Collaborative Testing Services, Inc.

Color & Appearance Testing Program

Summary Report #175 - 1st Qtr 2016

About the Color Program, About CTS

Key to Tables and Graphs (Color Tests)

Key to Tables and Graphs (Spectro Test)

Key to Tables and Graphs (GlossTests)

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 mailed 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 mailed 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
*	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. 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 an X on individual wavelength values as follows:

X - The laboratory's mean for that wavelength is greater than a 95% deviation from the GRAND MEAN.

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 mailed 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
2VXH3M		A161 A162	55.46 56.54	24.65 24.53	24.28 24.15	1.08	-0.12	-0.13	1.09	HY
3B3AGW		A161 A162	56.04 57.06	24.61 24.41	24.66 24.49	1.03	-0.20	-0.18	1.06	HW
3FX4EX		A161 A162	56.12 57.27	24.69 24.42	24.54 24.27	1.15	-0.27	-0.27	1.21	XO
3K7JNL		A161 A162	55.39 56.76	24.97 24.57	24.70 24.31	1.37	-0.40	-0.40	1.48	HY
6MBMXN		A161 A162	55.78 57.04	24.66 24.35	24.22 23.96	1.26	-0.31	-0.27	1.32	XZ
8TAYLW		A161 A162	56.20 57.21	24.50 24.34	24.56 24.41	1.02	-0.16	-0.15	1.04	GH
9GBL2Q		A161 A162	55.99 57.08	24.62 24.37	23.81 23.61	1.09	-0.25	-0.20	1.14	MO
9JG4YL		A161 A162	56.23 57.29	24.73 24.54	24.54 24.39	1.07	-0.19	-0.15	1.09	XO
BGZTYK	X	A161 A162	56.00 57.16	25.17 24.94	24.57 24.41	1.16	-0.23	-0.17	1.19	GE
DP88UK		A161 A162	55.87 56.91	24.62 24.37	24.49 24.26	1.05	-0.26	-0.23	1.10	XZ
ECDB8D		A161 A162	56.03 57.16	24.48 24.31	24.69 24.55	1.13	-0.18	-0.14	1.15	HW
F4YNYA		A161 A162	55.98 57.14	24.68 24.46	24.39 24.15	1.16	-0.22	-0.24	1.20	XK
FQQZL7	X	A161 A162	56.07 57.21	24.07 23.84	23.65 23.41	1.14	-0.24	-0.24	1.19	XX
GCQLYG		A161 A162	55.89 57.11	24.64 24.39	24.57 24.35	1.22	-0.26	-0.23	1.27	XM
H64VCL		A161 A162	56.79 57.85	24.48 24.40	24.10 24.02	1.06	-0.08	-0.08	1.07	XZ
H67HTZ		A161 A162	55.94 57.08	24.74 24.36	24.31 23.96	1.14	-0.38	-0.36	1.26	XZ

			CIE L* a* b* Color Values			Color Difference Values				
WebCode	Flag	Samples	L*	a*	b*	ΔL*	Δa*	Δb*	ΔE*	InstrCode
HQ2L9C		A161 A162	55.73 57.01	24.75 24.54	24.14 23.95	1.29	-0.21	-0.19	1.31	MQ
JWB3G2		A161 A162	56.28 57.29	24.56 24.38	24.74 24.55	1.01	-0.18	-0.19	1.04	HW
K6JYYC		A161 A162	55.81 56.96	24.43 24.22	24.79 24.58	1.15	-0.22	-0.21	1.18	GH
KL7E39		A161 A162	56.21 57.37	24.60 24.27	23.58 23.28	1.16	-0.33	-0.31	1.24	AE
L6C7K2		A161 A162	56.29 57.44	24.60 24.42	24.84 24.67	1.15	-0.18	-0.17	1.18	HW
L9BHF2		A161 A162	56.32 57.45	24.66 24.45	24.79 24.62	1.13	-0.21	-0.18	1.16	HW
LCDJGX		A161 A162	56.19 57.26	24.52 24.34	24.76 24.61	1.08	-0.18	-0.15	1.10	HW
MUVWF9		A161 A162	55.92 57.05	25.09 24.79	24.55 24.31	1.13	-0.31	-0.25	1.20	GB
MXPQDA		A161 A162	55.68 56.87	24.53 24.23	24.24 23.96	1.19	-0.30	-0.28	1.26	XN
PJ2FUB		A161 A162	55.57 56.64	24.58 24.34	24.09 23.92	1.07	-0.24	-0.17	1.10	XR
RA87YX		A161 A162	55.95 57.24	25.07 24.72	24.58 24.25	1.29	-0.35	-0.34	1.38	GH
RHLN37		A161 A162	56.01 57.18	24.65 24.43	24.46 24.24	1.18	-0.22	-0.22	1.22	XU
T8DK78		A161 A162	56.26 57.29	24.58 24.48	24.83 24.75	1.02	-0.10	-0.08	1.03	HW
TUUXYU		A161 A162	55.99 57.17	24.67 24.40	24.46 24.23	1.18	-0.27	-0.23	1.23	XO
UNZHK8		A161 A162	56.02 57.13	24.73 24.51	24.65 24.85	1.11	-0.22	0.20	1.15	HG
URVCH9		A161 A162	56.23 57.39	24.62 24.34	24.98 24.71	1.16	-0.28	-0.27	1.22	MG

			CIE L* a* b* Color Values			Color Difference Values				
WebCode	Flag	Samples	L*	a*	b*	ΔL*	Δa*	Δb*	ΔE*	InstrCode
VFYM3Y		A161	56.58	24.45	23.79	-0.07	-0.01	-0.03	0.07	XZ
		A162	56.51	24.44	23.77					
VNDC3T		A161	56.25	24.69	24.79	1.10	-0.16	-0.17	1.12	HW
		A162	57.35	24.53	24.62					
VX6RRW		A161	55.81	24.65	24.61	1.27	-0.29	-0.22	1.32	HK
		A162	57.08	24.36	24.39					
WN9CFX		A161	55.56	24.74	23.89	1.07	-0.24	-0.12	1.10	TO
		A162	56.62	24.51	23.77					
WWQK4U		A161	55.70	24.58	24.17	1.19	-0.31	-0.22	1.24	HK
		A162	56.88	24.27	23.95					
YEBKMM		A161	56.24	24.83	24.95	1.26	-0.23	-0.24	1.30	HW
		A162	57.50	24.61	24.71					
YWJ9JV		A161	56.06	24.40	23.73	1.09	-0.11	-0.11	1.10	MU
		A162	57.15	24.29	23.62					

Summary Statistics

Samples	L*	a*	b*	ΔL*	Δa*	Δb*	ΔE*
Grand Means							
A161	55.99	24.65	24.41				
A162	57.13	24.42	24.21	1.11	-0.23	-0.19	1.15
Stnd Dev Btwn Labs							
A161	0.28	0.15	0.38				
A162	0.25	0.12	0.37	0.22	0.08	0.10	0.21

Statistics based on 37 of 39 reporting participants

Comments Assigned on Data Flags for Test #408

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

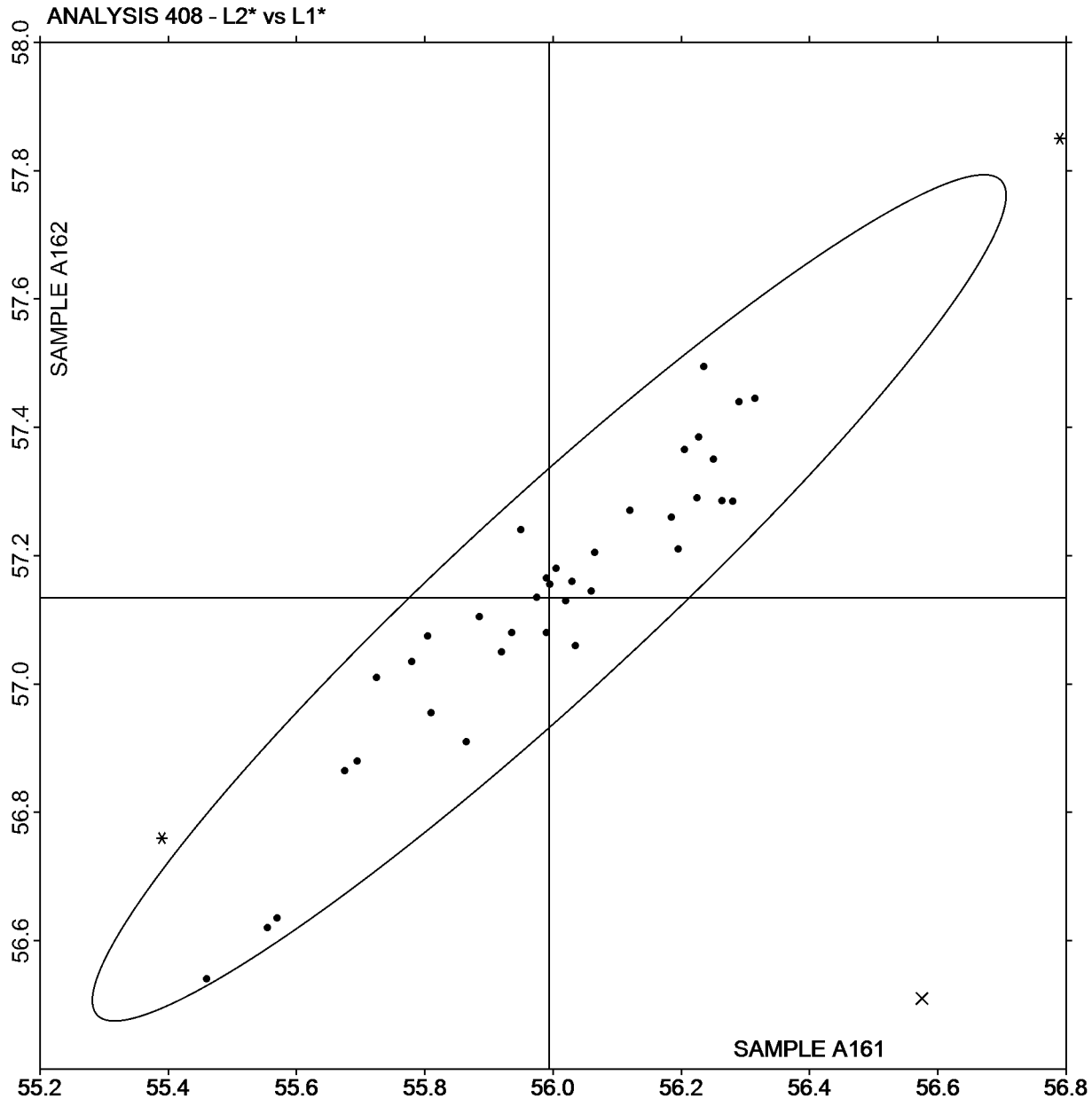
FQQZL7(X) - Low "a*" values.

Key to Instrument Codes Reported by Participants

AE	ACS Chroma-Sensor CS-3	GB	BYK-Gardner spectro-guide sphere gloss
GE	BYK-Gardner spectro-guide (45/0)	GH	BYK-Gardner Color-View
HG	Hunter ColorQUEST	HK	Hunter MiniScan XE (45/0)
HW	Hunter LabScan XE	HY	Hunter Color Flex 45/0
MG	Macbeth 1500/PLUS or 2025+ Color Eye	MO	Minolta CM-3600d Spectrophotometer
MQ	Minolta CM-503c Spectrophotometer	MU	Minolta
TO	Topcon SR-3 Spectroradiometer	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	XX	Instrument make/model not specified by lab
XZ	X-Rite		

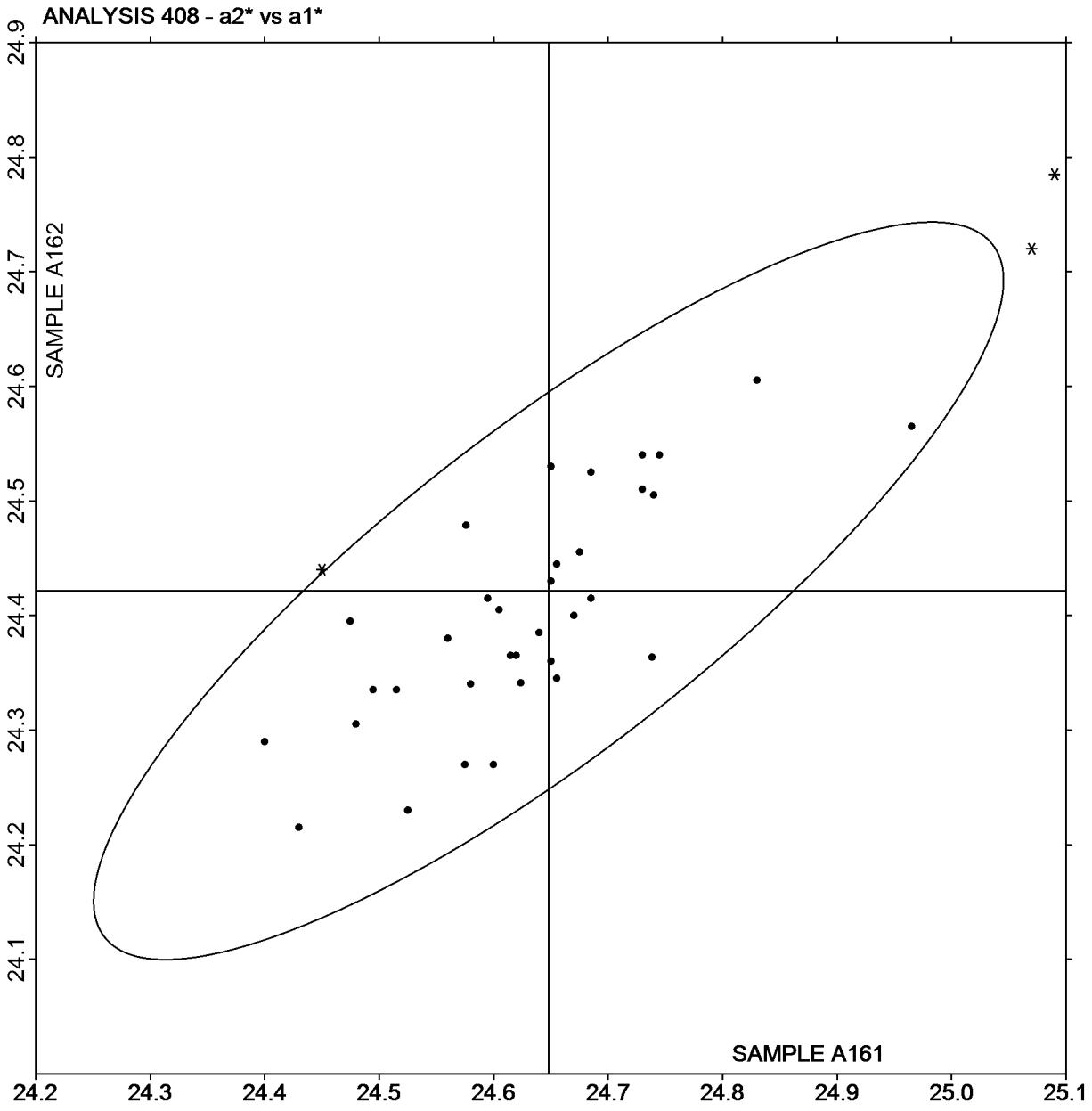
L2* vs L1*

SAMPLE A161 = 55.99 SAMPLE A162 = 57.13



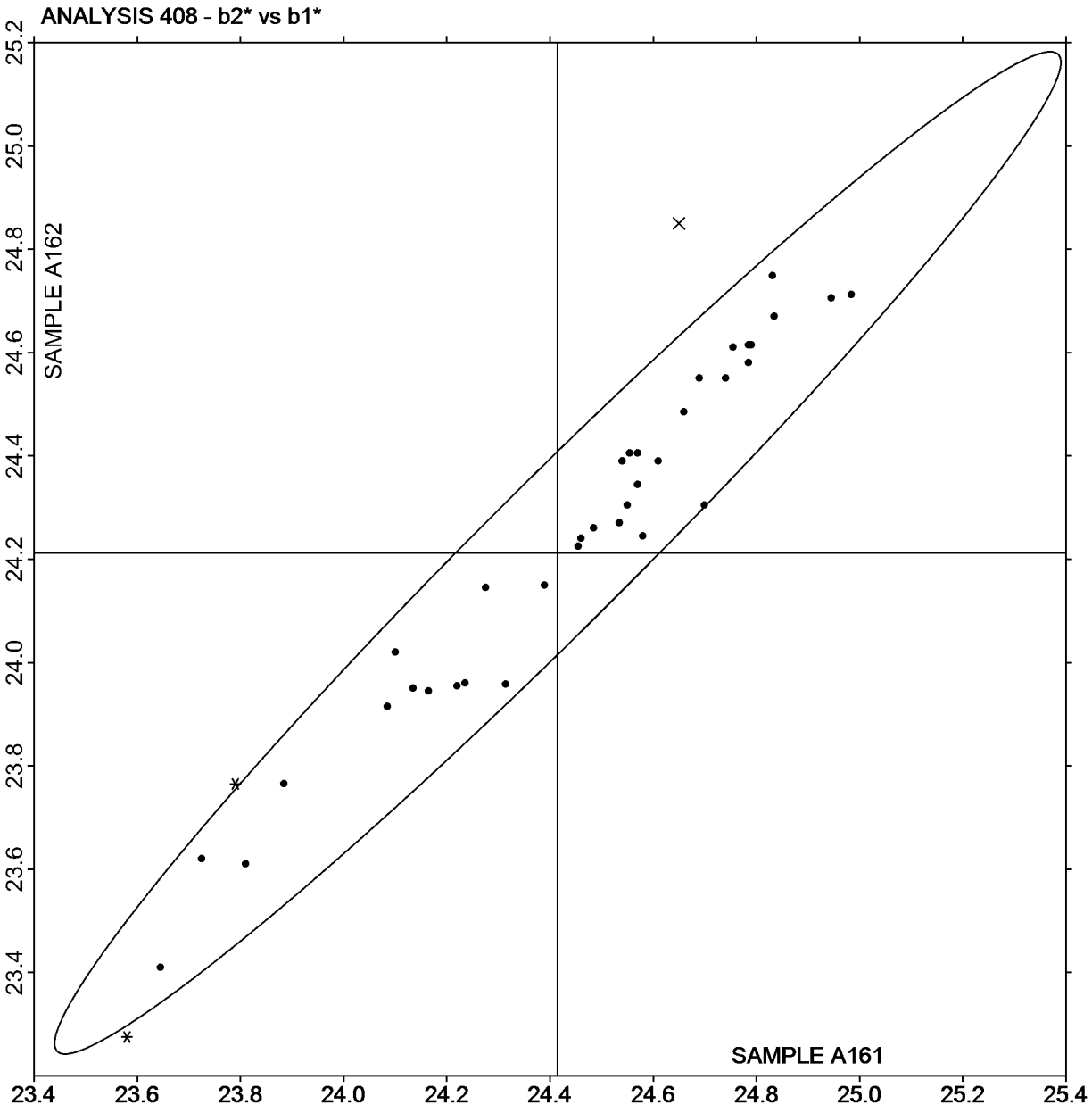
a2* vs a1*

SAMPLE A161 = 24.65 SAMPLE A162 = 24.42



b2* vs b1*

SAMPLE A161 = 24.41 SAMPLE A162 = 24.21



			CIE L* a* b* Color Values			Color Difference Values				
WebCode	Flag	Samples	L*	a*	b*	ΔL*	Δa*	Δb*	ΔE*	InstrCode
2KF2AF	X	A161 A162	54.29 55.34	24.75 24.61	23.90 23.77	1.05	-0.14	-0.13	1.07	AJ
2KYPTV		A161 A162	55.85 56.95	24.37 24.22	23.73 23.58	1.10	-0.15	-0.15	1.12	XI
2U3ZZL		A161 A162	55.90 57.03	24.31 24.08	23.32 23.09	1.13	-0.23	-0.24	1.18	HP
2ZNRCK	X	A161 A162	56.46 57.45	24.49 24.30	24.40 24.28	1.00	-0.19	-0.13	1.02	XX
2ZQMVQ		A161 A162	56.07 57.15	24.38 24.24	23.43 23.35	1.09	-0.15	-0.09	1.10	MM
34J4KP		A161 A162	55.94 57.12	24.38 24.16	23.55 23.40	1.18	-0.23	-0.15	1.21	XI
38KA2G		A161 A162	56.13 57.17	24.38 24.23	23.70 23.57	1.05	-0.15	-0.14	1.06	XI
3E3KDW		A161 A162	56.15 57.20	24.36 24.21	23.71 23.58	1.05	-0.15	-0.14	1.06	XI
3FX4EX		A161 A162	56.03 57.10	24.35 24.10	23.58 23.35	1.07	-0.25	-0.24	1.12	MI
3L33QN		A161 A162	55.95 57.15	24.35 24.08	23.33 23.06	1.20	-0.28	-0.27	1.26	XX
4V92YP		A161 A162	56.02 57.15	24.50 24.17	23.41 23.12	1.13	-0.33	-0.30	1.21	AM
6K3J2R		A161 A162	56.01 57.11	24.12 23.96	23.53 23.44	1.10	-0.16	-0.10	1.11	MM
6UT68P		A161 A162	56.29 57.41	23.98 23.79	23.23 23.09	1.13	-0.19	-0.14	1.15	MM
77FQPP		A161 A162	56.07 57.20	24.49 24.27	23.49 23.31	1.13	-0.22	-0.18	1.16	AO
7BBKMQ		A161 A162	56.04 57.27	24.43 24.05	23.07 22.92	1.23	-0.38	-0.15	1.29	HG
7KWNVQ		A161 A162	56.18 57.35	24.34 24.10	23.62 23.39	1.17	-0.24	-0.23	1.21	MM

			CIE L* a* b* Color Values			Color Difference Values				
WebCode	Flag	Samples	L*	a*	b*	ΔL*	Δa*	Δb*	ΔE*	InstrCode
7ZUZ4U		A161 A162	56.13 57.13	24.06 23.93	23.52 23.51	1.00	-0.13	-0.01	1.01	HF
8GTDCV		A161 A162	56.25 57.35	24.32 24.08	23.75 23.51	1.10	-0.25	-0.25	1.15	AJ
8RDJBK		A161 A162	55.84 57.15	24.15 23.78	23.76 23.49	1.31	-0.37	-0.27	1.39	AJ
8TAYLW		A161 A162	56.13 57.14	24.45 24.35	23.74 23.65	1.01	-0.10	-0.09	1.02	MV
98ZGQK		A161 A162	55.90 57.10	24.42 24.21	23.85 23.67	1.20	-0.22	-0.18	1.23	XH
9DBDWF		A161 A162	55.91 57.00	24.39 24.21	24.14 23.97	1.09	-0.19	-0.17	1.11	XO
9JY9GK		A161 A162	56.04 57.24	24.42 24.24	23.81 23.65	1.20	-0.18	-0.17	1.22	GD
9P32PU		A161 A162	56.10 57.21	24.48 24.23	23.73 23.47	1.12	-0.26	-0.26	1.17	AL
ABZRLK		A161 A162	55.92 57.03	24.37 24.22	23.63 23.52	1.11	-0.15	-0.11	1.13	PE
B34CAL		A161 A162	56.23 57.38	24.41 24.21	23.62 23.44	1.15	-0.20	-0.18	1.18	AM
BFTDQT		A161 A162	56.27 57.38	24.36 24.21	23.68 23.56	1.12	-0.15	-0.13	1.13	XI
BGZTYK		A161 A162	56.08 57.20	24.36 24.15	24.22 24.08	1.12	-0.21	-0.14	1.15	GD
C7ZH4H	X	A161 A162	56.17 57.28	23.91 23.68	23.89 23.68	1.11	-0.23	-0.22	1.15	XI
CX4M7J	X	A161 A162	55.58 56.72	24.27 24.04	23.18 23.01	1.14	-0.23	-0.17	1.17	HP
CY2NGH		A161 A162	55.85 57.10	24.33 24.12	23.81 23.61	1.25	-0.22	-0.20	1.28	GD
D9KQQN		A161 A162	56.12 57.20	24.44 24.24	23.62 23.37	1.08	-0.21	-0.26	1.13	AO

			CIE L* a* b* Color Values			Color Difference Values				
WebCode	Flag	Samples	L*	a*	b*	ΔL*	Δa*	Δb*	ΔE*	InstrCode
DQ796J		A161 A162	55.83 57.08	24.59 24.25	23.94 23.66	1.25	-0.34	-0.28	1.32	XH
DWR8CJ		A161 A162	56.05 57.30	24.45 24.08	23.68 23.32	1.25	-0.38	-0.36	1.35	MU
EUGM49		A161 A162	55.93 57.09	24.20 24.07	23.59 23.47	1.16	-0.13	-0.12	1.17	AJ
F4YNYA		A161 A162	56.12 57.32	24.44 24.12	23.38 23.08	1.20	-0.32	-0.30	1.28	AO
FFFB8A		A161 A162	56.03 57.24	24.38 24.08	23.56 23.28	1.21	-0.31	-0.29	1.28	AQ
FLK3KE		A161 A162	56.07 57.28	24.28 23.87	23.73 23.32	1.21	-0.41	-0.41	1.34	MM
GD6TMJ		A161 A162	56.04 56.99	24.16 24.19	23.35 23.33	0.95	0.03	-0.03	0.95	HP
GQEJBD		A161 A162	56.26 57.33	24.30 24.09	23.53 23.32	1.07	-0.21	-0.21	1.11	AJ
H8WYRE		A161 A162	56.04 57.14	24.45 24.19	23.61 23.35	1.10	-0.27	-0.26	1.16	AM
HD3H78		A161 A162	56.23 57.38	24.26 24.07	23.51 23.19	1.15	-0.19	-0.32	1.21	AM
HFMKWD		A161 A162	56.22 57.35	24.53 24.31	23.80 23.62	1.14	-0.22	-0.18	1.17	XI
HG4GPC		A161 A162	56.04 57.13	24.58 24.35	23.56 23.37	1.09	-0.23	-0.19	1.12	MV
K6WMZ4		A161 A162	55.82 56.98	24.34 24.07	23.50 23.26	1.16	-0.28	-0.25	1.22	GD
K7R736		A161 A162	56.28 57.42	24.59 24.33	23.78 23.47	1.15	-0.26	-0.31	1.21	AM
KBPRT9		A161 A162	56.36 57.37	24.50 24.31	23.87 23.73	1.02	-0.19	-0.14	1.04	MM
LWG4G6		A161 A162	55.97 57.09	24.51 24.26	24.01 23.77	1.12	-0.25	-0.24	1.17	XH

			CIE L* a* b* Color Values			Color Difference Values				
WebCode	Flag	Samples	L*	a*	b*	ΔL*	Δa*	Δb*	ΔE*	InstrCode
LWZ8N6		A161 A162	56.33 57.43	24.64 24.46	23.82 23.65	1.10	-0.19	-0.17	1.12	AO
M2BK74		A161 A162	55.73 56.90	24.35 24.08	23.39 23.16	1.17	-0.27	-0.23	1.22	XH
MFQNPD		A161 A162	55.71 56.84	24.48 24.21	23.68 23.38	1.13	-0.28	-0.30	1.20	XH
MXPQDA		A161 A162	55.79 56.99	24.36 24.08	23.93 23.69	1.21	-0.28	-0.25	1.26	XO
MXU9C9		A161 A162	56.11 57.26	24.48 24.23	23.42 23.19	1.15	-0.25	-0.24	1.20	AJ
N233KA		A161 A162	55.81 56.90	24.26 24.06	23.40 23.21	1.09	-0.21	-0.19	1.13	XH
N27KJ9		A161 A162	56.00 57.18	24.41 24.13	23.56 23.31	1.18	-0.28	-0.25	1.24	XI
N9NT86		A161 A162	56.05 57.28	24.30 23.93	24.07 23.71	1.23	-0.37	-0.36	1.33	XO
NDJM67		A161 A162	55.95 56.99	24.19 23.89	23.68 23.43	1.05	-0.31	-0.25	1.12	MG
NTUJ87		A161 A162	56.36 57.44	24.59 24.38	24.02 23.79	1.08	-0.22	-0.23	1.12	MK
P2ZT4X	X	A161 A162	56.42 57.51	24.94 24.78	24.27 24.12	1.09	-0.17	-0.16	1.11	CA
PBNN4D		A161 A162	56.20 57.35	24.18 23.93	23.51 23.22	1.15	-0.25	-0.29	1.21	XI
Q2DLHC		A161 A162	55.95 57.11	24.48 24.14	23.38 23.04	1.16	-0.34	-0.34	1.25	AJ
Q3QDBU		A161 A162	56.26 57.35	24.44 24.20	23.80 23.57	1.09	-0.24	-0.23	1.14	MT
Q4PCT3		A161 A162	55.86 57.06	24.30 24.01	23.39 23.13	1.20	-0.29	-0.26	1.26	AJ
QA9J8Z		A161 A162	56.15 57.28	24.55 24.40	23.65 23.53	1.13	-0.15	-0.13	1.14	MV

			CIE L* a* b* Color Values			Color Difference Values				
WebCode	Flag	Samples	L*	a*	b*	ΔL*	Δa*	Δb*	ΔE*	InstrCode
QAT62C		A161 A162	56.04 57.20	24.24 24.10	23.45 23.30	1.16	-0.14	-0.15	1.18	AO
QGA2H7		A161 A162	56.13 57.23	24.42 24.15	23.56 23.30	1.10	-0.27	-0.26	1.16	AJ
QKX4W8		A161 A162	55.97 57.13	24.34 24.08	23.56 23.35	1.16	-0.26	-0.21	1.21	XH
QUYQN4		A161 A162	56.03 57.19	24.52 24.19	23.91 23.58	1.16	-0.34	-0.34	1.25	XH
R2UV9R		A161 A162	56.15 57.33	24.39 24.09	23.54 23.26	1.18	-0.30	-0.29	1.25	MM
RHLN37		A161 A162	56.08 57.21	24.34 24.14	23.80 23.63	1.14	-0.20	-0.17	1.16	XI
RRKQV2		A161 A162	56.07 57.23	24.46 24.24	23.43 23.29	1.16	-0.22	-0.14	1.19	AJ
RUFCPT		A161 A162	56.17 57.36	24.38 24.08	23.49 23.26	1.20	-0.30	-0.23	1.25	AQ
TFDXC3		A161 A162	56.18 57.31	24.44 24.19	23.76 23.50	1.13	-0.25	-0.27	1.18	AM
THCDEX		A161 A162	56.04 57.16	24.54 24.36	23.82 23.65	1.12	-0.18	-0.17	1.14	AJ
TKJVDU		A161 A162	55.94 57.25	24.51 24.15	23.69 23.37	1.31	-0.37	-0.33	1.40	AM
TTYEWT		A161 A162	55.97 57.07	24.33 24.16	23.66 23.56	1.10	-0.17	-0.10	1.12	HP
TX9RER		A161 A162	56.10 57.18	24.45 24.27	23.50 23.33	1.08	-0.18	-0.17	1.11	AM
UNZHK8		A161 A162	56.11 57.14	24.40 24.21	23.72 23.59	1.03	-0.20	-0.13	1.06	XI
URZTG8		A161 A162	55.98 57.11	24.14 23.85	23.41 23.15	1.13	-0.29	-0.25	1.19	MM
UZFADN		A161 A162	56.11 57.29	24.54 24.20	23.68 23.36	1.18	-0.34	-0.33	1.27	MV

			CIE L* a* b* Color Values			Color Difference Values				
WebCode	Flag	Samples	L*	a*	b*	ΔL*	Δa*	Δb*	ΔE*	InstrCode
VGWNCX		A161 A162	56.11 57.37	24.46 24.17	23.82 23.56	1.26	-0.29	-0.27	1.31	XI
VKWZ9X		A161 A162	55.95 57.20	24.54 24.23	23.46 23.19	1.25	-0.31	-0.27	1.31	AJ
W8LVC2		A161 A162	55.98 57.06	24.16 23.97	23.99 23.81	1.08	-0.19	-0.18	1.11	XM
WELDPT		A161 A162	56.15 57.28	24.42 24.12	23.60 23.32	1.14	-0.30	-0.28	1.21	AJ
WMY6D6		A161 A162	56.17 57.22	24.08 23.88	23.47 23.36	1.06	-0.20	-0.11	1.08	GF
WN9CFX		A161 A162	55.69 56.78	24.50 24.33	23.93 23.77	1.09	-0.17	-0.17	1.11	CA
WYBUQ2		A161 A162	56.33 57.42	24.49 24.29	23.54 23.36	1.09	-0.20	-0.18	1.12	AO
XN6CT3		A161 A162	55.99 57.05	24.36 24.16	23.48 23.31	1.06	-0.20	-0.18	1.09	AM
XN72YL		A161 A162	56.08 57.19	24.25 23.99	23.58 23.36	1.11	-0.26	-0.23	1.16	MM
XXUWY2		A161 A162	56.00 57.04	24.10 23.90	23.48 23.28	1.05	-0.20	-0.20	1.08	MM
XYPFZ3		A161 A162	56.17 57.21	24.24 23.90	24.02 23.67	1.04	-0.34	-0.35	1.15	XO
Y7NFYV		A161 A162	56.22 57.36	24.53 24.18	23.66 23.33	1.15	-0.35	-0.34	1.24	AO
YNJX6Q		A161 A162	55.94 57.14	24.45 24.17	23.34 23.06	1.20	-0.28	-0.28	1.26	AJ
YPEDE2		A161 A162	56.06 57.23	24.39 24.17	23.70 23.52	1.17	-0.22	-0.18	1.20	XI
ZAK9NJ		A161 A162	56.15 57.27	24.42 24.16	23.61 23.36	1.12	-0.26	-0.25	1.18	AQ
ZFMHTQ		A161 A162	56.14 57.29	24.48 24.32	23.60 23.43	1.15	-0.16	-0.17	1.17	AJ

			CIE L* a* b* Color Values			Color Difference Values				
WebCode	Flag	Samples	L*	a*	b*	ΔL*	Δa*	Δb*	ΔE*	InstrCode
ZQ9LZQ		A161	56.26	24.21	23.65	1.15	-0.27	-0.28	1.21	AJ
		A162	57.41	23.94	23.37					
ZWAXVM		A161	56.15	24.23	23.44	1.11	-0.15	-0.15	1.13	MM
		A162	57.26	24.08	23.30					

Summary Statistics

Samples	L*	a*	b*	ΔL*	Δa*	Δb*	ΔE*
Grand Means							
A161	56.07	24.38	23.64				
A162	57.20	24.14	23.43	1.13	-0.24	-0.21	1.18
Stnd Dev Btwn Labs							
A161	0.15	0.13	0.22				
A162	0.14	0.14	0.23	0.07	0.07	0.08	0.08

Statistics based on 93 of 98 reporting participants

Comments Assigned on Data Flags for Test #409

2KF2AF(X) - Low "L*" values and high "a*" values.

2ZNRCK(X) - High "b*" values. Inconsistent between the duplicate measurements for L* values for A161, and L* a* and b* values for Sample A162.

C7ZH4H(X) - Low "a*" values.

CX4M7J(X) - Low "L*" values.

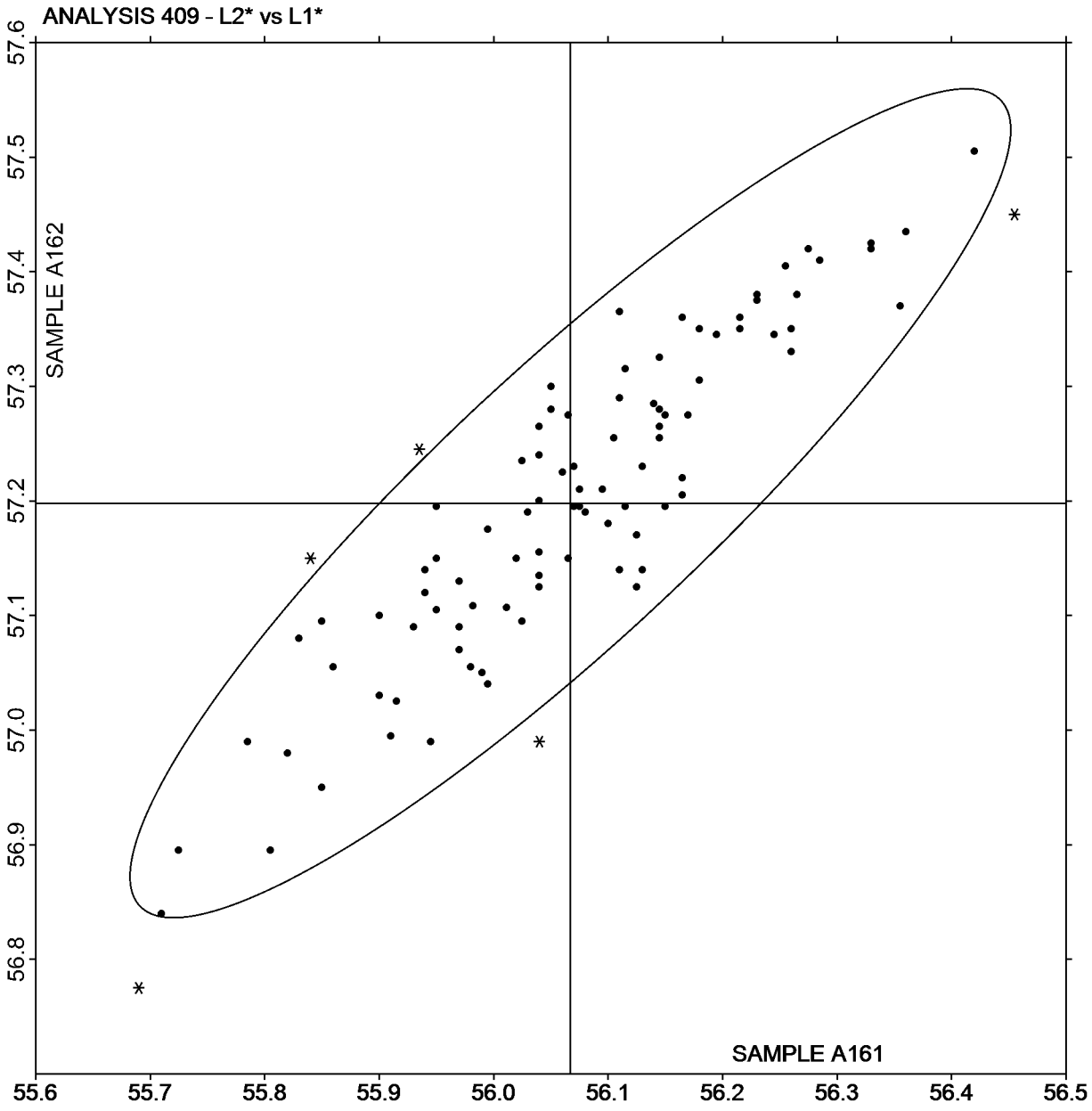
P2ZT4X(X) - High "a*" and "b*" values.

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	CA	Cary 5000
GD	BYK-Gardner spectro-guide sphere	GF	BYK-Gardner The Color Sphere (TCS)
HF	Hunter ColorFlex Diffuse	HG	Hunter ColorQUEST
HP	Hunter UltraScan PRO	MG	Macbeth 2180 Color Eye
MI	Macbeth Color i 5	MK	Macbeth Color-Eye 7000
MM	Macbeth Color-Eye 7000a	MT	Minolta CM-2600d
MU	Minolta	MV	Minolta CM-3000d Series Spectrophotometer
PE	Perkin Elmer Spectrophotometer	XH	X-Rite Color i5
XI	X-Rite Color i7	XM	X-Rite SP62 Portable Sphere Spectrophotometer
XO	X-Rite SP64 Portable Sphere Spectrophotometer	XX	Instrument make/model not specified by lab

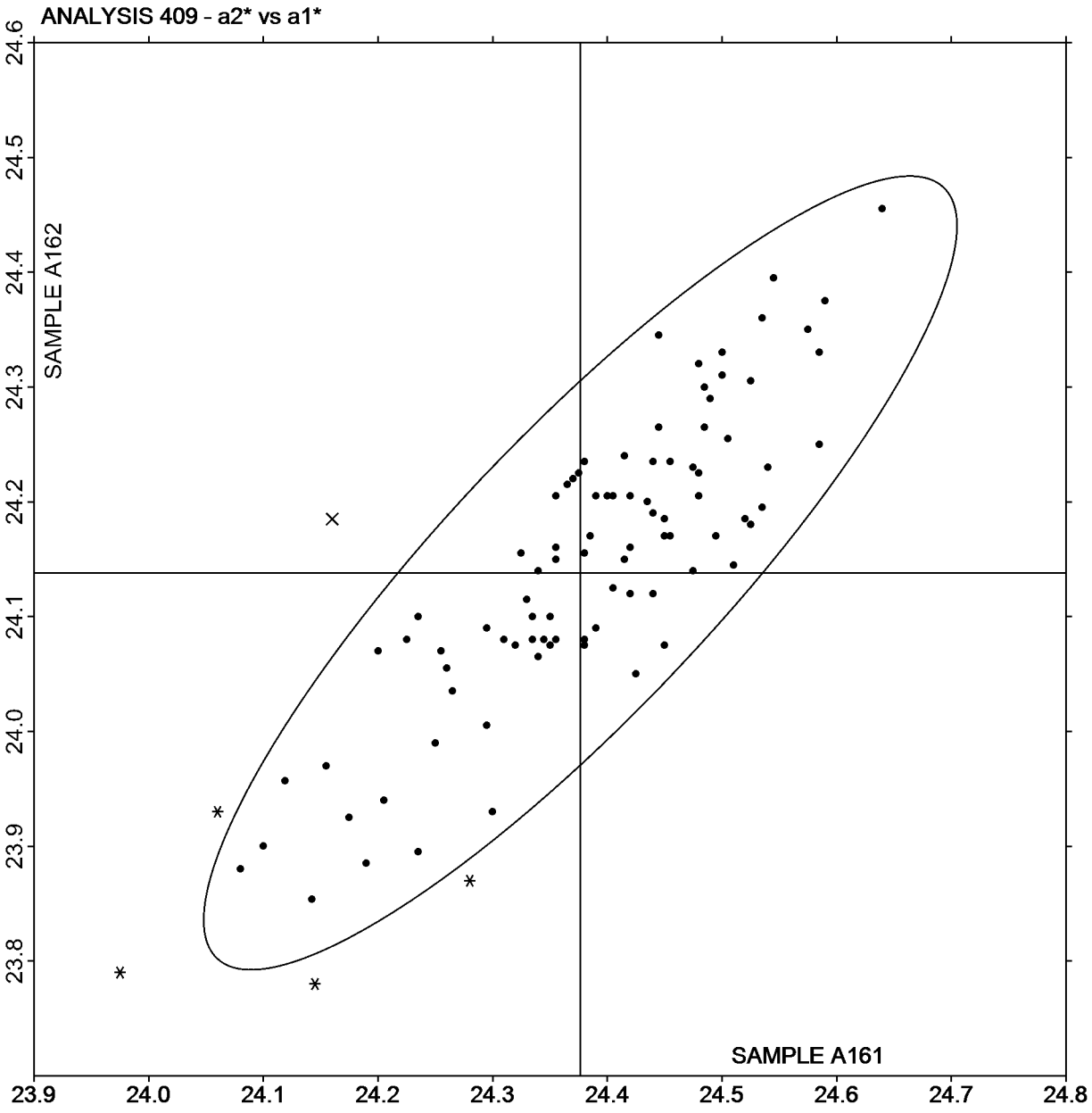
L2* vs L1*

SAMPLE A161 = 56.07 SAMPLE A162 = 57.20



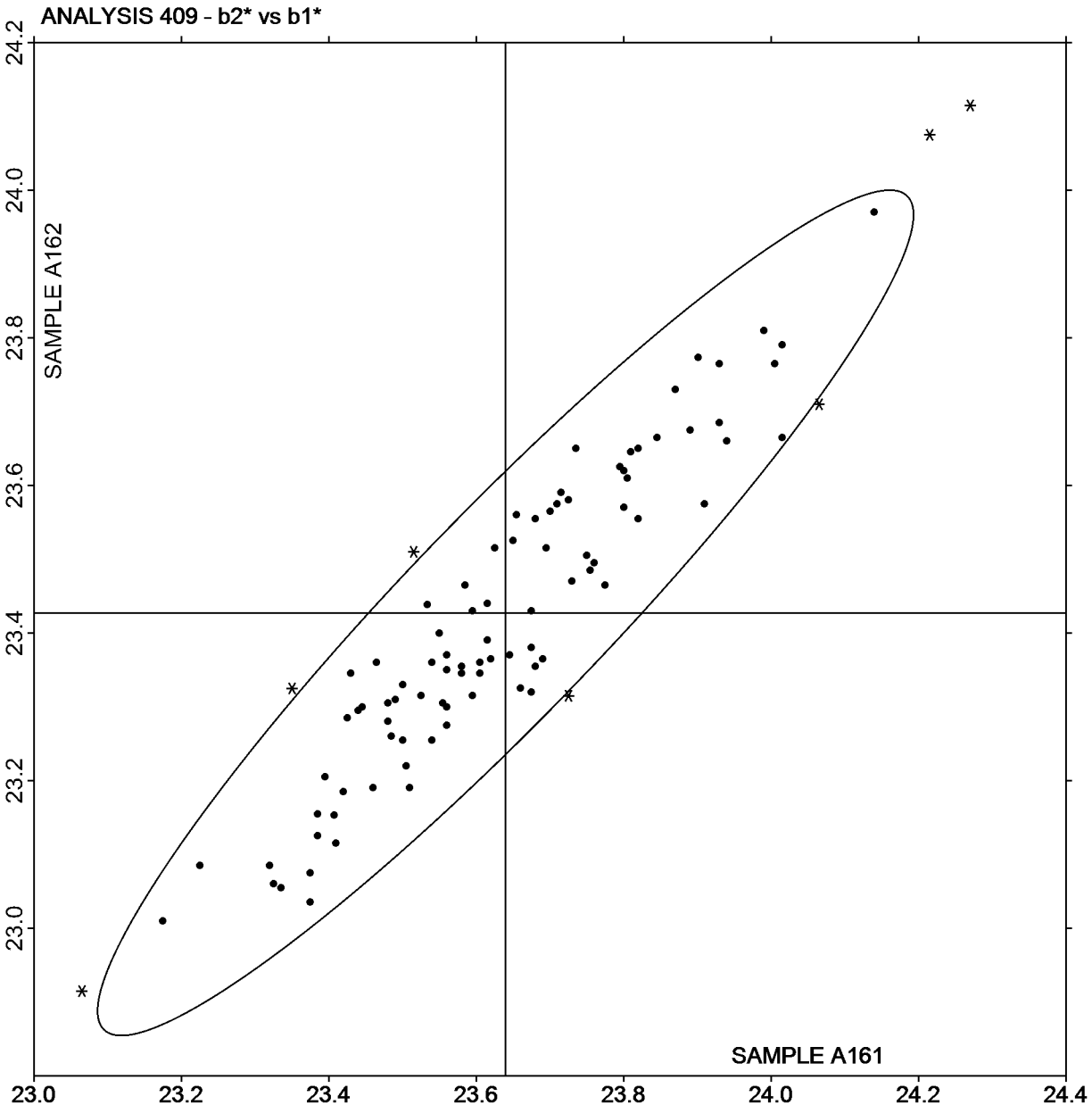
a2* vs a1*

SAMPLE A161 = 24.38 SAMPLE A162 = 24.14



b2* vs b1*

SAMPLE A161 = 23.64 SAMPLE A162 = 23.43



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 A161											
2KF2AF	X	9.40	10.32X	11.31X	11.83X	12.01X	12.65X	13.98X	15.66X	18.91X	28.39X	38.74X	42.99X	44.48X	46.39X	49.26X	52.11X	AJ
2KYPTV		10.23	11.20	12.33	12.90	13.08	13.81	15.21	16.99	20.65	30.35	40.68	44.71	46.26	48.10	51.13	53.71	XI
2U3ZZL		10.69	11.34	12.53	13.13	13.25	13.99	15.41	17.13	20.27	29.90	40.84	45.03	46.40	48.10	51.25	55.28	HP
2ZNRCK	X	31.87X	12.07X	12.33	13.68X	14.25X	15.44X	17.32X	19.56X	23.73X	35.12X	47.48X	52.27X	53.24X	54.94X	58.48X	62.50X	XX
2ZQMVQ		10.41	11.46	12.62	13.19	13.29	14.02	15.41	17.22	20.81	30.44	41.01	45.18	46.67	48.47	51.26	55.35	MM
34J4KP		10.47	11.36	12.48	13.03	13.15	13.91	15.30	17.05	20.72	30.39	40.83	44.88	46.35	48.21	51.19	55.37	XI
38KA2G		10.53	11.42	12.54	13.09	13.23	13.98	15.40	17.18	20.95	30.76	41.05	45.12	46.68	48.49	51.46	55.55	XI
3E3KDW		10.51	11.40	12.57	13.09	13.25	14.03	15.41	17.18	20.96	30.82	41.16	45.15	46.47	48.36	51.33	55.34	XI
3FX4EX		10.45	11.37	12.47	13.09	13.19	13.96	15.34	17.12	20.86	30.35	40.77	45.05	46.44	48.25	51.11	55.05	MI
3L33QN		10.50	11.44	12.55	13.16	13.32	13.99	15.39	17.16	20.68	30.19	40.60	45.12	46.69	48.63	51.67	55.13	XX
4V92YP		10.79	11.46	12.59	13.13	13.26	13.98	15.37	17.10	20.79	30.43	40.96	45.23	46.70	48.55	51.62	54.83	AM
6K3J2R		10.50	11.37	12.52	13.10	13.24	13.99	15.35	17.19	20.84	30.27	40.72	45.01	46.54	48.36	51.14	55.20	MM
6UT68P		10.93	11.74	12.83	13.38	13.50	14.25	15.65	17.46	21.14	30.60	40.92	45.27	46.86	48.63	51.40	55.46	MM
77FQPP		10.59	11.43	12.56	13.13	13.31	14.03	15.43	17.18	20.63	30.42	41.11	45.30	46.87	48.77	51.53	54.16	AO
7BBKMQ		22.10X	12.26X	12.52	12.98	13.14	13.87	15.35	17.23	21.04	30.61	40.68	44.92	46.62	48.42	51.24	55.39	HG
7KWNVQ		10.58	11.47	12.63	13.16	13.32	14.06	15.48	17.26	21.01	30.70	41.17	45.24	46.69	48.51	51.29	55.42	MM
7ZUZ4U		10.36	11.65	12.60	13.14	13.28	14.05	15.46	17.23	21.11	30.34	40.85	45.04	46.37	48.30	51.36	55.06	HF
8RDJBK		10.27	11.25	12.32	12.90	13.10	13.79	15.17	17.08	20.83	30.06	40.21	44.86	46.60	48.47	51.51	55.21	AJ
8TAYLW		10.39	11.32	12.51	13.16	13.24	13.98	15.37	17.11	20.83	30.58	41.33	45.36	46.81	48.58	51.45	55.52	MV
98ZGQK		10.24	11.26	12.34	12.89	13.02	13.81	15.22	16.99	20.73	30.45	40.80	44.86	46.30	48.15	51.13	55.18	XH
9DBDWF		10.18	11.20	12.22	12.77	12.96	13.71	15.07	16.82	20.84	30.93	40.82	44.69	46.22	48.01	51.01	54.91	XO
9JY9GK		12.07	11.13	12.37	13.04	13.07	14.02	15.29	17.20	20.93	30.14	41.14	45.19	46.33	48.03	50.91	54.61	GD
9P32PU		10.44	11.38	12.47	13.10	13.23	13.95	15.40	17.20	20.84	30.51	41.07	45.35	46.87	48.67	51.55	55.68	AL
ABZRLK		10.45	11.23	12.46	13.01	13.11	13.87	15.27	17.02	20.45	30.34	41.03	45.03	46.41	48.18	51.02	55.18	PE
B34CAL		10.73	11.49	12.64	13.22	13.39	14.12	15.52	17.35	20.85	30.82	41.18	45.46	46.87	48.82	51.83	55.69	AM

CTS Interlaboratory Testing Program for Color & Appearance

Analysis 411

Spectrophotometric - Sphere Geometry Instruments

Reflectance at 16 Selected Wavelengths

Report #175
1st Qtr 2016

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 A161																		
BFTDQT		10.57	11.48	12.62	13.21	13.33	14.10	15.51	17.30	21.07	30.95	41.27	45.33	46.83	48.58	51.56	55.64	XI
BGZTYK		8.81	11.31	12.24	12.89	13.06	13.90	15.04	17.17	20.92	31.29	40.37	45.17	46.43	48.19	51.00	54.91	GD
C7ZH4H		10.63	12.42X	12.50	13.01	13.24	14.05	15.48	17.23	21.13	30.86	40.90	44.79	46.34	48.24	51.25	55.25	AQ
CX4M7J		10.44	11.28	12.52	12.95	13.10	13.84	15.18	16.91	20.17	29.42	40.19	44.62	46.06	47.72	50.50X	54.67	HP
CY2NGH		10.40	11.16	12.21	12.92	13.09	13.55X	15.16	17.01	20.25	30.72	40.62	44.75	46.31	47.98	50.80	55.40	GD
D9KQQN		10.50	11.40	12.60	13.10	13.30	14.00	15.40	17.10	20.60	30.55	41.20	45.40	46.90	48.70	51.50	53.90	AO
DQ796J		10.27	11.16	12.25	12.81	12.93	13.71	15.04	16.82	20.68	30.58	40.80	44.78	46.24	47.98	50.92	55.09	XH
DWR8CJ		10.42	11.32	12.48	13.11	13.57	14.65X	15.38	17.09	20.67	30.42	41.19	45.28	46.72	48.39	51.49	55.56	MV
EUGM49		12.23	11.27	12.43	13.05	13.19	13.91	15.34	17.10	20.83	30.41	40.57	44.77	46.27	48.03	51.00	54.24	AJ
F4YNYA		10.58	11.54	12.68	13.21	13.37	14.05	15.45	17.27	20.78	30.52	40.97	45.36	46.78	48.73	51.78	55.33	AO
FFFB8A		10.43	11.39	12.54	13.11	13.28	13.95	15.37	17.12	20.83	30.44	40.87	45.16	46.60	48.46	51.38	55.10	AQ
FLK3KE		10.48	11.33	12.50	13.06	13.21	13.96	15.36	17.19	20.84	30.41	40.98	45.20	46.76	48.62	51.52	55.70	MM
GD6TMJ		10.57	11.48	12.62	13.19	13.30	14.07	15.49	17.28	20.75	30.10	40.91	45.25	46.63	48.38	51.22	55.27	HP
GQEJBD		10.63	11.53	12.71	13.26	13.43	14.18	15.57	17.36	20.79	30.69	41.19	45.59	47.04	48.99	51.99	54.45	AJ
H8WYRE		10.34	11.35	12.52	13.09	13.24	13.94	15.36	17.11	20.85	30.45	41.08	45.23	46.66	48.55	51.62	54.88	AM
HD3H78		10.51	11.43	12.67	13.28	13.42	14.18	15.57	17.37	20.93	30.64	41.19	45.38	46.93	48.84	51.82	55.68	AM
HFMKWD		10.53	11.45	12.57	13.08	13.25	13.99	15.39	17.16	20.97	31.06	41.43	45.22	46.64	48.50	51.53	55.63	XI
HG4GPC		10.59	11.40	12.55	13.12	13.21	13.91	15.35	17.06	20.60	30.52	41.24	45.36	46.67	48.51	51.47	55.68	MV
K7R736		10.58	11.47	12.61	13.21	13.35	14.05	15.46	17.24	21.08	30.93	41.32	45.71	47.12	49.03	51.97	54.92	AM
KBPRT9		10.59	11.44	12.66	13.17	13.31	14.08	15.48	17.29	21.11	26.21X	41.69	45.47	46.82	48.57	51.39	55.52	MM
LWG4G6		10.30	11.19	12.35	12.89	12.97	13.78	15.15	16.91	20.75	30.69	41.08	45.05	46.42	48.15	51.10	55.19	XH
LWZ8N6		10.62	11.48	12.60	13.20	13.37	14.09	15.47	17.23	20.80	31.21	41.81	45.64	46.92	48.68	51.25	53.81	XI
M2BK74		10.40	11.28	12.39	12.99	13.07	13.78	15.16	16.93	20.56	30.00	40.40	44.66	46.01	48.00	50.78	55.12	MI
MFQNPD		10.23	11.14	12.27	12.83	12.97	13.73	15.10	16.87	20.52	29.98	40.54	44.79	46.19	47.99	50.87	54.99	XH
MXPQDA		10.39	11.15	12.31	12.77	13.01	13.72	15.21	17.03	20.83	30.13	40.64	44.85	46.56	48.40	51.42	55.49	XO

Spectrophotometric Reflectance values (as %) at selected wavelengths

WebCode	Data Flag	400	420	440	460	480	500	520	540	560	580	600	620	640	660	680	700	Instr Code
Sample A161																		
MXU9C9		10.57	11.57	12.62	13.19	13.37	14.05	15.44	17.23	20.72	30.48	41.03	45.39	46.80	48.72	51.84	55.43	AJ
N233KA		10.52	11.33	12.44	13.01	13.12	13.87	15.24	17.05	20.68	29.97	40.42	44.72	46.34	48.20	51.10	55.09	XH
N27KJ9		10.55	11.42	12.53	13.05	13.18	13.92	15.29	17.07	20.78	30.61	40.90	44.93	46.37	48.22	51.10	55.18	XI
N9NT86		10.36	11.21	12.36	12.90	13.08	13.82	15.28	17.09	21.04	30.72	41.18	44.91	46.57	48.27	51.35	55.41	XO
NDJM67		10.53	11.26	12.45	12.96	13.07	13.87	15.29	17.03	20.78	30.51	40.67	44.71	46.30	48.09	50.98	54.79	MG
NTUJ87		10.51	11.39	12.59	13.14	13.27	14.05	15.44	17.25	21.10	31.32	41.82	45.50	46.85	48.57	51.43	55.53	MK
P2ZT4X		10.63	11.44	12.69	13.24	13.35	14.12	15.52	17.31	20.94	31.33	42.13X	45.89	47.15	48.87	51.76	55.90	CA
PBNN4D		10.58	11.53	12.70	13.21	13.35	14.11	15.55	17.24	20.92	30.76	41.20	45.09	46.54	48.42	51.29	55.40	XI
Q2DLHC		10.63	11.49	12.55	13.10	13.21	13.92	15.32	17.11	20.72	30.24	40.72	45.13	46.70	48.54	51.42	55.52	AJ
Q3QDBU		10.40	11.37	12.59	13.22	13.33	14.05	15.51	17.25	20.92	30.78	41.40	45.61	47.03	48.78	51.61	55.89	MT
Q4PCT3		10.51	11.42	12.47	13.06	13.23	13.92	15.30	17.10	20.54	29.87	40.55	45.08	46.64	48.52	51.44	55.46	AJ
QAT62C		10.50	11.40	12.60	13.15	13.30	14.00	15.40	17.20	20.60	30.35	40.80	45.15	46.80	48.70	51.45	53.70	AO
QGA2H7		11.36	11.48	12.61	13.15	13.35	14.07	15.48	17.26	20.82	30.56	41.01	45.43	46.84	48.74	51.86	55.45	AJ
QUYQN4		10.38	11.29	12.37	12.97	13.10	13.85	15.24	17.06	20.85	30.67	41.08	45.11	46.56	48.42	51.39	55.50	XH
R2UV9R		10.60	11.45	12.63	13.18	13.32	14.05	15.45	17.29	20.93	30.53	41.13	45.28	46.82	48.71	51.62	55.78	MM
RHLN37		10.55	11.39	12.47	13.02	13.11	13.93	15.34	17.16	20.93	30.74	40.98	45.06	46.43	48.17	51.14	55.18	XI
RRKQV2		10.55	11.57	12.65	13.12	13.24	13.96	15.40	17.15	20.96	30.44	40.87	45.28	46.84	48.76	51.76	54.44	AJ
RUFCPT		11.66	11.59	12.60	13.21	13.37	14.07	15.50	17.27	20.97	30.52	40.97	45.46	46.97	48.85	52.02	55.77	AQ
TFDXC3		10.46	11.39	12.52	13.11	13.29	14.04	15.49	17.28	20.91	30.61	41.10	45.54	47.05	48.91	51.98	54.70	AM
THCDEX		10.45	11.29	12.46	13.02	13.24	13.98	15.36	17.10	20.66	30.52	41.04	45.35	46.87	48.69	51.43	54.31	AJ
TKJVDU		10.42	11.26	12.37	13.01	13.18	13.91	15.32	17.10	20.58	30.21	40.82	45.31	46.82	48.69	51.77	55.09	AM
TTYEWT		10.77	11.21	12.45	12.97	13.17	13.98	15.35	17.05	20.74	30.11	40.97	45.19	46.51	48.08	51.17	55.25	HP
TX9RER		11.08	11.47	12.59	13.16	13.33	14.02	15.43	17.23	20.70	30.50	41.02	45.34	46.79	48.73	51.94	55.62	AM
UNZHK8		10.57	11.40	12.54	13.06	13.21	13.91	15.28	17.15	21.01	30.84	41.06	45.01	46.40	48.20	51.10	55.14	XI
URZTG8		10.52	11.43	12.55	13.14	13.27	13.99	15.40	17.20	20.77	30.12	40.68	45.04	46.65	48.53	51.33	55.34	MM

CTS Interlaboratory Testing Program for Color & Appearance

Analysis 411

Spectrophotometric - Sphere Geometry Instruments

Reflectance at 16 Selected Wavelengths

Report #175
1st Qtr 2016

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 A161																		
UZFADN		10.55	11.37	12.58	13.14	13.19	13.99	15.37	17.11	20.73	30.73	41.36	45.35	46.72	48.51	51.39	55.64	MV
VGWNCX		10.51	11.33	12.49	13.03	13.17	13.93	15.36	17.17	20.87	30.77	41.17	45.16	46.56	48.42	51.32	55.48	XI
VKWZ9X		10.57	11.41	12.56	13.06	13.21	13.88	15.30	17.07	20.58	30.44	40.83	45.16	46.47	48.39	51.35	54.23	AJ
W8LVC2		10.75	11.45	12.72	13.20	13.35	14.14	15.60	17.44	21.74X	31.65	41.75	45.59	46.74	48.10	51.37	55.17	HW
WELDPT		10.54	11.41	12.60	13.18	13.35	14.08	15.48	17.27	20.79	30.57	41.12	45.40	46.92	48.89	51.62	54.39	AJ
WN9CFX		10.11	10.92	12.18	12.75	12.89	13.64	15.06	16.83	20.26	30.08	40.71	44.78	46.12	47.93	50.73	54.77	CA
WYBUQ2		10.66	11.57	12.76	13.29	13.46	14.20	15.61	17.38	20.88	30.84	41.53	45.72	47.24	49.11	51.73	54.28	AO
XN6CT3		10.96	11.45	12.54	13.09	13.21	13.96	15.37	17.15	20.17	30.16	40.63	45.28	46.87	48.79	51.86	55.00	AM
XN72YL		10.55	11.41	12.55	13.13	13.25	14.00	15.38	17.20	20.83	30.47	41.01	45.14	46.64	48.49	51.33	55.42	MM
XXUWY2		10.50	11.43	12.51	13.12	13.26	14.01	15.39	17.20	20.86	30.22	40.61	45.05	46.63	48.42	51.24	55.25	MM
XYPFZ3		10.38	11.25	12.46	13.00	13.18	13.94	15.39	17.25	21.11	30.71	41.25	45.11	46.64	48.66	51.66	55.54	XO
Y7NFYV		10.54	11.48	12.58	13.21	13.35	14.04	15.46	17.25	20.92	30.71	41.31	45.53	46.88	48.80	51.75	55.60	AO
YNJX6Q		10.50	11.43	12.55	13.13	13.30	13.99	15.37	17.13	20.49	30.19	40.68	45.17	46.73	48.75	51.75	54.60	AJ
YPEDE2		10.46	11.32	12.52	13.05	13.20	13.92	15.33	17.13	20.87	30.67	41.04	45.00	46.48	48.35	51.24	55.23	XI
ZFMHTQ		10.58	11.45	12.60	13.16	13.33	14.07	15.45	17.18	20.75	30.59	41.18	45.42	46.89	48.81	51.46	53.39X	AO
ZWAXVM		10.36	11.50	12.65	13.22	13.36	14.10	15.49	17.33	21.00	30.47	40.91	45.19	46.78	48.61	51.47	55.69	MM

Summary Statistics

	400	420	440	460	480	500	520	540	560	580	600	620	640	660	680	700
Grand Means	10.68	11.40	12.52	13.08	13.23	13.97	15.37	17.15	20.80	30.47	40.99	45.17	46.64	48.47	51.39	55.12
Stnd Dev Btwn Labs	1.28	0.19	0.13	0.12	0.13	0.14	0.13	0.13	0.23	0.57	0.34	0.27	0.26	0.29	0.31	0.53

Comments Assigned on Data Flags for Test #411

2KF2AF (X) - Low % reflectance data for most wavelengths.

2ZNRCK (X) - High % reflectance data for most wavelengths.

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 650	AQ	ACS-Datacolor 600X	CA	Cary 5000
GD	BYK-Gardner spectro-guide sphere	HF	Hunter ColorFlex Diffuse	HG	Hunter ColorQUEST
HP	Hunter UltraScan PRO	HW	Hunter UltraScan XE	MG	Macbeth 2180 Color Eye
MI	Macbeth Color i5	MK	Macbeth Color-Eye 7000 Spectrophotometer	MM	Macbeth Color-Eye 7000a
MT	Minolta CM-2600d	MV	Minolta CM-3000d Series Spectrophotometer	PE	Perkin Elmer Spectrophotometer
XH	X-Rite Color i5	XI	X-Rite Color i7	XO	X-Rite SP64
XX	Instrument make/model not specified by lab				

Interlaboratory Testing Program for Color & Appearance

Analysis 440

60 Degree Gloss - Paint Chips

ASTM Method D 523

WebCode	Data Flag	Sample E161 Lab Mean	Sample E161 Difference from Grand Mean	Sample E161 Comparative Performance Value	Sample E162 Lab Mean	Sample E162 Difference from Grand Mean	Sample E162 Comparative Performance Value	Instr Code
38KA2G		29.13	-0.17	-0.41	38.40	-0.30	-0.60	GL
3E3KDW		29.29	-0.01	-0.03	38.70	0.00	0.00	GL
3FX4EX		29.08	-0.22	-0.52	38.50	-0.20	-0.40	GL
4BJKXG		29.23	-0.07	-0.17	38.38	-0.33	-0.64	XX
6K3J2R		29.40	0.10	0.24	39.05	0.35	0.69	GL
6MBMXN		30.18	0.88	2.05	39.45	0.75	1.48	GK
77EV8J		29.30	0.00	0.00	38.58	-0.13	-0.25	GK
7KWNVQ		29.43	0.13	0.30	38.80	0.10	0.20	RA
9DBDWF		29.43	0.13	0.30	39.05	0.35	0.69	GK
9JG4YL		28.93	-0.37	-0.88	38.58	-0.13	-0.25	GL
9JY9GK		28.93	-0.37	-0.88	38.15	-0.55	-1.09	GB
9P32PU		29.00	-0.30	-0.70	38.43	-0.28	-0.55	GL
BFTDQT		30.03	0.73	1.70	39.53	0.82	1.63	GL
BGZTYK		29.89	0.59	1.39	39.01	0.31	0.61	GN
CX4M7J		29.65	0.35	0.82	39.30	0.60	1.19	XX
CY2NGH	*	29.05	-0.25	-0.58	37.85	-0.85	-1.68	GB
DQ796J		29.58	0.28	0.65	38.73	0.02	0.05	GL
DWR8CJ		29.40	0.10	0.24	38.85	0.15	0.30	GL
EAUYTG		29.15	-0.15	-0.35	38.60	-0.10	-0.20	GL
ED9TAE	X	28.63	-0.67	-1.58	37.13	-1.58	-3.12	GK
EDQKKJ		29.18	-0.12	-0.29	38.70	0.00	0.00	GN
EUGM49		28.75	-0.55	-1.28	37.65	-1.05	-2.08	GK
EZJW8G		29.28	-0.02	-0.06	38.65	-0.05	-0.10	GX
F4YNYA		28.45	-0.85	-1.99	38.15	-0.55	-1.09	GQ
GCQLYG		28.70	-0.60	-1.40	38.00	-0.70	-1.39	GL
GQEJBD		29.73	0.43	1.00	39.13	0.42	0.84	XX
H64VCL		29.48	0.18	0.41	38.78	0.07	0.15	GL
H8WYRE		29.55	0.25	0.59	38.93	0.22	0.44	GQ
HD3H78		29.28	-0.02	-0.06	38.83	0.12	0.25	GK
HG4GPC		29.53	0.23	0.53	38.55	-0.15	-0.30	RA

WebCode	Data Flag	Sample E161 Lab Mean	Sample E161 Difference from Grand Mean	Sample E161 Comparative Performance Value	Sample E162 Lab Mean	Sample E162 Difference from Grand Mean	Sample E162 Comparative Performance Value	Instr Code
HGH4YE		28.95	-0.35	-0.82	38.48	-0.23	-0.45	GK
J882DD		29.05	-0.25	-0.58	38.68	-0.03	-0.05	GK
K6WMZ4		28.88	-0.42	-0.99	37.75	-0.95	-1.88	GB
L8L8P9		29.05	-0.25	-0.58	38.68	-0.03	-0.05	GK
LHJEZX		29.50	0.20	0.47	39.05	0.35	0.69	XX
LWG4G6		29.30	0.00	0.00	38.83	0.12	0.25	GL
M2BK74		29.15	-0.15	-0.35	39.05	0.35	0.69	GL
MUVWF9	X	28.13	-1.17	-2.75	36.73	-1.98	-3.91	GB
MXPQDA		29.00	-0.30	-0.70	38.70	0.00	0.00	GL
N233KA		29.50	0.20	0.47	39.00	0.30	0.59	GL
N9NT86		29.63	0.33	0.76	39.00	0.30	0.59	GN
QUYQN4		29.43	0.13	0.30	38.93	0.22	0.44	GK
RA87YX		29.35	0.05	0.12	38.73	0.02	0.05	GA
RHLN37		29.90	0.60	1.41	39.30	0.60	1.19	GL
THCDEX		29.05	-0.25	-0.58	38.80	0.10	0.20	MW
UNZHK8		29.00	-0.30	-0.70	38.75	0.05	0.10	GL
URZTG8		28.60	-0.70	-1.64	37.70	-1.00	-1.98	GL
V4RFM3		29.10	-0.20	-0.47	38.23	-0.48	-0.94	GL
VX6RRW		29.68	0.38	0.88	38.73	0.02	0.05	GK
VYZBTY		29.38	0.08	0.18	38.58	-0.13	-0.25	GL
W8LVC2		28.90	-0.40	-0.93	38.20	-0.50	-0.99	GK
WELDPT	*	30.58	1.28	2.99	40.10	1.40	2.77	MW
WMY6D6		28.75	-0.55	-1.28	38.05	-0.65	-1.29	GL
WN9CFX		29.18	-0.12	-0.29	38.70	0.00	0.00	GL
WWQK4U		29.20	-0.10	-0.23	38.33	-0.38	-0.74	GL
XN72YL		29.35	0.05	0.12	38.70	0.00	0.00	GL
XYPFZ3		28.98	-0.32	-0.76	38.30	-0.40	-0.79	XX
Y77D8M		29.50	0.20	0.47	38.95	0.25	0.49	MW
YNJX6Q		28.93	-0.37	-0.88	38.13	-0.58	-1.14	GK
YWJ9JV	*	30.03	0.73	1.70	39.98	1.27	2.52	GK

Interlaboratory Testing Program for Color & Appearance

Report #175
1st Qtr 2016

Analysis 440

60 Degree Gloss - Paint Chips

ASTM Method D 523

WebCode	Data Flag	Sample E161 Lab Mean	Sample E161 Difference from Grand Mean	Sample E161 Comparative Performance Value	Sample E162 Lab Mean	Sample E162 Difference from Grand Mean	Sample E162 Comparative Performance Value	Instr Code
ZAHJG2		30.18	0.88	2.05	39.50	0.80	1.58	GL
ZAK9NJ		28.38	-0.92	-2.16	37.78	-0.93	-1.83	PC
ZF9VG4		29.05	-0.25	-0.58	38.68	-0.03	-0.05	MH
ZMMR8W		29.38	0.08	0.18	39.08	0.37	0.74	GL
ZQ9LZQ		30.08	0.78	1.82	39.50	0.80	1.58	GL

Summary Statistics

	Sample E161	Sample E162
Grand Means	29.30 Gloss Units	38.70 Gloss Units
Stnd Dev Btwn Labs	0.43 Gloss Units	0.51 Gloss Units

Statistics based on 63 of 65 reporting participants

Comments on Assigned Data Flags for Test #440

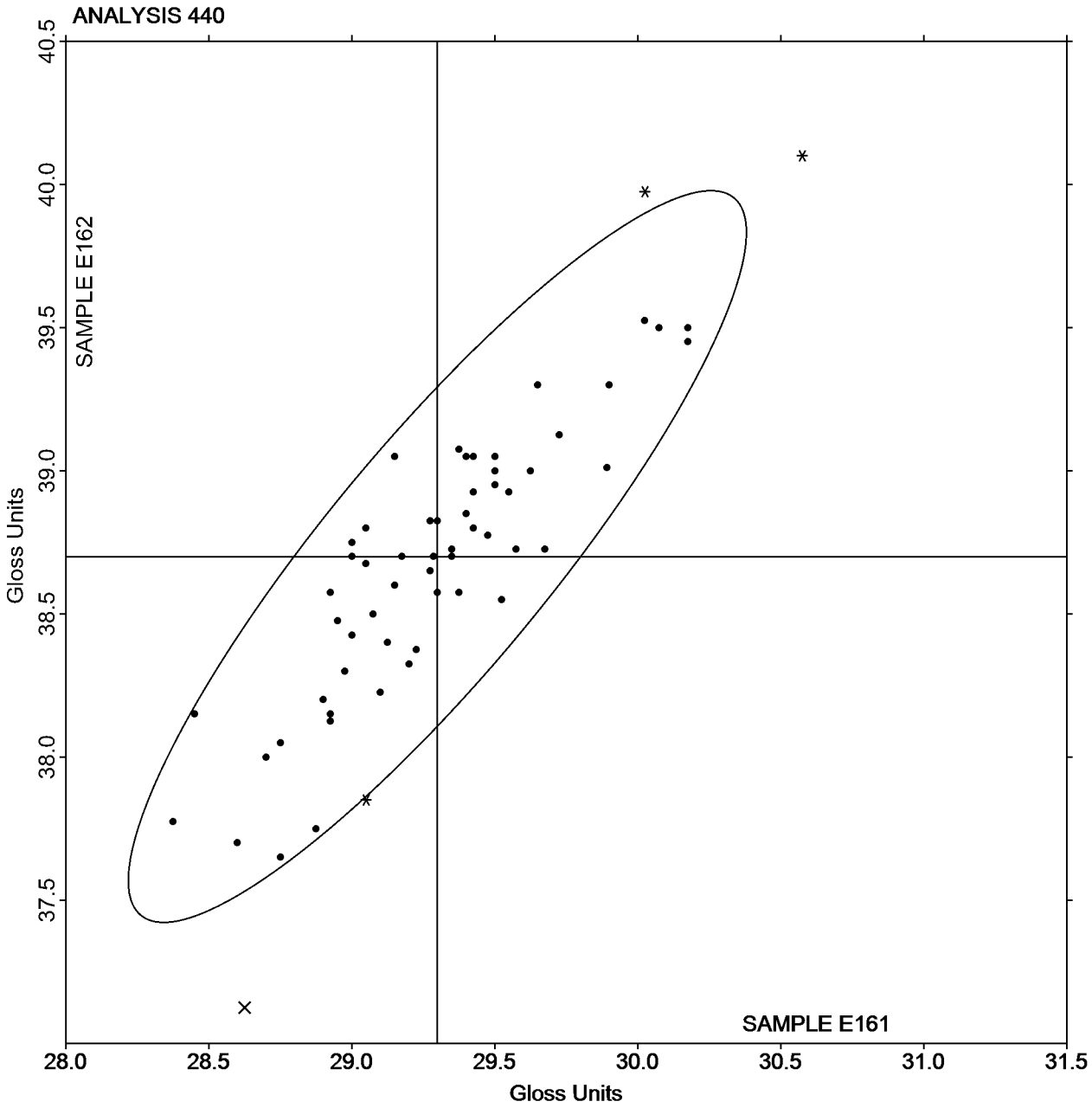
ED9TAE(X) - Inconsitency in testing, data for Sample E162 are low.

MUVWF9(X) - Low data for both samples.

Key to Instrument Codes Reported by Participants

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

SAMPLE E161 = 29.30 Gloss Units SAMPLE E162 = 38.70 Gloss Units



Interlaboratory Testing Program for Color & Appearance

Analysis 442

85 Degree Gloss - Paint Chips

ASTM Method D 523

WebCode	Data Flag	Sample J161 Lab Mean	Sample J161 Difference from Grand Mean	Sample J161 Comparative Performance Value	Sample J162 Lab Mean	Sample J162 Difference from Grand Mean	Sample J162 Comparative Performance Value	Instr Code
38KA2G		10.35	0.07	0.19	14.35	0.08	0.14	GL
6K3J2R		10.40	0.12	0.32	13.60	-0.67	-1.20	GN
BGZTYK		10.57	0.29	0.76	14.68	0.41	0.73	GN
DQ796J		10.55	0.27	0.71	14.85	0.58	1.03	GL
DWR8CJ		10.25	-0.03	-0.07	14.60	0.33	0.58	GL
N9NT86		10.55	0.27	0.71	15.00	0.73	1.30	GN
UNZHK8		10.00	-0.28	-0.72	13.75	-0.52	-0.93	RA
WN9CFX		9.38	-0.90	-2.35	13.48	-0.80	-1.42	GL
XN72YL		10.45	0.17	0.45	14.15	-0.12	-0.22	GL

Summary Statistics

	Sample J161	Sample J162
Grand Means	10.28 Gloss Units	14.27 Gloss Units
Stnd Dev Btwn Labs	0.38 Gloss Units	0.56 Gloss Units

Statistics based on 9 of 9 reporting participants

Key to Instrument Codes Reported by Participants

GL	BYK-Gardner micro-TRI-gloss	GN	BYK-Gardner new micro-TRI-gloss
RA	Rhopoint		

SAMPLE J161 = 10.28 Gloss Units SAMPLE J162 = 14.27 Gloss Units