	22.45	18.07	15.71	14.51	14.29	15.05	14.81	13.67	XI
G986HP		21.22	26.52	29.06	30.25	30.29	30.49	30.17	27.86	22.88	18.37	16.04	14.91	14.80*	15.49	15.20	13.86	XI
GGLMLX		21.92	26.25	28.67	29.81	29.72	29.84	29.50	27.15	22.08*	17.78	15.47	14.33	14.23	14.84	14.68	13.47	XM
GPGKBK	X	20.72	25.35X	27.90X	28.96X	29.08X	29.27X	29.07X	26.60X	21.51X	17.21X	14.99X	13.89X	13.77X	14.40X	14.03X	12.79X	XO
GR4BCP		20.95	26.21	28.55	29.78	29.77	29.92	29.63	27.36	22.50	18.11	15.73	14.55	14.39	15.06	14.89	13.69	XH
GVLR8F		21.35	26.48	29.12	30.18	30.23	30.44	30.20	27.85	22.86	18.30	15.98	14.77	14.60	15.23	14.83	13.56	AS
HK3BGU		21.63	26.40	29.02	30.16	30.05	30.32	30.01	27.69	22.58	18.12	15.86	14.70	14.51	15.27	15.09	13.70	PE
HVHHWU		21.32	26.32	28.83	29.96	29.94	30.16	29.85	27.52	22.64	18.18	15.78	14.62	14.46	15.14	14.96	13.68	MM
J4MUKC		21.31	26.37	28.88	29.93	29.92	30.21	29.89	27.44	22.37	18.02	15.66	14.52	14.40	15.13	14.94	13.68	XC
JAWTEP		21.65	26.52	29.17	30.19	30.29	30.46	30.24	27.77	22.79	18.24	15.92	14.72	14.56	14.68X	14.99	13.55	AS
JJKYVU		21.47	26.32	28.85	29.99	29.97	30.18	29.89	27.56	22.60	18.18	15.81	14.68	14.54	15.26	14.99	13.70	MM
JQ2DXZ		21.27	26.58	29.05	30.16	30.12	30.35	30.10	27.80	22.68	18.15	15.83	14.69	14.51	15.32	15.11	13.82	MV

Spectrophotometric Reflectance values (as %) at selected wavelengths

WebCode	Data Flag	400	420	440	460	480	500	520	540	560	580	600	620	640	660	680	700	Instr Code
Sample C171																		
K3TJ7N		21.04	26.41	28.85	30.10	30.06	30.33	30.07	27.71	22.67	18.17	15.84	14.67	14.53	15.27	15.12	13.73	MV
KBP7EM		21.09	26.08	28.55	29.75	29.72	29.97	29.71	27.40	22.41	17.99	15.68	14.52	14.33	15.07	14.83	13.55	MS
KY8LWC		22.17	26.55	29.15	30.25	30.31	30.48	30.26	27.82	22.79	18.29	15.98	14.80	14.64	15.26	15.05	13.76	AS
L7LPJ6	X	22.27	27.22X	29.72X	30.89X	30.87X	31.03X	30.74X	28.36X	23.37X	18.84X	16.43X	15.25X	15.07X	15.77X	17.17X	14.23X	MM
LL2T3E		21.44	26.38	28.93	30.10	30.08	30.30	30.04	27.72	22.77	18.28	15.89	14.74	14.58	15.30	15.05	13.76	MM
LLHY9W		20.61	25.87	28.42	29.63	29.65	29.84	29.57	27.19	22.24	17.88	15.56	14.38	14.29	14.99	14.72	13.41	XH
LXDBHN		21.05	26.17	28.60	29.71	29.77	29.91	29.62	27.27	22.30	17.97	15.66	14.56	14.41	15.06	14.76	13.54	XI
LZYYWA		21.21	26.12	28.65	29.78	29.76	29.99	29.61	27.25	22.31	17.97	15.62	14.49	14.35	15.03	14.62	13.38	XI
MPV4D6		20.81	26.05	28.58	29.74	29.79	29.96	29.64	27.30	22.38	18.00	15.65	14.51	14.40	14.90	14.70	13.57	AJ
MTBRUV		21.08	26.19	28.75	29.94	29.92	30.17	29.87	27.51	22.56	18.13	15.72	14.56	14.40	15.13	14.91	13.61	MK
NAXC79		21.21	26.36	28.86	30.05	30.00	30.24	29.95	27.54	22.57	18.15	15.79	14.66	14.53	15.23	14.81	13.55	XI
NKHNJ8		20.85	25.81*	28.27*	29.56	29.56	29.71	29.46	27.11	22.31	17.90	15.60	14.46	14.36	15.00	14.75	13.47	XH
NM86GL		21.54	26.55	29.09	30.21	30.24	30.47	30.18	27.80	22.74	18.21	15.88	14.67	14.44	15.19	14.90	13.43	XB
NTUXTL		20.97	26.08	28.53	29.82	29.77	29.97	29.66	27.33	22.35	18.01	15.69	14.55	14.37	15.11	14.82	13.58	XH
NVWV2T		21.20	26.47	29.00	30.19	30.21	30.41	30.12	27.76	22.80	18.29	15.93	14.74	14.57	15.28	15.09	13.71	AL
NXKEZ6		21.82	26.50	28.99	30.10	30.08	30.30	30.02	27.68	22.64	18.21	15.84	14.68	14.51	15.25	14.96	13.63	XB
P623JD		21.28	26.35	28.90	30.04	30.14	30.34	30.12	27.74	22.69	18.14	15.79	14.61	14.45	15.08	14.92	13.62	AJ
P7XF4L		21.45	26.60	29.20	30.30	30.40	30.50	30.25	27.90	22.90	18.30	16.00	14.80	14.70	15.30	15.05	13.70	AO
PQGRLB		21.69	26.49	29.06	30.16	30.16	30.31	30.08	27.65	22.59	18.16	15.82	14.64	14.46	15.04	14.87	13.59	AR
Q86FDK		21.34	26.56	29.14	30.17	30.25	30.42	30.18	27.86	22.86	18.40	16.00	14.82	14.63	15.25	15.02	13.78	AM
Q8KEVN		21.40	26.55	29.14	30.11	30.21	30.41	30.12	27.77	22.75	18.25	15.93	14.74	14.59	15.23	14.93	13.61	AJ
QDPK4Z		19.96*	25.94	28.32	29.61	29.52	30.16	29.74	27.35	22.35	18.06	15.66	14.01X	14.23	14.89	14.81	13.75	GD
QNV8G7		21.51	26.53	29.11	30.26	30.28	30.37	30.20	27.83	22.79	18.26	15.93	14.74	14.55	15.12	14.99	13.79	AO
QRTNRF		21.18	26.43	28.97	30.12	30.13	30.34	30.06	27.66	22.68	18.22	15.85	14.70	14.55	15.27	15.01	13.71	MM
QU2W3K		21.65	26.70	29.20	30.30	30.40	30.60	30.30	27.90	22.90	18.40	16.10	14.90	14.70	15.40	15.15	13.70	AO

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 C171																		
QXVV94		21.19	26.48	28.95	30.06	30.10	30.26	30.00	27.56	22.55	18.11	15.76	14.64	14.48	15.09	14.87	13.60	AQ
R4HZPB		21.15	26.23	28.67	29.87	29.81	30.09	29.70	27.37	22.35	17.99	15.60	14.40	14.25	14.97	14.73	13.55	XI
RUUBJA		21.86	27.10X	29.61*	30.72X	30.72*	30.90*	30.60*	28.19*	23.25X	18.74X	16.28X	15.13X	14.94X	15.66X	15.43X	14.18X	MM
T7NR9B		21.09	26.45	29.09	30.32	30.21	30.50	30.26	27.83	22.82	18.30	15.96	14.74	14.57	15.34	15.13	13.81	MT
T8XTDH		21.14	26.04	28.43	29.74	29.72	29.78	29.52	27.24	22.29	17.87	15.50	14.39	14.29	14.86	14.69	13.49	XI
TAYXLW		20.70	26.20	28.65	29.90	29.80	30.10	29.80	27.60	22.50	18.00	15.70	14.50	14.30	15.10	14.90	13.60	MV
TGKVD6		20.32	26.03	28.67	30.04	30.02	30.28	30.02	27.74	22.62	18.11	15.78	14.61	14.44	15.26	15.03	13.69	MV
TPFVPC		22.00	26.26	28.83	29.97	29.89	30.14	29.84	27.46	22.59	18.13	15.77	14.51	14.18*	15.00	14.75	13.58	HP
U28YEN		20.90	26.39	28.95	30.11	30.16	30.35	29.99	27.62	22.65	18.20	15.85	14.63	14.48	15.12	14.82	13.73	AM
U3HL7A		21.28	26.30	28.78	29.87	29.86	30.14	29.77	27.32	22.26	17.92	15.66	14.54	14.45	15.17	14.95	13.66	XF
UFL32H		20.94	26.14	28.62	29.87	29.82	30.00	29.69	27.33	22.41	18.05	15.69	14.56	14.46	15.12	14.82	13.59	XI
UKE9BE		21.65	26.37	28.89	30.05	29.91	30.20	29.88	27.49	22.57	18.16	15.84	14.60	14.40	15.18	14.77	13.63	HP
VC6X3M		21.00	26.24	28.81	29.94	30.01	30.15	29.92	27.52	22.61	18.07	15.73	14.55	14.35	15.01	14.83	13.56	AJ
VJZ3PW		21.54	26.62	29.10	30.24	30.26	30.38	30.19	27.80	22.84	18.29	15.97	14.76	14.58	15.14	15.00	13.76	AH
VRTEMB		21.65	26.61	29.21	30.27	30.34	30.53	30.29	27.91	22.88	18.36	16.04	14.86	14.70	15.30	15.11	13.68	AS
VRU3AG		21.18	26.14	28.70	29.77	29.72	29.91	29.72	27.32	22.28	17.94	15.61	14.47	14.43	15.07	14.84	13.56	XO
W4G28W		21.28	26.38	28.89	30.05	30.01	30.22	29.89	27.50	22.63	18.26	15.91	14.75	14.60	15.32	14.96	13.74	XI
WZ6U9D		21.10	26.50	29.07	30.18	30.25	30.42	30.19	27.80	22.80	18.28	15.99	14.78	14.63	15.36	14.91	13.53	AS
X6A6HJ		21.13	26.38	28.82	30.04	29.99	30.21	29.94	27.53	22.53	18.14	15.78	14.62	14.48	15.19	14.81	13.56	XI
X6RZ37		21.74	26.53	29.32	30.18	30.14	30.33	30.08	27.65	22.73	18.26	15.84	14.74	14.51	15.72X	15.43X	14.17X	HH
XFRTBW		21.63	26.66	29.25	30.34	30.43	30.60	30.33	27.91	22.91	18.39	16.05	14.87	14.72	15.34	15.13	13.70	AO
XGLJGC		18.36X	25.29X	27.85X	29.18X	29.21X	29.53*	29.30*	27.03*	22.04*	17.62X	15.30X	14.14*	13.94X	14.71*	14.54*	13.23*	XZ
XL2R6B		21.60	26.55	29.19	30.41	30.32	30.56	30.33	28.00	22.86	18.31	15.97	14.75	14.56	15.36	15.13	13.80	CA
XWDET3		21.50	26.42	28.97	30.15	30.13	30.35	30.06	27.72	22.73	18.24	15.85	14.69	14.55	15.27	15.02	13.72	MM
Y2T4WC		21.58	26.64	29.17	30.26	30.38	30.55	30.20	27.86	22.93	18.39	15.89	14.65	14.48	15.11	14.84	13.58	XI

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 C171										
Y9PW9C		21.44	26.52	28.99	29.97	30.02	30.21	29.98	27.58	22.63	18.17	15.86	14.71	14.57	15.17	14.88	13.61	AJ
YBCKMX		21.14	26.14	28.68	29.84	29.83	30.06	29.78	27.46	22.50	18.07	15.71	14.57	14.42	15.15	14.90	13.60	MM
ZNXB4E		23.31	25.94	28.44	29.70	29.64	29.76	29.49	27.18	22.34	18.06	15.47	14.40	14.35	14.90	14.86	13.74	GD
ZULWRT		21.44	26.65	29.20	30.23	30.29	30.50	30.23	27.83	22.87	18.35	16.01	14.82	14.66	15.27	15.06	13.64	AS
ZULYHX		21.29	26.35	28.85	30.00	30.00	30.21	29.89	27.59	22.71	18.30	15.91	14.74	14.58	15.26	15.06	13.82	MM

X = High % reflectance data at all wavelengths.

Summary Statistics

	400	420	440	460	480	500	520	540	560	580	600	620	640	660	680	700
Grand Means	21.33	26.34	28.87	30.01	30.02	30.22	29.95	27.58	22.59	18.14	15.80	14.63	14.48	15.17	14.92	13.65
SD Btwn Labs	0.62	0.27	0.30	0.26	0.26	0.26	0.27	0.26	0.24	0.18	0.17	0.18	0.15	0.17	0.16	0.17

Comments Assigned on Data Flags for Test #411

82Z739 (X) - High % reflectance data at all wavelengths.

CPPA3M (X) - Very high % reflectance data at all wavelengths.

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

L7LPJ6 (X) - High % reflectance data for most wavelengths. Large replication difference for all wavelengths.

Key to Instrument Codes Reported by Participants

AH	ACS-Datacolor 550	AJ	ACS-Datacolor 600	AL	ACS-Datacolor Intl. Dataflash 100
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
XZ	X-Rite				

WebCode	Data Flag	Sample G171 Lab Mean	Sample G171 Diff from Grand Mean	Sample G171 CPV	Sample G172 Lab Mean	Sample G172 Diff from Grand Mean	Sample G172 CPV	Instr Code
24PCDR	X	45.33	1.16	1.89	53.93	-0.88	-1.49	MW
26YJEY		43.75	-0.41	-0.68	54.88	0.07	0.12	PC
2DTLHV	X	43.48	-0.69	-1.12	52.73	-2.08	-3.53	GL
2JKPU9		43.58	-0.59	-0.96	55.05	0.25	0.42	RA
32JBQY		44.38	0.21	0.34	54.95	0.15	0.25	GL
3HL9PN		44.30	0.14	0.22	54.78	-0.03	-0.05	GK
3T6HJA		44.30	0.14	0.22	55.43	0.62	1.06	GL
44GC42		44.43	0.26	0.43	54.95	0.15	0.25	GK
49WG3W	*	42.70	-1.46	-2.39	53.90	-0.90	-1.53	GB
6TF2GC		44.63	0.46	0.75	55.55	0.75	1.27	GK
6VLJF9		44.13	-0.04	-0.06	54.75	-0.05	-0.09	GL
762ZER		44.00	-0.16	-0.27	54.80	0.00	0.00	GL
82Z739		42.70	-1.46	-2.39	53.83	-0.98	-1.66	RA
89HHFA		43.48	-0.69	-1.12	54.05	-0.75	-1.28	XX
92EZCG		45.03	0.86	1.40	54.95	0.15	0.25	GN
9LKFVU		43.40	-0.76	-1.25	54.10	-0.70	-1.19	GL
9NVBJ8		43.88	-0.29	-0.47	54.65	-0.15	-0.26	GK
9QJKVT		44.80	0.64	1.04	55.68	0.87	1.48	GN
AJDCKH		44.08	-0.09	-0.15	55.05	0.25	0.42	GQ
ALG84L		43.98	-0.19	-0.31	54.45	-0.35	-0.60	GK
B4C3EN		43.68	-0.49	-0.80	54.35	-0.45	-0.77	GK
BKL28R		44.34	0.17	0.28	55.19	0.39	0.65	GL
BPD9PZ		44.95	0.79	1.28	55.58	0.77	1.31	GL
BPWYTT		44.98	0.81	1.32	55.25	0.45	0.76	XX
CFNPZU		44.90	0.74	1.20	55.08	0.27	0.46	GN
CNJPFM		43.65	-0.51	-0.84	54.15	-0.65	-1.11	GL
CPCL3V		43.28	-0.89	-1.45	53.63	-1.18	-2.00	GX
CPPA3M		44.63	0.46	0.75	55.45	0.65	1.10	GL
CW9FZT		43.73	-0.44	-0.72	54.10	-0.70	-1.19	GL
CYD4EJ	X	41.63	-2.54	-4.14	53.05	-1.75	-2.97	GL

WebCode	Data Flag	Sample G171 Lab Mean	Sample G171 Diff from Grand Mean	Sample G171 CPV	Sample G172 Lab Mean	Sample G172 Diff from Grand Mean	Sample G172 CPV	Instr Code
DT489N		43.60	-0.56	-0.92	54.08	-0.73	-1.23	KB
E6D8HM		45.28	1.11	1.81	55.83	1.02	1.74	GK
EJGNCV		44.18	0.01	0.02	55.45	0.65	1.10	GK
ETH7MX		43.43	-0.74	-1.21	54.40	-0.40	-0.68	GK
EXYEBW		44.08	-0.09	-0.15	54.95	0.15	0.25	GL
FP3ZN3	*	45.78	1.61	2.63	56.20	1.40	2.37	GK
FZHUXA		44.28	0.11	0.18	54.50	-0.30	-0.51	MW
G2NRNW		43.83	-0.34	-0.55	54.55	-0.25	-0.43	GL
G4CBMA		43.73	-0.44	-0.72	54.23	-0.58	-0.98	GL
GPGKBK		44.18	0.01	0.02	54.93	0.12	0.21	GL
GR4BCP		44.93	0.76	1.24	55.00	0.20	0.34	GL
HVXPCK		45.43	1.26	2.06	55.68	0.87	1.48	GX
HZBMLT	X	46.25	2.09	3.40	56.75	1.95	3.31	GL
J48DPJ		44.43	0.26	0.43	55.25	0.45	0.76	GL
J94ZJ8		44.40	0.24	0.39	54.23	-0.58	-0.98	GL
JHQVK8		44.78	0.61	1.00	55.28	0.47	0.80	GK
JPNQH7		44.68	0.51	0.83	55.30	0.50	0.84	GL
K6E8KA		44.00	-0.16	-0.27	54.73	-0.08	-0.13	GL
KBP7EM		44.50	0.34	0.55	55.58	0.77	1.31	GK
L36JKA		44.85	0.69	1.12	55.25	0.45	0.76	GL
LLHY9W		44.20	0.04	0.06	54.50	-0.30	-0.51	GK
LXDBHN		45.00	0.84	1.36	55.75	0.95	1.61	GL
MFAXMT		44.73	0.56	0.92	55.63	0.82	1.40	GK
NKHNJ8		44.35	0.19	0.30	54.33	-0.48	-0.81	GL
NM86GL		44.03	-0.14	-0.23	54.73	-0.08	-0.13	GL
NVWV2T		43.33	-0.84	-1.37	54.50	-0.30	-0.51	GL
QDPK4Z		43.93	-0.24	-0.39	54.55	-0.25	-0.43	GN
R4HZPB		43.55	-0.61	-1.00	54.78	-0.03	-0.05	GL
RF9WFB		44.63	0.46	0.75	55.05	0.25	0.42	GL
T28MAF	X	43.38	-0.79	-1.29	55.28	0.47	0.80	GN

Interlaboratory Testing Program for Color & Appearance

Analysis 440

60 Degree Gloss - Paint Chips

ASTM Method D 523

WebCode	Data Flag	Sample G171 Lab Mean	Sample G171 Diff from Grand Mean	Sample G171 CPV	Sample G172 Lab Mean	Sample G172 Diff from Grand Mean	Sample G172 CPV	Instr Code
T8XTDH		44.00	-0.16	-0.27	54.25	-0.55	-0.94	MH
TEWJCE	*	42.63	-1.54	-2.51	52.95	-1.85	-3.14	GL
UCQCTL		43.73	-0.44	-0.72	54.00	-0.80	-1.36	GL
UFL32H		44.04	-0.12	-0.20	54.62	-0.18	-0.31	GL
VRU3AG		44.30	0.14	0.22	54.50	-0.30	-0.51	MW
WZ6U9D		44.10	-0.06	-0.10	54.73	-0.08	-0.13	XX
WZHPAC		44.00	-0.16	-0.27	54.58	-0.23	-0.39	GK
XWDET3		44.53	0.36	0.59	55.35	0.55	0.93	GL
YBCKMX		44.45	0.29	0.47	55.10	0.30	0.51	RA
YBUKN2	X	41.75	-2.41	-3.94	54.63	-0.18	-0.30	GB
YY36FT		43.98	-0.19	-0.31	54.90	0.10	0.17	GL
ZC29HX		43.83	-0.34	-0.55	54.68	-0.13	-0.22	GN
ZNXB4E		43.85	-0.31	-0.51	54.60	-0.20	-0.34	GB
ZULYHX		44.10	-0.06	-0.10	54.60	-0.20	-0.34	GL

Summary Statistics

Grand Means

Sample G171	Sample G172
44.16 Gloss Units	54.80 Gloss Units

Stnd Dev Btwn Labs

Sample G171	Sample G172
0.61 Gloss Units	0.59 Gloss Units

Statistics based on 68 of 74 reporting participants

Comments on Assigned Data Flags for Test #440

24PCDR(X) - Inconsistent in testing between samples and inconsistent within the determinations for both samples.

2DTLHV(X) - Data low for, and inconsistent within the determinations of, Sample G172.

CYD4EJ(X) - Data for both samples are low and inconsistent within the determinations of Sample G171.

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

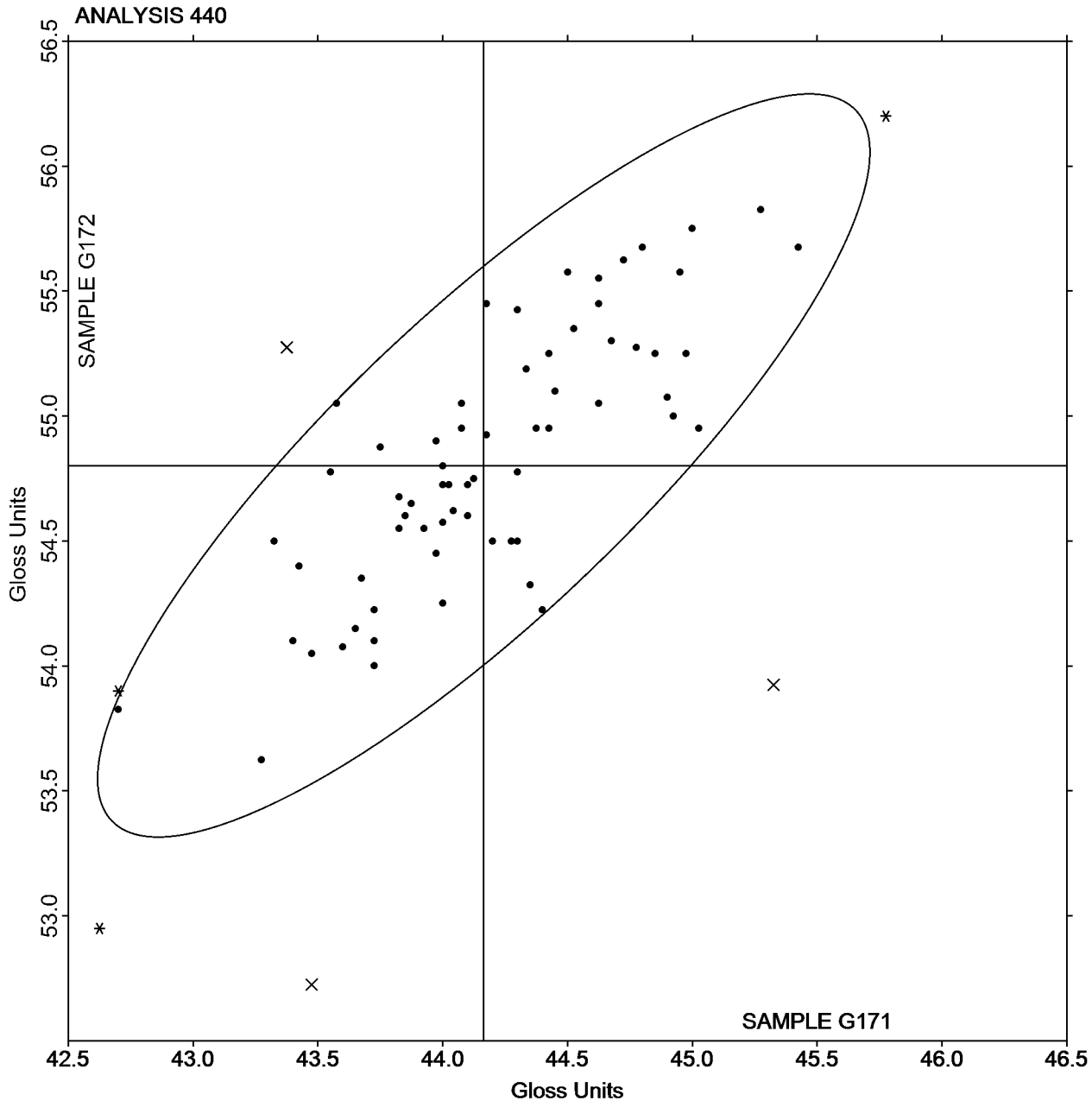
T28MAF(X) - Inconsistent in testing between samples and inconsistent within the determinations for Sample G171.

YBUKN2(X) - Inconsistent in testing between samples, data for Sample G171 are 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)
KB	KSJ MG268 Multiangle Glossmeter	MH	X-Rite/Macbeth Color-Eye XTH
MW	Minolta Multi-Gloss 268	PC	Picogloss 503 Erichson
RA	Rhopoint Novo-Gloss Glossmeter	XX	Instrument make/model not specified by lab

SAMPLE G171 = 44.16 Gloss Units SAMPLE G172 = 54.80 Gloss Units



Interlaboratory Testing Program for Color & Appearance

Analysis 442

85 Degree Gloss - Paint Chips

ASTM Method D 523

WebCode	Data Flag	Sample L171 Lab Mean	Sample L171 Diff from Grand Mean	Sample L171 CPV	Sample L172 Lab Mean	Sample L172 Diff from Grand Mean	Sample L172 CPV	Instr Code
2DTLHV		7.75	0.08	0.51	11.20	-0.22	-0.59	GL
32JBQY		7.93	0.25	1.68	11.85	0.43	1.15	GL
92EZCG		7.70	0.03	0.18	11.68	0.26	0.68	GN
BKL28R		7.78	0.11	0.71	11.44	0.02	0.06	GL
BPWYTT	X	5.15	-2.52	-16.86	7.83	-3.59	-9.61	WG
CPPA3M		7.35	-0.32	-2.16	10.55	-0.87	-2.32	GL
LXDBHN		7.55	-0.12	-0.82	11.20	-0.22	-0.59	GL
QDPK4Z		7.68	0.00	0.01	11.38	-0.04	-0.12	GN
XWDET3		7.68	0.00	0.01	11.73	0.31	0.82	GL
ZC29HX		7.68	0.00	0.01	11.63	0.21	0.55	XX
ZULYHX		7.65	-0.02	-0.15	11.55	0.13	0.35	GN

Summary Statistics

	Sample L171	Sample L172
Grand Means	7.67 Gloss Units	11.42 Gloss Units
Stnd Dev Btwn Labs	0.15 Gloss Units	0.37 Gloss Units

Statistics based on 10 of 11 reporting participants

Comments on Assigned Data Flags for Test #442

BPWYTT(X) - Data for both samples are low.

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 L171 = 7.67 Gloss Units SAMPLE L172 = 11.42 Gloss Units